

Lack of Rybp in Mouse Embryonic Stem Cells Impairs Cardiac Differentiation

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Ring1 and Yy1 Binding Protein (Rybp) has been implicated in transcriptional regulation, apoptotic signaling and as a member of the polycomb repressive complex 1 has important function in regulating pluripotency and differentiation of embryonic stem cells. Earlier, we have proven that Rybp plays essential role in mouse embryonic and central nervous system development. This work identifies Rybp, as a critical regulator of heart development. Rybp is readily detectable in the developing mouse heart from day 8.5 of embryonic development. Prominent Rybp expression persists during all embryonic stages and Rybp marks differentiated cell types of the heart. By utilizing *rybp null* embryonic stem cells (ESCs) in an *in vitro* cardiac differentiation assay we found that *rybp null* ESCs do not form rhythmically beating cardiomyocytes. Gene expression profiles revealed a down-regulation of terminal cardiac and upregulation of germ line specific markers in the *rybp null* cardiomyocytes. Furthermore, transcriptome analysis uncovered a number of novel candidate target genes regulated by Rybp. Among these are several important in cardiac development and contractility such as *Plagl1*, *Isl1*,

Tnnt2. Importantly, forced expression of *rybp* in *rybp* deficient ESCs by a lentiviral vector was able to rescue the mutant phenotype. Our data provides evidence for a previously unrecognized function of Rybp in heart development, and pointing out the importance of germ cell lineage gene silencing during somatic differentiation.

Introduction

A complex network of transcription factors governs the temporal and spatial patterns of gene expression in the organs of the developing embryo proper. Transcription factors also have important roles in postnatal and adult life in maintaining the pattern of differentiated gene expression [1-3]. Ring1 and Yy1 binding protein (Rybp; or also known as Dedaf (Death Effector Domain Associated Factor), UniGene Mm.321633; MGI:1929059) is a repressor protein that is also a member of the mammalian polycomb repressive complex 1 (PRC1) [4]. Rybp first was described as binding partner for the polycomb group protein (PcG) Ring1A (Ring1; ortholog of *Drosophila* dRing/Sce) and also was shown to associate with Ring1B (Ring2/Rnf2; ortholog of *Drosophila* dRing/Sce) and M33 (Pc1; ortholog of *Drosophila* Pc), components of the PRC1 multiprotein complex [5]. Our previous work showed that Rybp is selectively upregulated in distinct structures and cell types of the developing eye and the central nervous system (CNS) and, may also play a role in the development of more mature neurons [6,7]. We have also shown that *rybp* is essential for the development of the mouse embryo proper and that homozygous null mouse embryos cannot develop further implantation (embryonic day 5.5 (E5.5)). Notably, in a subset of heterozygous animals and in *rybp*^{-/-} ↔ *rybp*^{+/+} chimeras, alterations in Rybp dosage induced striking neural tube defects (NTDs) [6,7]. These findings have demonstrated the integral role of Rybp at the early postimplantation and later stage CNS development. At the same time, early embryonic lethality of the *rybp* homozygous null embryos obstructed to the study of the precise role of Rybp at later developmental stages or the development of other organs.

In current study, the early lethal effect of Rybp deficiency was overcome by utilizing *rybp*^{-/-} embryonic stem cells (ESCs) in order to model cardiac differentiation in the lack of Rybp. Our results showed that ESCs lacking functional Rybp are not able to form contractile cardiomyocytes (CMCs) and that Rybp is important for the proper expression of several key regulators of cardiac development. Recent data provides the first evidence that Rybp is required

for the formation of beating CMCs. Thus defines novel role for Rybp in mammalian heart formation and have implications for the understanding of heart diseases.

Materials and Methods

Experimental procedures

All chemicals were purchased from Sigma-Aldrich (St Louis, MO, USA) and all the culture reagents from Invitrogen Life Technologies (Carlsbad, CA, USA), unless otherwise specified.

Cell culture

Mouse R1 [8] (hereafter mentioned as *rybp*^{+/+} or WT ESCs) and *rybp null* [6] (hereafter mentioned as *rybp*^{-/-}) ESCs were thawed on mitomycin C (MitC; MitC; Sigma-Aldrich, St Lake, MO, USA) inactivated mouse embryonic fibroblast (MEF) layer and cultured on gelatin coated tissue culture plates as described [9]. All cells were cultured at 37 °C in humidified atmosphere containing 5% CO₂. ESCs were cultured in ESC medium, consisting of Dulbecco's Modified Eagle's Medium GlutaMaxI, 15% (v/v) ES cell qualified fetal calf serum (FCS, SLI Ltd, West Sussex, UK), 1% (v/v) non-essential amino acids, 1 % (v/v) Pen/Strep, 100 µM 2-mercaptoethanol, 1000 U/ml Leukemia Inhibitory Factor (LIF, ESGRO, Chemicon/Millipore, Billerica, MA, USA). Medium was changed daily on mouse ESC cultures and every 2 days during differentiation.

Expression Vectors

To generate Rybp/Egfp expression construct we modified the original vector of Lois et al. to include a multiple cloning site and an IRES sequence upstream of the Egfp gene [10]. We cloned the Rybp cDNA to the multiple cloning site by Xba1/Nhe1 digest. We also substituted the ubiquitin-C promoter by the promoter of the Elongation Factor-1α (EF1α) gene.

Production of lentiviruses

All recombinant lentiviruses were produced by transient transfection of 293T cells as described by Dull et al [11]. The packaging constructs were obtained through Addgene (ref No: pMD2.G: 12259, pRSV-Rev: 12253, pMDLg/pRRE: 12251). The lentiviral particles were tested on 293T

cells.

Transduction of ESCs

Lentiviral particles were added to ESCs in expansion culture medium (MOI: 3-5) in the presence of 8µg/ml polybrene and were centrifuged for 30min on 1000g at 32 °C. After overnight incubation at 37 °C, the full medium was changed to fresh expansion medium. The cells were assayed 3 days after infection.

Immunoblot analysis of ESCs

Immunoblotting experiments of ESCs were carried out on 50µg protein from whole cell lysates fractionated by SDS-PAGE using secondary antibodies conjugated with HRP (Millipore, AP132P). The intensities of the reactive bands were detected by Bio-Rad Opti-4CN Substrate Kit (170-8235). Anti-Rybp (anti-Dedaf 1:1000, Chemicon, AB3637) was used for the detection of Rybp protein expression.

Immunocytochemistry (ICC)

For immunofluorescence staining of the cells, cells were plated onto 0.1% gelatin-coated coverslips and fixed with 4% paraformaldehyde (PFA) for 15 minutes at room temperature. Cells were permeabilized with 0.05% Triton-X100/PBS for 10 minutes at room temperature, followed by blocking in 1% bovine serum albumin (BSA) for 1 hour at room temperature. Cells were washed with PBS and incubated with primary antibody for overnight at 4 °C. Primary antibodies used for this study include: Oct3/4 antibody (C-10, 1:100, Santa Cruz), anti-Rybp (anti-Dedaf 1:1000, Chemicon, AB3637), cardiac Troponin T antibody (Ms mAb Cardiac Troponin T [1C11] 1:2000, ABCAM, ab8295). After 3 times washing with PBS, cells were labeled with Alexa Fluor®647-conjugated secondary antibodies (Invitrogen, for Oct3/4 antibody and for anti-Rybp) and Alexa Fluor 488 Goat Anti-Mouse IgG (H+L) secondary antibody (1:2000, Invitrogen, A11001) for 1 hour at room temperature. Cells were then washed 3 times with PBS and covered with DAPI mounting medium (VectaShield, Vector Laboratories). Imaging was performed with Olympus CellR Imaging microscope (Olympus Corporation, Japan) and with Olympus LSM confocal microscope (Olympus Corporation, Japan). The captured images of ICCs were semi-quantified using Olympus FluoView software.

Histology and Immunohistochemistry (IHC)

Embryos and adult mouse testis were collected, washed three times in PBS, then fixed with 4% PFA for overnight, embedded in paraffin, and examined for general histological analysis. Serial sections were generated and 4- μ m-thick sections were Hematoxylin & Eosin (H&E) stained for morphology assessment and with anti-Rybp (anti-Dedaf 1:1000, Chemicon, AB3637) for monitoring endogenous Rybp staining. The sections were analyzed and imaged by using Zeiss AxioImager Z1 microscope (Carl Zeiss MicroImaging GmbH, Germany).

mRNA expression analysis

Total cellular RNA was isolated using RNeasy Mini Kit (Qiagen, Hilden, Germany) according to manufacturer's instructions. The RNA prep was DNase treated (Promega), and transcribed by Superscript II cDNA Synthesis Kit (Invitrogen, by Life Technologies, Carlsbad, CA, USA), as per the manufacturer's instructions. Quantitative RT-PCR was performed in SYBR Green JumpStart Taq ReadyMix (S4438) for QPCR green master mix, in Rotor-Gene Q real-time PCR machine (Qiagen, Hilden, Germany). Gapdh was used as an internal control. Experiments were performed in triplicate and repeated three times. See primer sequences in Table S8 (supplementary).

In vitro cardiac differentiation

For cardiac differentiation embryoid bodies (EBs) were generated by Hanging Drop (HD) method as previously described [12]. For single cell suspension, the cells were dissociated from monolayer culture with 0.25% trypsin-EDTA (day 0 (d0)). The cells were counted, and 800 cells/20 μ l differentiation medium (ESC medium without LIF) were pipetted on the lid of a bacterial Petri-dish. The dish was filled with PBS to prevent the droplets to dry out. The cells were allowed to aggregate with the help of gravity by reversing the Petri-dish lid. On day 2, individual EBs were plated into a well of a 24-well plate containing 0.1% gelatin coated coverslips. Differentiation medium was changed every second day, the number of CMCs was continuously observed and recorded. The CMCs were further processed as required (e.g. *monitoring $[Ca^{2+}]$ transient and cell contraction or mRNA expression analysis*) or fixed on day 7 (d7), day 14 (d14) and day 21 (d21) for immunocytochemistry (ICC).

Quantification of beating activity of EBs

Quantification of beating activity of EBs were performed as previously described [13,14]. In brief: the number of spontaneously beating clusters was recorded daily after plating EBs under a Nikon TMS inverted light microscope (Nikon Instruments, Inc., Melville, NY). The number of beating EBs was represented as the percentage of the total plated EBs. The cardiac beatings were further evaluated by grading of cardiac beating (area of cardiac beating and beating rate) as described earlier [13,14]. The results represent the mean \pm SEM of three independent experiments. Statistical analyses for comparison of the percentage of the EB beating and the grading of EB beating between groups were conducted using a one-way ANOVA of SPSS Statistics version 18.0.

Monitoring $[Ca^{2+}]_i$ transient and cell contraction

Cardiomyocytes were loaded with 5 μ M Fluo-4 (Molecular Probes Inc.), in DMSO+20% pluronic acid F-127 (Sigma) in differentiation medium for 40 minutes in dark at room temperature. Subsequently, myocytes were washed two times with normal Tyrode's solution and placed on the stage of an inverted fluorescent microscope (Eclipse TE2000, Nikon, Japan). The Tyrode's solution contained (in mM): 144 NaCl, 0.4 NaH₂PO₄, 4 KCl, 0.53 MgSO₄, 1.8 CaCl₂, 5.5 glucose and 5 HEPES, pH 7.4 with NaOH. Fluo-4 was excited at 480 nm fluorescence emission was recorded at 535nm by using appropriate filter sets (Chroma Technology, USA). Optical signals were recorded by a photon counting photomultiplier module (H7828, Hamamatsu, Japan), and sampled at 1 kHz. Cell contraction was determined by a video edge detection system (VED-105, Crescent Electronics, USA). Measurements were performed and data were analyzed using the WinWCP software (V4.9.1. Whole Cell Electrophysiology Analysis Program, John Dempster, University of Strathclyde). All experiments were performed at room temperature.

Global gene expression analysis by next generation sequencing

Cells from a 6cm culture dish were harvested by resuspending in 500 μ l TRIzol (Invitrogen) and total RNA was extracted with the TRIzol method following the protocol of the manufacturer. RNA was quality controlled by nanodrop and Bioanalyser. High-quality RNA (RIN>9 and

260/230>2; 260/280>1.8) was converted to cDNA and Illumina-compatible sequencing libraries using NUGen Ovation and Encore NGS kits. Barcoded libraries were pooled and sequenced on an Illumina Genome Analyzer GAIIx in single read mode with 80 nt read length. Reads were mapped to the mouse genome using TopHat [15]. Differentially expressed genes between wild-type and *rybp*^{-/-} ESCs were identified with DESeq and filtered for having a fold change >1.5 or <-1.5 and $\text{fdr} < 0.05$. In the case of increasing gene expression the fold change value was calculated by the expression ratio of the *rybp*^{-/-} and the wild-type samples however when the gene expression showed decreasing tendency the negative reciprocal of this quotient was used for the fold change calculation. Significant genes were uploaded to Ingenuity Pathway Analysis (IPA) platform, where functional enrichment studies were executed. The extent of overrepresentation was quantified by the Benjamini-Hochberg corrected significance value calculated by using chi-square test. Gene annotation information was either derived from the knowledge base of IPA or was collected from Ensembl database using BioMart tool.

Results

Rybp is abundantly expressed in the developing mouse heart

To gain further support for the presence of Rybp in different organs besides CNS we examined the distribution of *rybp* mRNAs by Northern blotting analysis using total RNA isolated from multiple mouse tissues. Our results demonstrated that the major 4.7 kb isoform of *rybp* is highly expressed in the heart and also in other mouse tissues (kidney, liver, skin, small intestine, thymus) (Fig. 1A). To confirm that Rybp is also present at the protein level in the developing mouse heart we examined its expression pattern by utilizing anti-Rybp (anti-Dedaf) antibody on embryonic sections. Rybp was shown to be readily detectable in the developing heart from day 8.5 of embryonic development (E8.5) (Fig. 1B). Prominent Rybp expression persisted during all embryonic stages examined and Rybp marked differentiated cell types of the heart suggesting its involvement in heart development and differentiation.

rybp null ESCs do not form rhythmically beating CMCs

Abundant expression of Rybp in the heart prompted us to investigate the role of Rybp in the regulation of cardiac lineage commitment. In order to investigate the function of Rybp during cardiac differentiation we utilized *rybp null* (*rybp*^{-/-}) ESCs lacking functional Rybp protein product [6] (Fig. 1C). *Rybp*^{-/-} ESCs are viable and display typical ES cell morphology when grown on a MEF monolayer, forming round and oval-shaped compact colonies, indistinguishable from those which formed by the wild-type (WT) cells [6] (Fig. 1D). We used the classic HD method to generate EBs as common intermediate during the *in vitro* differentiation of pluripotent stem cells into CMCs (Fig. 2A and Materials and methods). Differentiation in brief, to induce ESC differentiation LIF was withdrawn from the culture medium and cells were kept as hanging drops (HDs) (800 cells/20 μ l) in order to form EBs. Two days later EBs were transferred into suspension culture system. At d4 of differentiation the EBs were placed onto gelatin coated cover slips, one of each cover slips and grew them for another 10 days. We subjected undifferentiated (d0) and differentiated (d8 and d14) cell samples to analysis. Both WT and *rybp*^{-/-} ESCs formed EBs and attached to the gelatin-coated surface of the dishes and WT ESCs formed rhythmically beating CMCs in 6-14 days (Fig. 2B). We found although EBs could be derived from the *rybp null* ESCs but no beating colonies were observed from the mutant cells (Fig. 2B). Out of 400 WT EBs 93% formed beating CMCs when they were allowed to attach on gelatin coated surfaces by the 14th day of differentiation whilst non was beating from the *rybp*^{-/-} genotype. Studies using Fluo-4 Ca²⁺-sensitive dye confirmed that *rybp*^{-/-} CMCs cannot produce intracellular [Ca²⁺] transient, indicating that the defective Ca handling may contribute to the loss of cell shortening (Fig. 2C). Analysis of gross morphology of derived CMCs showed decreased colony size and less cell content in the *rybp null* ESCs then the wild-type at each examined timepoints of *in vitro* cardiac differentiation (Fig. 2D). This suggested that *in vitro* cardiac differentiation was affected by the absence of functional *rybp*.

Ascorbic acid fails to induce contractility of the rybp^{-/-} CMCs

Ascorbic acid (ASC) is a known inducer of cardiac differentiation and robustly enhances cardiac differentiation of even cell lines without spontaneous cardiogenic potential. Therefore we have added ASC supplement in the differentiation medium of the *rybp null* mutant cells in order to test whether their cardiogenic potential can be further increased in the presence of ASC. We

found that ASC was not able to induce the contractility of the *rybp*^{-/-} derivatives any further. However, as a result of the ASC treatment, cell populations from both genotypes grew and form bigger colonies with visibly more cell layers than without ASC (Fig. 2D). This suggested that the *rybp null* mutant cells cannot form beating CMCs either spontaneously or after induction by ASC.

Lack of Rybp affects Isl1, Tnnt2 and Tbx3 expression in CMCs

To gain insights to underlying molecular events we have measured the expression of lineage specific markers in the *rybp*^{-/-} ESCs and compared them to the WT cells. We have also measured marker gene expression during the time course of cardiac differentiation (d2, 4, 8, 10, 14) in both genotypes. Analysis revealed no significant changes in gene expression level of the key pluripotency genes (Rex1, Oct4, Nanog) (Fig. 3) and pan-mesodermal markers (T/Bra, Gsc) (Fig. 3). The expression of all examined pluripotency markers were progressively downregulated in both cell populations by differentiation. This suggested that silencing of pluripotency gene expression was properly executed in the *rybp*^{-/-} cells as well. Importantly, further gene expression analysis revealed down-regulation of the terminal cardiogenic marker cardiac troponinT (Tnnt2) in the mutants suggesting that cardiac lineage commitment was impaired in the *rybp*^{-/-} cells. By examining the earlier steps of cardiac lineage commitment (Isl1, Gata4, Gata6 expression) we found no significant differences in the expression of Gata4 and Gata6 expression (Fig. 3) whilst Isl1 expression was impaired in the mutants (near 6x more in the WT cells) (Fig. 3). Isl1 is a homeobox transcription factor and an essential regulator of cardiac progenitor differentiation. Rybp may function as member of PRC1 [4,16] and regulate the expression of homeobox-type transcription factors during heart development. Therefore we have also examined whether the expressions of the T-box (homeobox-type) cardiac transcription factors (Tbx3, Tbx5) were changed. CMCs lacking *rybp* showed more than two fold increase in Tbx3 expression compared to WT (Fig. 3) however the level of Tbx5 did not change significantly. Together, the data suggested that while expression of pluripotency genes was commonly downregulated, differentiation-driven activation of some cardiac transcription factors, like the homeobox-type Isl1 and Tbx3, is different between cells expressing and those lacking Rybp.

Polycomb repressive complex 2 (PRC2) regulates the balance between self-renewal and differentiation of ESCs. Therefore we have examined whether loss of *rybp* results the altered expression of PRC2 members. Our data showed no significant alterations in PcG expression levels, including Ezh2, Eed and also PRC2 regulator Jmj. This suggests that lack of *rybp* (Fig. 3) has no significant influence on the expression level of the PRC2 members. These results also showed that Rybp is necessary for the proper execution of CMC differentiation.

Transcriptome analysis reveals a spectrum of genes with altered expression profile in the rybp null ESCs and CMCs

To examine possible gene expression alterations in a broader spectrum and to examine which signaling pathways are influenced by the lack of *rybp* we have performed a quantitative comparative transcriptome analysis with Illumina genome analyzer. We have compared the gene expression profile of the undifferentiated *rybp*^{-/-} and WT ESCs (d0). We also performed analysis on differentiated ESCs (d8, d14). D8 represents an earlier and d14 corresponds a later time point of *in vitro* cardiac differentiation and lineage commitment. Using the filtering criteria of a two-or-greater-fold change in expression and a false discovery rate of less than 1%, 53 out of over 20747 transcripts were differentially expressed at undifferentiated stage (d0) (Table 1). At differentiated stage 3%, 716 out of over 23045 transcripts at d8 (early stage) (Table 1) and 3.5%, 768 out of over 21982 transcripts at d14 (late stage) (Table 1). Under these conditions, there were 25 transcripts with increased expression in the *rybp null* ESCs (d0), while 30 transcripts showed decreased expression (Table S1 and S2). There were 393 transcripts with increased expression in the *rybp null* ESCs at d8, while 325 transcripts showed decreased expression (Table S1 and S2). At d14 of cardiac differentiation 478 transcripts showed increased and 292 showed decreased expression (Table S1 and S2). To identify the biological processes in which genes transcriptionally affected in *rybp*^{-/-} ESCs are involved, we performed gene function enrichment analysis using IPA knowledge base. At undifferentiated stage (d0) ESCs the most striking effect we recorded in genes critical for germ development. The transcriptome analysis revealed that genes critical for germ development were de-repressed in comparison to the WT ESCs (e.g. *Tex11*, *Tex13*, *Piwi2*, *Dazl*, *Rnf17*) (Table S1 and S2). These genes are involved in early stage of spermatogenesis and are also expressed in primordial germ cells (PGC).

Immunostaining of adult testis confirmed that Rybp is localized in spermatogonia and weak staining of spermatocytes, but was not visible in spermatids or Sertoli or Leydig cells (Fig. S1). The transcriptome analysis of d8 and d14 differentiated cells showed that other genes, involved in later stage of sperm development are also de-repressed (e.g. Ddx4, Mael, Syce1, Sycp3). The IPA analysis revealed a significant enrichment in different Gene Ontology (GO) Biological Process categories, such as apoptosis (d8: Table S3; d14 Table S4) in which *rybp* is already known to be involved [17,18]. This observation suggests that *rybp* deficiency has an effect on the transcriptome in ESCs, which is consistent with the data obtained.

Altered expression level of genes important for cardiovascular system development and function in the rybp deficient CMCs

To better understand the precise role of *rybp* in heart development we conducted functional enrichment assay using IPA. The IPA analyses revealed that several cardiovascular related gene sets can be found among of most overrepresented physiological functions in the *rybp* deficient samples during cardiac differentiation (d8: Fig. 4A, day14: Fig. 4B). Genes of this functional category with significantly different expression in WT and *rybp*^{-/-} ESCs are listed in Table S5 (d8) and Table S6 (d14). Given these data, which provided additional evidence that absence of *rybp* has an effect on the transcriptome in ESCs and CMCs, we further analyzed the data obtained by DNA-seq and searched for genes expressed in the heart and for genes already known to have cardiac phenotype in mouse models. One of the most downregulated genes expressed during cardiac differentiation is *Plagl1* (**d0**: FC= -13.86, padj=2.3x10⁻⁵; **d8**: FC= -76.79, padj=3.44x10⁻⁷⁷; **d14**: FC= -92.91, padj=2.68x10⁻⁷⁹; Table S2). *Plagl1* is an essential factor for cardiac morphogenesis and highly expressed in mouse hearts from E8.5 to adulthood in a chamber-restricted pattern. In the *rybp null* ESCs *Plagl1* is nearly absent at all timepoints of cardiac differentiation. On the contrary, one of the most upregulated gene during cardiac differentiation was *Tbx3* (**d0**: FC= 4.63, padj=5.95x10⁻³; **d8**: FC= 3.07, padj=5.53x10⁻⁷; **d14**: FC= 3.53, padj=2.11x10⁻⁶ Table S1) which is required for pacemaker and conduction system development in the mammalian heart. *Tbx3* was present nearly 5x higher in the *rybp* mutants ESCs compared to the WT (d0) and was induced nearly 4x and 5x more in CMCs during cardiac differentiation. *Six1*, which functions in cardiac progenitor cells but is stably silenced

upon cardiac differentiation was also under-represented in the *rybp null* ESCs (d0) and CMCs (d8; d14) (**d0**: FC= 75.00, padj=1.74x10⁻²; **d8**: FC= -5.23, padj=5.73x10⁻¹; **d14**: FC=-2.45, padj=9.48x10⁻¹) [19]. Our DNA-Seq data indicates that key cardiac differentiation pathways are impaired in the *rybp null* cells. This suggested that altered Rybp dosage led to the improper execution of the cardiac developmental program.

Rybp deficient ESCs do not express structural genes essential for contractility of matured CMSc

The observation that *rybp*^{-/-} CMCs can not for rhythmically beating CMCs motivated us to perform gene function enrichment analysis using IPA knowledge base and examine the expression level of genes important for CMC contractility. IPA analysis revealed that *rybp*^{-/-} CMCs have an almost complete lack of organized myofibrils and Z-line genes (e.g. Actn1, Myh6, Myh7, Myl2, Myl3, Myl4, Myod, Myom1, Tnn1, Tnn2, Tnn3) when compared with normal WT CMCs (Table S7). Among these genes, Tnnt2 is a key component of the troponin complex in CMCs. It has a regulatory role in CMC contraction by anchoring troponinI and troponinC, to tropomyosin on the thin filaments in the sarcomeres and also confers a Ca²⁺-dependence on sarcomere contraction. Since the *rybp*^{-/-} CMCs exhibit deficiency in terminal differentiation marker Tnnt2 mRNA induction we analysed the spatial distribution of the Tnnt2 protein product as well (Fig. 4C). Immunostaining of late stage CMCs (d21) confirmed that cardiac Tnnt2 is localized in the cytoplasm and exhibits strong staining in the wild type CMCs and its presence is less prominent in the *rybp*^{-/-} cells (Fig. 4C, Fig. 4D). These data demonstrate that the absence of Rybp interferes with the normal expression of structural genes important for contractility and it may have an important role in regulating CMC contraction and heartbeat.

*Rybp deficient ESCs can be partially rescued by ectopic *rybp**

Having shown that lack of *rybp* led to an impaired differentiation and interferes with CMC contractility, we assessed whether ectopic expression of Rybp might rescue the cardiac phenotype (no rhythmically contracting CMCs, impaired cardiac gene expression profile) of the *rybp*^{-/-} cells. We have postulated that by re-introducing *rybp* with a lentiviral expression vector

(rescued cells; *rybp*^{Res}) we can possibly induce contraction and restore the gene expression profile in the rescued cells (Fig. 2C).

We re-introduced the *rybp* cDNA in the *rybp*^{-/-} ESCs by lentiviral expression system (Fig. 5A). To this purpose, we generated stable ESC clones expressing the HA-tagged *rybp* cDNA in *rybp*^{-/-} ESCs (*rybp*^{Res} ESC lines) and tested for Rybp expression by IHC (Fig. 5D) and Western blotting (Fig. 5B). Lower Rybp expression was detected in the *rybp*^{Res} lines compared to WT ESCs by Western blot analysis. In order to see whether this lower protein expression was due to the insufficiency of our lentiviral expression system, we performed quantitative RT-PCR analysis of *rybp* mRNA in the *rybp*^{Res} lines. We found 10-15 times higher expression of *rybp* mRNA in the *rybp*^{Res} lines compared to WT ESCs (Fig. 5C).

To determine whether this level of Rybp was functional, both *rybp*^{-/-} and two independent rescued ESC lines (*rybp*^{Res1}; *rybp*^{Res2}) were allowed to differentiate towards CMCs. As the results showed, increased spontaneous beating activity in 20-25% of the rescued CMCs (*rybp*^{Res1}; *rybp*^{Res2}) was observed (Fig. 5E). Microscopic observations revealed an increased cellularity in the *rybp*^{Res} clones compared to the parental *rybp*^{-/-} cells (Fig. 5F). Molecular analysis of the gene expression profile confirmed that ectopic Rybp was able to partially rescue the cardiac defect: *Isl1*, *Tnnt3*, *Myh6* expression were partially restored (Fig. 5G). Furthermore, germ line-specific *Tex11*, *Ddx4* and *Piwil2* expression were downregulated in *rybp*^{Res} lines suggesting that Rybp is a repressor of germ specific genes and absence of Rybp leads to activation of these promoters. This experiment also showed that normal dosage of Rybp is required for both activation (some of the cardiac) and repression (germ specific) of target genes.

Discussion

We have previously shown that correct dose of Rybp required for maintaining the appropriate spatiotemporal expression pattern and levels of Rybp for proper CNS development thereby providing an *in vivo* mouse model of neural tube defects (NTDs) [6]. In the present study, we provided evidence for the expression of Rybp during mouse heart development and analysed the consequences of the loss of *rybp* on *in vitro* cardiac differentiation. We found that homozygous *rybp* deficient ESCs formed cell clusters but were not able to differentiate into rhythmically beating CMCs *in vitro*, suggesting the requirement of *rybp* for proper cardiac differentiation and

contractility. Gene expression analysis of undifferentiated ESCs and CMCs during cardiac differentiation demonstrated upregulation (Tbx3) and downregulation of several transcription factors (Isl1, Plagl1) and structural myofibril proteins (Actn1, Myh6, Myh7, Myl2, Myl3, Myl4, Myocd, Myom1, Tnn1, Tnn2, Tnn3) critical for heart development.

Aiming to find the causatives of the observed phenotype, we have analysed whether alteration in pluripotency, or key developmental and cardiac gene expression is responsible for the impairment. One possible explanation for the impaired cardiac differentiation of the mutants is that pluripotency gene silencing is incomplete during differentiation, which may cause impaired differentiation. First we analysed the key pluripotency gene (e.g. Rex1, Oct4, Nanog) expression levels and we concluded that there were no significant changes in the kinetics of pluripotency gene expression between the two cell population (*rybp*^{-/-} vs. *rybp*^{+/+}). We concluded that proper silencing of pluripotency genes shows the expected kinetics thus cannot be the causative of the observed differentiation defect.

Second, since the mammalian heart essentially has a mesodermal origin, we have tested whether mesoderm is properly formed in the *rybp* mutant cells. We did not find difference in the expression pattern of pan-mesodermal marker Bra/T, which as expected was nearly absent in the undifferentiated ESCs and transiently expressed during EB formation peaking at d4. Gsc, which is another marker of early mesodermal lineage commitment, exhibited normal expression pattern in the *rybp* mutants as well. Notably, the level of Gsc transcripts was three-folds higher in the undifferentiated *rybp*^{-/-} than in the wild type ESCs, suggesting that abundant pool of mesodermal precursors are available in the *rybp*^{-/-} cells at the beginning of cardiac differentiation. Taken together, these data showed that silencing of pluripotency gene expression and formation of mesoderm were comparable in both the WT and the *rybp null* mutant cells and that the defect in cardiac differentiation is probably due to later stage causatives. By examining the induction kinetic of several key cardiac transcription factors we have found that induction of Isl1 expression was defective in the *rybp*^{-/-} cells (10x vs. 2x by d8; 12x vs. 5x by d10) (Fig. 3). Isl1 is an essential regulator of cardiac progenitor differentiation and also an important transcriptional factor for the development of the secondary heart field. Thus, one possible explanation for the phenotype is that deficiency in Isl1 expression lead to improper cardiac progenitor cell differentiation and these resulted defects in producing functional CMCs in the *rybp*^{-/-} mutants. It is also worthwhile to note that Isl1 belongs to the family of homeodomain transcriptional

regulators, thus can be a potential target of Rybp by a PcG dependent fashion. PcG proteins regulate homeotic gene expression and are essential for organ development. It has been previously shown that members of the PRC1 and PRC2 complexes have essential roles in early embryonic development, however few of their target genes are known in mammals [20,21]. Some of the PcG proteins were also shown to have essential function in mammalian heart development. A key cardiac regulatory gene, *six1*, which also has altered expression in the *rybp*^{-/-} CMCs, is suppressed by a PcG-mediated mechanism by PRC2 member Ezh2 and Eed in cardiac differentiation [22]. Loss of Ezh2 in cardiac progenitors and in CMCs mediated by early myocardial transcription factor Nkx2.5^{Cre} resulted in lethal heart abnormalities and disrupted CMC gene expression. PRC1 member Rae28 knockout mice displayed cardiac anomalies similar to congenital heart diseases in humans [23]. Rae28 sustains Nkx2.5 expression in CMCs and plays a key role in cardiac lineage commitment [24]. Furthermore, in ES cell-based assays, the loss-of-function of the Rybp binding partner Yy1, resulted in decrease in CMCs, whereas Yy1 gain-of-function enhanced the generation of cardiac cells [25]. As far as the potential role of Rybp in PRC mediated repression is concerned, we still do not have a clear understanding of how Rybp functions as a PRC member or how PcG complexes containing Rybp reach their targets. Rybp is generally considered as a PcG protein and a transcriptional repressor [5,26], so downregulation of downstream targets that results from the absence of *rybp* seems paradoxical. This leads to two alternate possibilities. Either Rybp normally represses factors that would otherwise repress the target genes (absence of a putative repressor results in the down-regulation of downstream targets), or Rybp functions as a transcriptional activator on some genes. In the first case, we would expect that the repressive function of Rybp is typical of a PRC1 complex-dependent regulation. In the second case, activation by Rybp would most likely be independent of PcG proteins although it is also possible that Rybp specifically displaces PRC1 from chromatin and facilitates transcriptional activation this way [27]. By the biochemical characterization of Rybp Containing Multimeric Protein Complexes, much of which should also contain Ring1 or Yy1 proteins, this paradox might be easier to solve.

On the other hand, lack of Rybp did not result significant change in the expression level of some other homeodomain transcription factors. The level of Tbx5, which is an essential gene of mammalian heart development, did not change in our experiments suggesting that Rybp regulates cardiac transcription factors via different regulatory circuits. It has been also reported

that Rybp is functioning as member of the non-canonical PRC1 complex on a broad variety of target genes [4]. Rybp, as a member of the non canonical PRC, has emerging and complex role in the regulation of gene expression, differentiation and development. Furthermore, Rybp defines functionally different PRC1 family complexes thus, preventing the incorporation of other canonical PRC1 subunits, such as Cbx, Scm and Phc. The precise biological functions of these versatile complexes are not known [4]. To clarify whether Rybp is functioning as member of the PRC1 complexes during heart development certainly needs further investigations. Notably, transcriptome analysis did not show any disturbance in PcG protein distribution between the undifferentiated *rybp*^{-/-} and WT ESCs or CMCs (Table S1 and S2). This suggests that the lack of functional Rybp had no significant effect on the expression of the PRC1 and PRC2 members.

Down-regulation of terminal cardiac marker *Tnnt2* in the *rybp*^{-/-} CMCs may indicate the role of Rybp in regulating structural proteins of the functional sarcomer. Lack of *Tnnt2* in mouse models caused early embryonic lethality due to a lack of heartbeats [28]. Our gene expression analysis showed decreased expression of *Tnnt2* in the *rybp null* mutants (approximately 2000x vs. 500x by d8; 3000x vs. 500x by d10 and 3500x vs. 500x by d14) however it was still abundantly expressed even in the *rybp*^{-/-} mutant CMCs (500x) compared to the WT CMCs (Fig. 3). This suggests that perhaps not only the availability but also the functionality of *Tnnt2* is critical for the contraction of the WT CMCs. Members of PRC2 are also required later in heart development, as demonstrated by the conditional TNT-Cre inactivated *Eed* knockout mice. However, *Ezh2* inactivation (another essential member of PRC2), by TNT-Cre did not cause an overt phenotype, likely because of functional redundancy with *Ezh1* [22]. Further experiments need to clarify whether the assembly of functional sarcomeres is impaired in the *rybp* mutants.

Our recent study also showed that the defect in contractility in the *rybp null* CMCs could not be restored by adding ASC to the culture as supplement. ASC has multiple effects on cell proliferation and differentiation, especially of promoting mesenchymal cells towards adipogenesis, osteogenesis, chondrogenesis and myogenesis. ASC is also able to restore the contractile response in patients after heart failure or myocardial infarction [29]. However, in our experiments ASC was not able to restore contractility of the mutant CMCs but increased the cell mass of the *rybp*^{-/-} and *rybp*^{+/+} CMCs. Little is known about the exact effect of ASC, but it has been reported that reactive oxygen species (ROS) regulate the intracellular signal transduction of the β -adrenergic pathway, that is, its receptors, G-proteins and adenylyl cyclase, function in

myocardium [30]. These observations have led to the hypothesis that ROS directly affect myocardial contractile function through alteration of the β -adrenergic pathway. Future experiments need to clarify whether members of the β -adrenergic pathway are defective in the *rybp*^{-/-} CMCs.

Importantly, re-introduction of *rybp* by a lentiviral expression vector in *rybp* deficient ESCs was able to rescue the mutant phenotype and has partially restored contractility of the *rybp*^{-/-} CMCs. The appearance of contracting cells was paralleled by the expression of early (*Isl1*) and late (*Tnni3*) cardiac gene markers, thus suggesting their identity as CMCs.

It is also important to mention that the absence of functional Rybp had significant effect on the cascade members of germ cell development. This is in agreement with the abundant expression of Rybp in the reproductive systems and recent observation of Hisada et al., that Rybp functions as a de-repressor of germ specific genes in pluripotent ESCs [31]. Our transcriptome analysis revealed that abundant expression of germ line specific genes persist during the entire course of *in vitro* cardiac differentiation and their downregulation is impaired. Our experiments demonstrated that abundant germ line specific gene expression persist during the entire time course of cardiac differentiation in the mutants. Therefore, we cannot rule out the possible effect of this abundant germ specific gene expression on the inhibition of normal somatic differentiation (e.g. cardiac), which needs further investigations. Especially, since recent evidence indicates that germ line specific genes (e.g. *vasa* (*Ddx4*), *stella* (*Dppa3*)) also function in other cell types, distinct from the germ line or in facilitating differentiation towards endodermal lineage commitment [32,33]. Both genes, *Ddx4* and *Dppa3* are aberrantly upregulated in our *rybp* deficient ESCs and *Ddx4* is expressed throughout cardiac derived differentiation in *rybp*^{-/-} CMCs. In our experiments forced expression of exogenous Rybp partially restored the repressed state of genes important for normal germ cell development in the *rybp* deficient ESCs. This underlines the function of Rybp in epigenetic regulation at early stage embryonic development [31] and pinpoints the importance of germ line gene silencing during somatic differentiation.

In summary, we demonstrate, for the first time, that the differentiation capacity of ESCs that lack *rybp* towards the cardiogenic cell fate is severely impaired. We find that *rybp null* ESCs are blocked in cardiac differentiation. Finally, we present evidence that Rybp contributes to the contractility of CMCs during stem cell differentiation.

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Author Disclosure Statement

No competing financial interests exist.

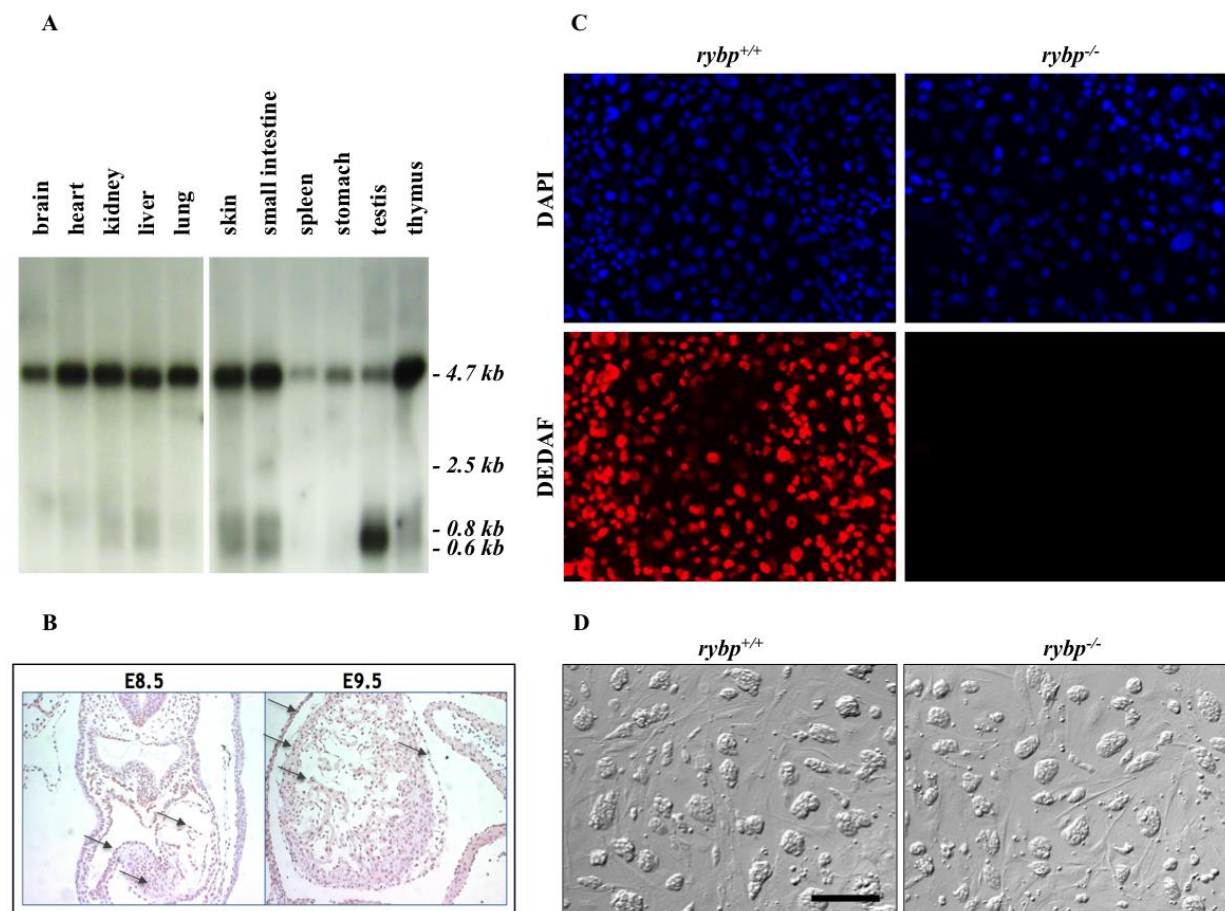
References

1. Davidson EH, Rast JP, Oliveri P, Ransick A, Calestani C, et al. (2002) A genomic regulatory network for development. *Science* 295: 1669-1678.
2. Novershtern N, Subramanian A, Lawton LN, Mak RH, Haining WN, et al. (2011) Densely interconnected transcriptional circuits control cell states in human hematopoiesis. *Cell* 144: 296-309.
3. Odom DT, Zizlsperger N, Gordon DB, Bell GW, Rinaldi NJ, et al. (2004) Control of pancreas and liver gene expression by HNF transcription factors. *Science* 303: 1378-1381.
4. Gao Z, Zhang J, Bonasio R, Strino F, Sawai A, et al. (2012) PCGF homologs, CBX proteins, and RYBP define functionally distinct PRC1 family complexes. *Mol Cell* 45: 344-356.
5. Garcia E, Marcos-Gutierrez C, del Mar Lorente M, Moreno JC, Vidal M (1999) RYBP, a new repressor protein that interacts with components of the mammalian Polycomb complex, and with the transcription factor YY1. *EMBO J* 18: 3404-3418.
6. Pirity MK, Locker J, Schreiber-Agus N (2005) Rybp/DEDAF is required for early postimplantation and for central nervous system development. *Mol Cell Biol* 25: 7193-7202.
7. Pirity MK, Wang WL, Wolf LV, Tamm ER, Schreiber-Agus N, et al. (2007) Rybp, a polycomb complex-associated protein, is required for mouse eye development. *BMC Dev Biol* 7: 39.
8. Nagy A, Rossant J, Nagy R, Abramow-Newerly W, Roder JC (1993) Derivation of completely cell culture-derived mice from early-passage embryonic stem cells. *Proc Natl Acad Sci U S A* 90: 8424-8428.
9. Magin TM, McWhir J, Melton DW (1992) A new mouse embryonic stem cell line with good germ line contribution and gene targeting frequency. *Nucleic Acids Res* 20: 3795-3796.
10. Lois C, Hong EJ, Pease S, Brown EJ, Baltimore D (2002) Germline transmission and tissue-specific expression of transgenes delivered by lentiviral vectors. *Science* 295: 868-872.
11. Dull T, Zufferey R, Kelly M, Mandel RJ, Nguyen M, et al. (1998) A third-generation lentivirus vector with a conditional packaging system. *J Virol* 72: 8463-8471.

12. Klincumhom N, Purity MK, Berzsényi S, Ujhelly O, Muenthaisong S, et al. (2012) Generation of neuronal progenitor cells and neurons from mouse sleeping beauty transposon-generated induced pluripotent stem cells. *Cell Reprogram* 14: 390-397.
13. Rungarunlert S, Klincumhom N, Bock I, Nemes C, Techakumphu M, et al. (2011) Enhanced cardiac differentiation of mouse embryonic stem cells by use of the slow-turning, lateral vessel (STLV) bioreactor. *Biotechnol Lett* 33: 1565-1573.
14. Rungarunlert S, Klincumhom N, Tharasanit T, Techakumphu M, Purity MK, et al. (2013) Slow turning lateral vessel bioreactor improves embryoid body formation and cardiogenic differentiation of mouse embryonic stem cells. *Cell Reprogram* 15: 443-458.
15. Trapnell C, Pachter L, Salzberg SL (2009) TopHat: discovering splice junctions with RNA-Seq. *Bioinformatics* 25: 1105-1111.
16. Morey L, Pascual G, Cozzuto L, Roma G, Wutz A, et al. (2012) Nonoverlapping functions of the Polycomb group Cbx family of proteins in embryonic stem cells. *Cell Stem Cell* 10: 47-62.
17. Zheng L, Schickling O, Peter ME, Lenardo MJ (2001) The death effector domain-associated factor plays distinct regulatory roles in the nucleus and cytoplasm. *J Biol Chem* 276: 31945-31952.
18. Stanton SE, Blanck JK, Locker J, Schreiber-Agus N (2007) Rybp interacts with Hippi and enhances Hippi-mediated apoptosis. *Apoptosis* 12: 2197-2206.
19. Delgado-Olguin P, Huang Y, Li X, Christodoulou D, Seidman CE, et al. (2012) Epigenetic repression of cardiac progenitor gene expression by Ezh2 is required for postnatal cardiac homeostasis. *Nat Genet* 44: 343-347.
20. Boyer LA, Plath K, Zeitlinger J, Brambrink T, Medeiros LA, et al. (2006) Polycomb complexes repress developmental regulators in murine embryonic stem cells. *Nature* 441: 349-353.
21. Simon JA, Kingston RE (2009) Mechanisms of polycomb gene silencing: knowns and unknowns. *Nat Rev Mol Cell Biol* 10: 697-708.
22. He A, Ma Q, Cao J, von Gise A, Zhou P, et al. (2012) Polycomb repressive complex 2 regulates normal development of the mouse heart. *Circ Res* 110: 406-415.

23. Takihara Y, Tomotsune D, Shirai M, Katoh-Fukui Y, Nishii K, et al. (1997) Targeted disruption of the mouse homologue of the *Drosophila* polyhomeotic gene leads to altered anteroposterior patterning and neural crest defects. *Development* 124: 3673-3682.
24. Shirai M, Osugi T, Koga H, Kaji Y, Takimoto E, et al. (2002) The Polycomb-group gene *Rae28* sustains *Nkx2.5/Csx* expression and is essential for cardiac morphogenesis. *J Clin Invest* 110: 177-184.
25. Gregoire S, Karra R, Passer D, Deutsch MA, Krane M, et al. (2013) Essential and unexpected role of *Yin Yang 1* to promote mesodermal cardiac differentiation. *Circ Res* 112: 900-910.
26. Tavares L, Dimitrova E, Oxley D, Webster J, Poot R, et al. (2012) RYBP-PRC1 complexes mediate H2A ubiquitylation at polycomb target sites independently of PRC2 and H3K27me3. *Cell* 148: 664-678.
27. Richly H, Rocha-Viegas L, Ribeiro JD, Demajo S, Gundem G, et al. (2010) Transcriptional activation of polycomb-repressed genes by ZRF1. *Nature* 468: 1124-1128.
28. Nishii K, Morimoto S, Minakami R, Miyano Y, Hashizume K, et al. (2008) Targeted disruption of the cardiac troponin T gene causes sarcomere disassembly and defects in heartbeat within the early mouse embryo. *Dev Biol* 322: 65-73.
29. Shinke T, Shite J, Takaoka H, Hata K, Inoue N, et al. (2007) Vitamin C restores the contractile response to dobutamine and improves myocardial efficiency in patients with heart failure after anterior myocardial infarction. *Am Heart J* 154: 645 e641-648.
30. Choi KM, Seo YK, Yoon HH, Song KY, Kwon SY, et al. (2008) Effect of ascorbic acid on bone marrow-derived mesenchymal stem cell proliferation and differentiation. *J Biosci Bioeng* 105: 586-594.
31. Hisada K, Sanchez C, Endo TA, Endoh M, Roman-Trufero M, et al. (2012) RYBP represses endogenous retroviruses and preimplantation- and germ line-specific genes in mouse embryonic stem cells. *Mol Cell Biol* 32: 1139-1149.
32. Gustafson EA, Wessel GM (2010) *Vasa* genes: emerging roles in the germ line and in multipotent cells. *Bioessays* 32: 626-637.
33. Wongtrakongate P, Jones M, Gokhale PJ, Andrews PW (2013) STELLA facilitates differentiation of germ cell and endodermal lineages of human embryonic stem cells. *PLoS One* 8: e56893.

Figure legends



UjhellyFig1.

Figure 1. Rybp is abundantly expressed in the embryonic and adult mouse heart. (A) Northern blot analysis with *rybp* specific probe identifies a 4.7 kb major transcript in various mouse tissues and a 0.6 kb mRNA transcript expressed abundantly only in testis. Several *rybp* isoforms at lower molecule weight range (0.6-0.8 kb) are also visible in multiple tissues (kidney, liver, skin, small intestine thymus). The smallest molecular weight 0.6 kb isoform is not present in the heart and the brain. A 2.5 kb transcript is only present in the small intestine. (B) Representative examples of immunohistochemistry performed with an anti-Rybp (anti-Dedaf; Chemicon) antibody (brown staining, arrows) on counterstained (purple) sections from early postimplantation developmental stages (E8.5; E9.5) in normal mouse embryos showing Rybp expression in the heart. (C) Immunostaining of wild-type (*rybp*^{+/+}) and *rybp*^{-/-} ESCs for Rybp. ESCs were fixed and immunostained with anti-Dedaf antibody (red) and DAPI (blue). *Rybp null* ESCs are not expressing Rybp. Magnification: 20x. (D) Bright field images of undifferentiated wild-type and *rybp*-null ESC colonies. *Rybp null* ESCs are viable and display typical ES cell morphology. Colonies are composed of small cells attached to each other with high N/C (nucleoplasm/cytoplasm) ratio where a single cytoplasm is not detectable. Based on gross morphology the *rybp*^{-/-} ESCs show the typical mouse ES cell morphology. Cells were grown on MEF layer. Scale bar = 100 μ m.

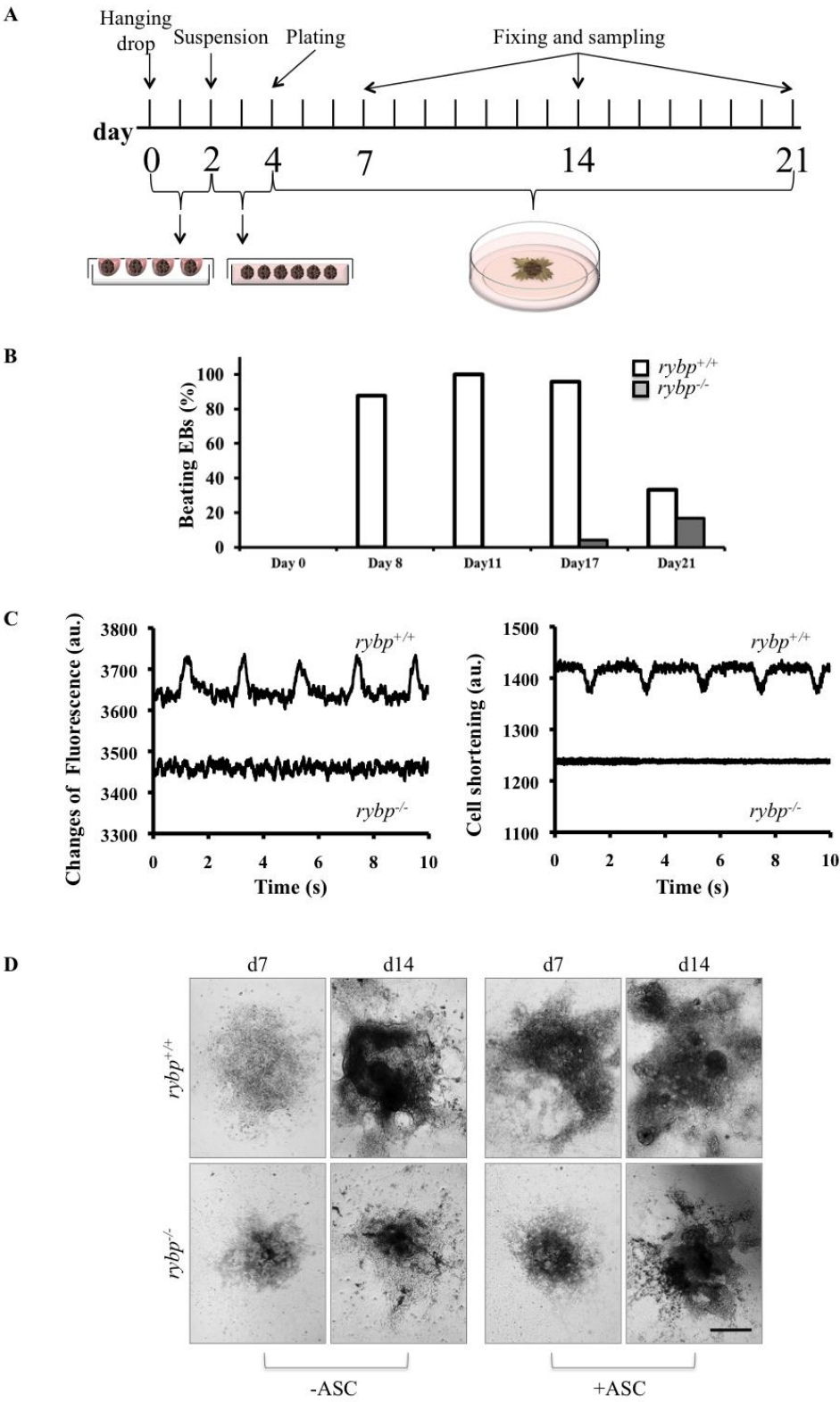
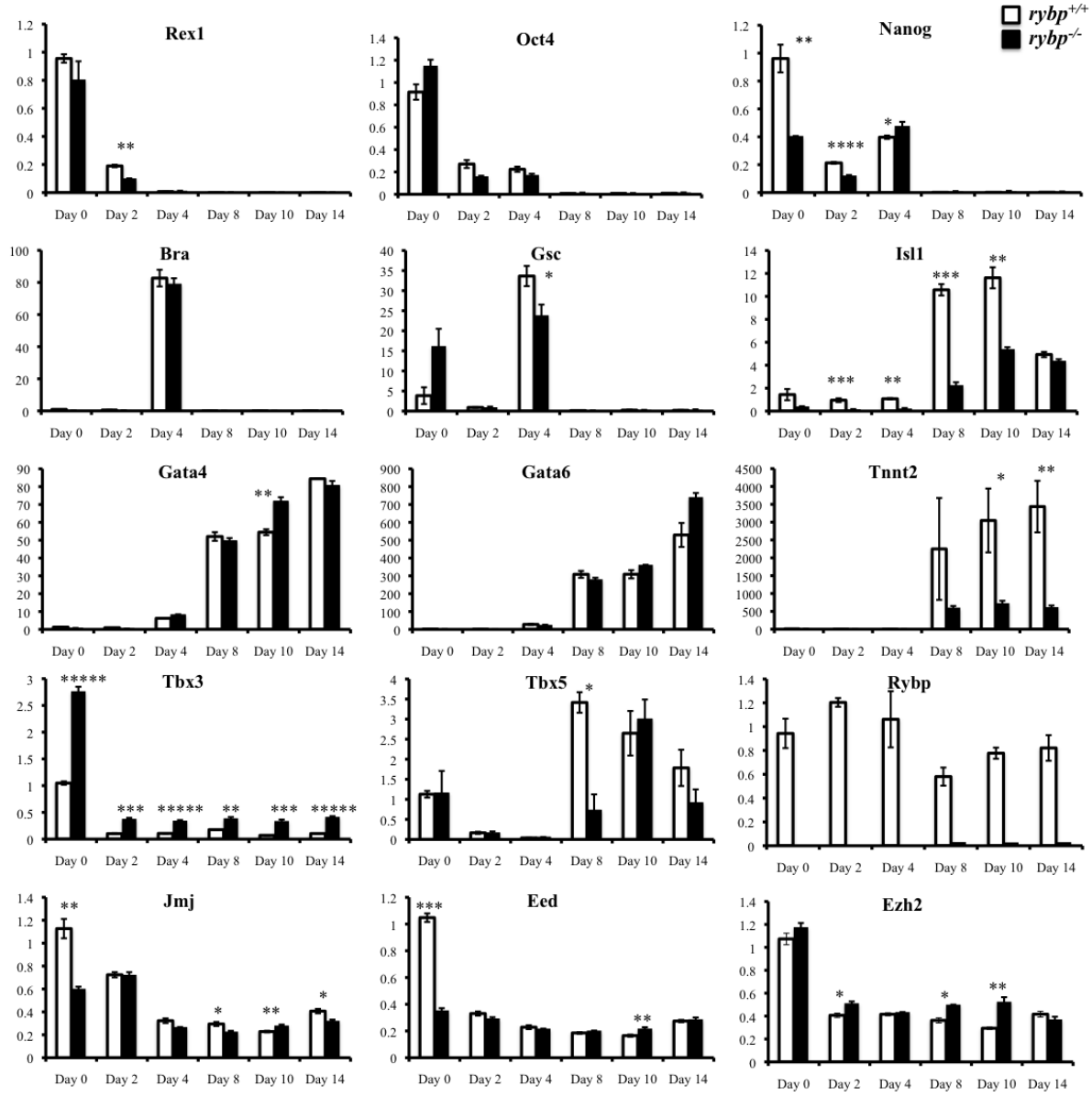
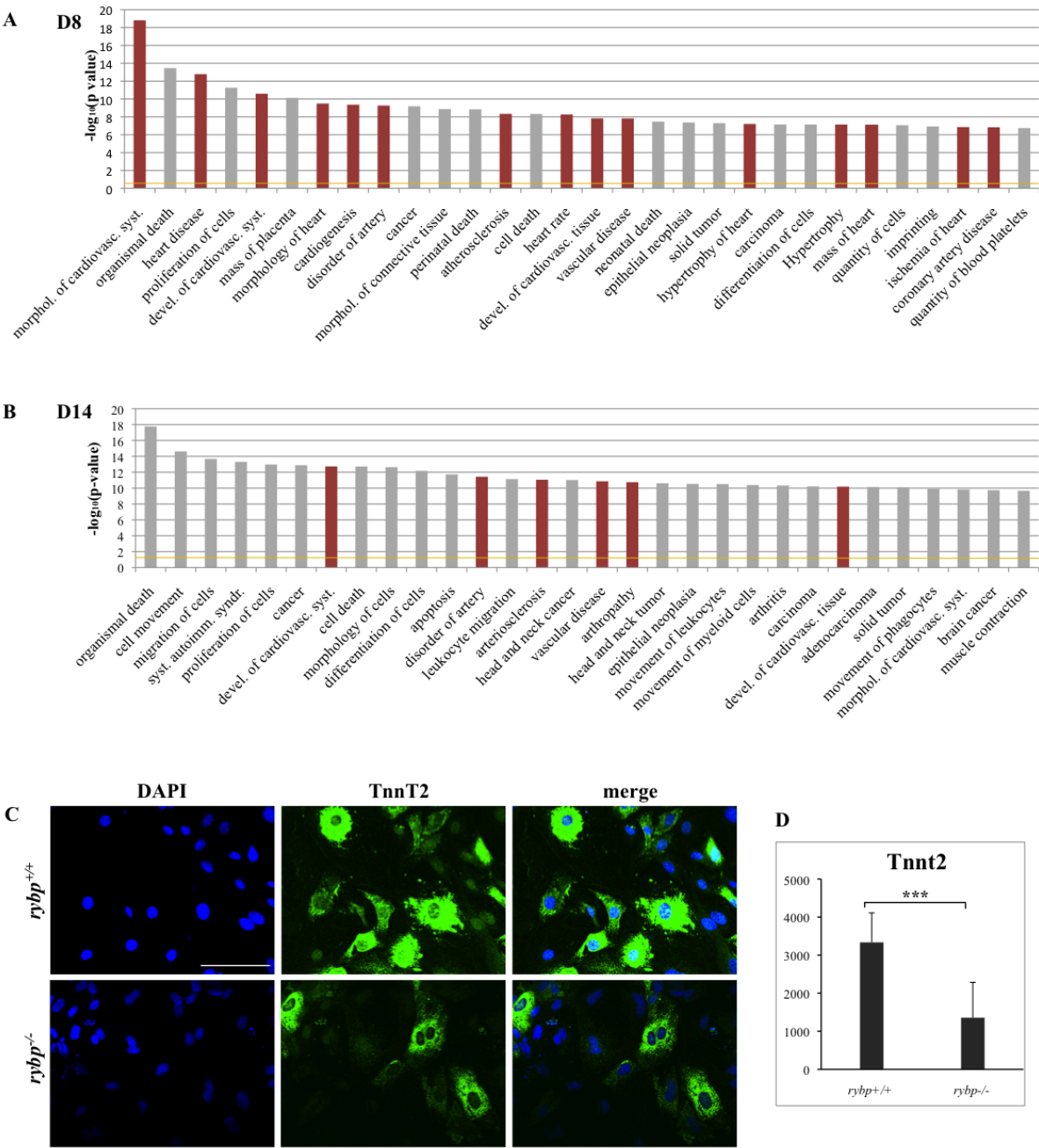


Figure 2. The *rybp*^{+/+} and *rybp*^{-/-} ESC lines show differences in morphology of differentiated CMC colonies and in contractile activity (A) Schematic representation of *in vitro* cardiac differentiation. CMCs were differentiated *in vitro* from ESCs by using Hanging Drop (HD) method. CMC colonies were grown for 21 days and sampled at different time points (e.g, day 0, 7, 14 and 21) as further required. (B) Quantitative analysis of beating CMC colonies derived from *rybp*^{+/+} and *rybp*^{-/-} ESCs. Vertical axis indicates the percentage of beating colonies, horizontal axis shows the days of observation (day 8, 11, 17 and 21). Day 0 corresponds to the undifferentiated ES cell stage (no beating). 93% of *rybp*^{+/+} CMC colonies were beating from day 8 and *rybp*^{-/-} CMC colonies show weak contractile activity only at day 17 (~5%) and at day 21 (~20%). (C) Original recordings from 12 days old beating *rybp*^{+/+} and non-beating *rybp*^{-/-} CMCs derived from mouse ESCs. Left panel shows the changes of intracellular Ca²⁺ concentration as Ca²⁺ dependent fluorescent signal (F535 nm). Right panel shows the corresponding cell shortening. (D) Comparison of *rybp*^{+/+} and *rybp*^{-/-} CMC morphology with and without ASC treatment at day 7 and 14 shows prominent differences. The CMCs derived from WT (*rybp*^{+/+}) ESC line had grown in multiple layer while the mutant (*rybp*^{-/-}) colonies were scattered and thin. CMCs derived from both ESC lines formed larger and more developed colonies with ASC induction.



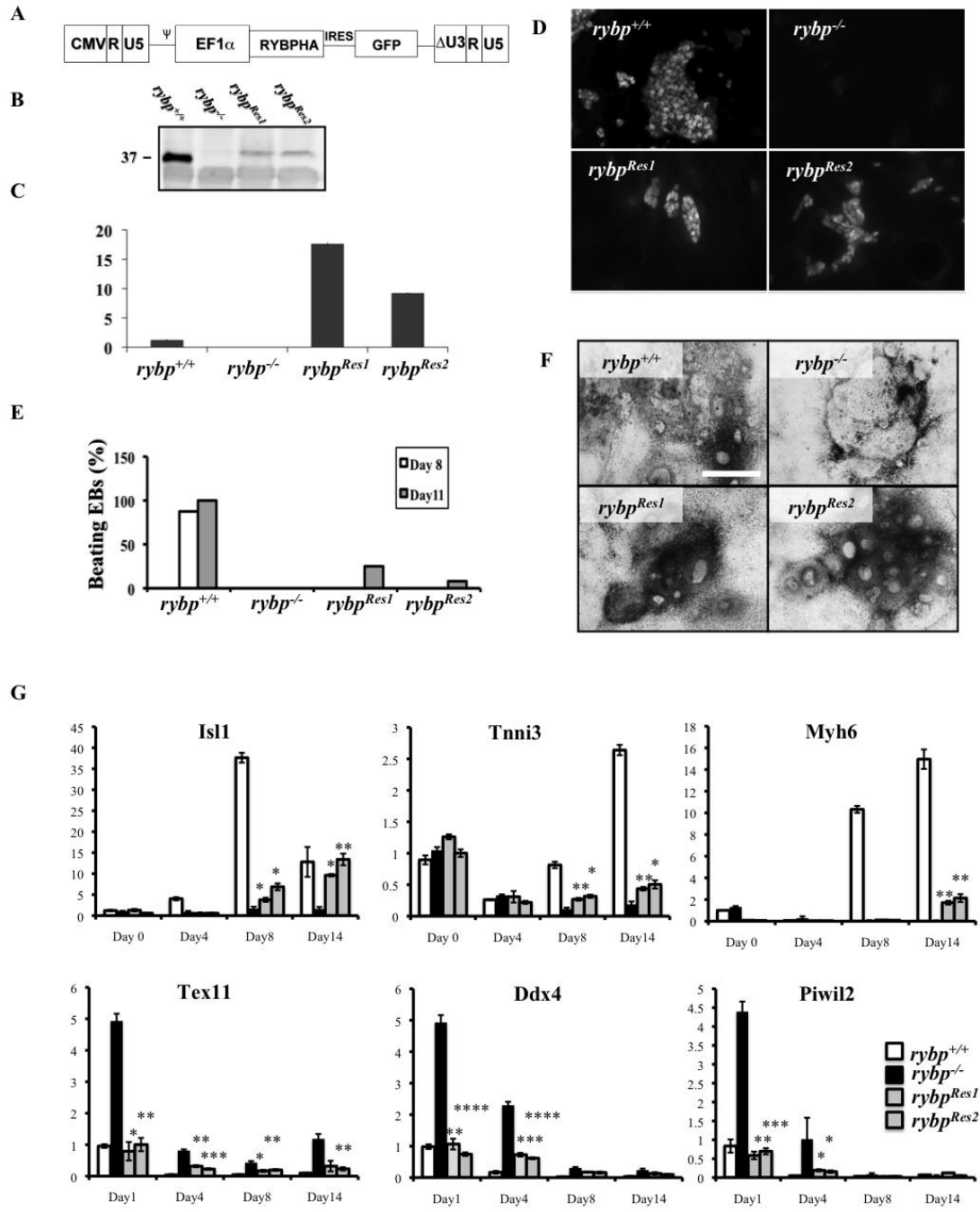
UjhellyFig3.

Figure 3. *rybp* deficient ESCs are impaired in cardiac differentiation and expression of pluripotency (Rex1, Oct4, Nanog), early mesodermal (Bra, Gsc), early cardiac (Isl1, Gata4, Gata6), T-box (Tbx3, Tbx5) and PcG (Jmj, Eed, Ezh2) genes during *in vitro* cardiac differentiation. For quantitative RT-PCR analyses RNA was extracted and reverse-transcribed from differentiated cardiac cells generated from WT and *rybp*^{-/-} ESCs at day 0, 2, 4, 8, 10 and 14 of differentiation and analyzed for expression of marker genes. Gapdh transcripts were amplified as an internal control. The expressions of the indicated markers were relative gene expression changes and were normalized to Gapdh expression. Quantitative RT-PCR was performed with the primers listed in Table S8. Values and means: \pm SD* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.0001$; ***** $p < 0.00001$ (n=5) Statistical method: T test type 3



Ujhelly Fig4.

Figure 4. (A-B) Functional categories overrepresented among genes with significantly different expression in WT and *rybp*^{-/-} ESCs. Vertical axis indicates the negative log₁₀ transformed significance value of the enrichment calculated by Fisher's Exact Test. The horizontal (yellow) line shows the p=0.05 threshold generally accepted as the criteria for the selection of significant enrichments. Panel **A**: samples from day 8. Panel **B**: samples from day 14. **(C)** Immunocytochemical localisation of the cardiac Tnnt2 protein (green) in *rybp*^{+/+} and *rybp*^{-/-} CMCs. Immunofluorescence analysis of cardiomyocytes derived from wild-type (*rybp*^{+/+}) and null mutant (*rybp*^{-/-}) ESCs at day 21 of differentiation using an anti-cardiac troponin T antibody reveals down-regulation of cardiac troponinT (Tnnt2) in the mutants. Scale bar: 100 μm; Objective: 20x. **(D)** Semi-quantification of Tnnt2 levels of panel C by using Olympus FluoView software. Means are standard deviation ± SD. Values of p < 0.05 were accepted as significant (*** p < 0.001). Statistical method: T test type 3.



UjhellyFig5.

Figure 5. Reconstitution of Rybp expression and function in *rybp*^{-/-} ESCs. **(A)** Lentiviral construct used for ectopic expression of Rybp. **(B)** Western blot analysis of WT, *rybp*^{-/-} and two independent rescued ESC lines (*rybp*^{Res1}; *rybp*^{Res2}). Western blot was probed with anti-Dedaf antibody (38 kDa). **(C)** Quantitative RT-PCR analysis of *rybp*^{Res} clones compared to WT cells. **(D)** Immunostaining of WT, *rybp*^{-/-} and *rybp*^{Res} ESC clones for Rybp expression. ESCs were fixed and immunostained with anti-Dedaf antibody. **(E)** Spontaneous beating activity of differentiated WT, *rybp*^{-/-} and rescued ESC lines (*rybp*^{Res1}; *rybp*^{Res2}). Beating of differentiated EBs was counted at day 0, 8 and 11 of differentiation. **(F)** Microscopic analysis of cellularity of differentiated WT, *rybp*^{-/-} and rescued ESC lines (*rybp*^{Res1}; *rybp*^{Res2}). **(G)** Quantitative RT-PCR analysis of cardiac- and germ cell-specific differentiation markers. RNA was extracted and reverse-transcribed from differentiated cardiac cells generated from WT, *rybp*^{-/-} and rescued ESC lines (*rybp*^{Res1}; *rybp*^{Res2}) at day 0, 4, 8, and 14 of differentiation and analyzed for expression of differentiation markers *Isl1*, *Tnni3*, *Myh6*, *Tex11*, *Ddx4* and *Piwil2*. *Gapdh* transcripts were amplified as an internal control. . Values and means: \pm SD* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.0001$; (n=5) Statistical method: T test type 3

Figure S1. Immunohistochemical localisation of WT Rybp protein (brown) in adult mouse testis.

Samples were counterstained (purple) with hematoxylin and eosin.

Table 1. Gene expression changes in *rybp*^{-/-} cells.

Table S1. Upregulated genes in *rybp*^{-/-} cells.

Table S2. Downregulated genes in *rybp*^{-/-} cells.

Table S3. Apoptosis gene set expression changes at d8 CMCs.

Table S4. Apoptosis gene set expression changes at d14 CMCs.

Table S5. Cardiovascular system development/function gene set expression changes at d8 CMCs.

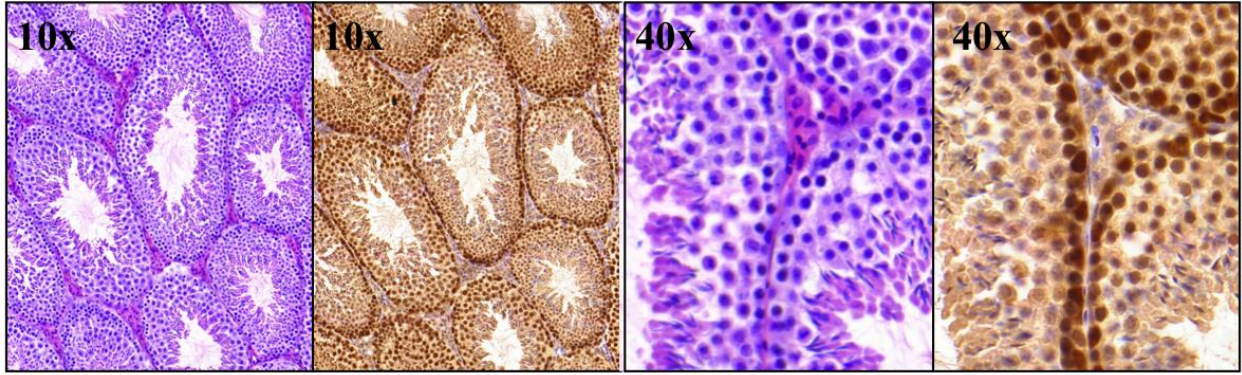
Table S6. Cardiovascular system development/function gene set expression changes at d14 CMCs.

Table S7. Gene expression changes in muscle contractility members at d8 and d14 CMCs.

Table S8. Primers used in this study.

Table 1

	Significant increase	Significant decrease	Genes detected
<i>d0</i>	24	29	20 747
<i>d8</i>	392	324	23 045
<i>d14</i>	477	291	21 982



Ujhelly Fig. S1.

Ujhelly FigS1 Revised

Table S8

Gene	Forward	Reverse
Bra	5'-CTGTGACTGCCTACCAGAATGAGGAG-3'	5'-GGTCGTTTCTTTCTTTGGCATCAAG-3'
Ddx4	5'-ACCAAGATCAGGGGACACAG-3'	5'-TAACCACCTCGACCACTTCC-3'
Eed	5'-GCACAGAGATGAAGTTCTGAGTGCTG-3'	5'-ATAAGACTCCTTAATTGCATTCATCATCCT-3'
Hzh2	5'-TTACTGCTGGCACCGTCTGATGTG-3'	5'-TGTCTGCTTCATCCTGAGAAATAATCTCC-3'
Gapdh	5'-CATGTTCCAGTATGACTCCACTCACG-3'	5'-CCAGTAGACTCCACGACATACTCAGCA-3'
Gata4	5'-CTCTATCACAAGATGAACGGCATCAAC-3'	5'-TCTGGCAGTTGGCACAGGAGAG-3'
Gata6	5'-CTTGCGGGCTCTATATGAAACTCCAT-3'	5'-TAGAAGAAGAGGAAGTAGGAGTCATAGGGACA-3'
Gsc	5'-TCCAGGAGACGAAGTACCCAGACGT-3'	5'-CTCGGCGGTTCTTAACCAGACCT-3'
Isl1	5'-GTCGTTCTTGCTGAAGCCTATGCTG-3'	5'-GGGATGGGAAAACCTACTGTAAAAGAGA-3'
Imj	5'-AGGCGGTAAATGGGCTTCTTGGA-3'	5'-AGCCTGGGCCTTTTCCTCGAC-3'
Myh6	5'-CTACGCCTTCGTCTCTCAGG-3'	5'-AGGCACTATCAGTGGCCAAG-3'
Nanog	5'-CAAGGGTCTGCTACTGAGATGCTCTG-3'	5'-TTTTGTTTGGGACTGGTAGAAGAATCAG-3'
Oct4	5'-CTCCCGAGGAGTCCCAGGACAT-3'	5'-GATGGTGGTCTGGCTGAACACCT-3'
Piwi2	5'-GAGCTTTTGGTCAAGCAAGG-3'	5'-ACCTCATGCTTTTGCATTCC-3'
Rex1	5'-GACAGACTGACCCTAAAGCAAGACGA-3'	5'-GGTATCCGTCAGGGAAGCCATCT-3'
Kybp	5'-AGACCAGCGAAACAAACCAC-3'	5'-GGAGGAGGAGCGAGTCTTTT-3'
Tbx3	5'-CAGCTCACACTGCAGTCCAT-3'	5'-TGGAGACAGCAGGAGAGGAT-3'
Tbx5	5'-TTCAGCACCAAGACCTCAGTG-3'	5'-CACGCCGTGAGTGTAGAGAA-3'
Tbx11	5'-GTTGCTCAAGGGGATTTCAA-3'	5'-TTTATTCGCTTGCTTGCTT-3'
Tnni3	5'-GGTGGACAAAGTGGATGAAGAG-3'	5'-GGTGGGCCGCTTAAACTTG-3'
Tnni2	5'-CTGAGACAGAGGAGGCCAAC-3'	5'-ACCAAGTTGGGCATGAAGAG-3'

Table_S1

d0_increase									
Gene Name	foldChange	padj	Ensembl Gene ID	Description	Chromosome Name	Gene Start (bp)	Strand	Ensembl Protein Family ID(s)	Ensembl Family Description
A2m	Inf	1.62E-03	ENSMUSG00000030111	alpha-2-macroglobulin [Source:MGI Symbol;Acc:MGI:2449119]	6	121636173	1	ENSMF00730001521356	PRECURSOR
Tex13	Inf	9.00E-04	ENSMUSG00000042386	testis expressed gene 13 [Source:MGI Symbol;Acc:MGI:1890544]	X	140808307	-1	ENSMF00260000051441	TESTIS EXPRESSED SEQUENCE
Xlr4a	Inf	4.83E-02	ENSMUSG00000079845	X-linked lymphocyte-regulated 4A [Source:MGI Symbol;Acc:MGI:3574098]	X	73074345	-1	ENSMF00250000008051	X LINKED LYMPHOCYTE REGULATED
Hmgn3	9125.00	1.01E-02	ENSMUSG00000066456	high mobility group nucleosomal binding domain 3 [Source:MGI Symbol;Acc:MGI:2138069]	9	83109948	-1	ENSMF00740001595931	HIGH MOBILITY GROUP NUCLEOSOME BINDING DOMAIN CONTAINING 3
Six1	75.00	1.74E-02	ENSMUSG00000051367	sine oculis-related homeobox 1 [Source:MGI Symbol;Acc:MGI:102780]	12	73040015	-1	ENSMF00730001521336	HOMEBOX SINE OCULIS HOMEBOX HOMOLOG
Car12	52.00	1.42E-02	ENSMUSG00000032373	carbonic anhydrase 12 [Source:MGI Symbol;Acc:MGI:1923709]	9	66713686	1	ENSMF00670001235433	CARBONIC ANHYDRASE PRECURSOR EC_4.2.1.1 CARBONATE DEHYDRATASE CARBONIC ANHYDRASE CA
Tex11	39.50	7.13E-06	ENSMUSG00000009670	testis expressed gene 11 [Source:MGI Symbol;Acc:MGI:1933237]	X	100838648	-1	ENSMF00250000004461	TESTIS EXPRESSED SEQUENCE 11
Dazl	14.07	9.76E-06	ENSMUSG00000010592	deleted in azoospermia-like [Source:MGI Symbol;Acc:MGI:1342328]	17	50279394	-1	ENSMF00650001140038	DELETED IN AZOOSPERMIA DAZ
Gm2022	13.88	3.25E-04	ENSMUSG00000071217	predicted pseudogene 2022 [Source:MGI Symbol;Acc:MGI:3780191]	12	87892834	1		
Gm8300	11.74	5.42E-04	ENSMUSG00000079034	predicted gene 8300 [Source:MGI Symbol;Acc:MGI:3643794]	12	87514316	1	ENSMF00250000002567	EUKARYOTIC TRANSLATION INITIATION FACTOR 1A EIF 1A EUKARYOTIC TRANSLATION INITIATION FACTOR 4C EIF 4C
BB287469	11.24	8.88E-04	ENSMUSG00000079031	expressed sequence BB287469 [Source:MGI Symbol;Acc:MGI:3034635]	12	87816577	1	ENSMF00250000002567	EUKARYOTIC TRANSLATION INITIATION FACTOR 1A EIF 1A EUKARYOTIC TRANSLATION INITIATION FACTOR 4C EIF 4C
Gm5662	11.18	1.13E-04	ENSMUSG00000079029	predicted gene 5662 [Source:MGI Symbol;Acc:MGI:3648257]	12	88270640	-1	ENSMF00250000002567	EUKARYOTIC TRANSLATION INITIATION FACTOR 1A EIF 1A EUKARYOTIC TRANSLATION INITIATION FACTOR 4C EIF 4C
P4ha2	9.71	1.74E-02	ENSMUSG00000018906	procollagen-proline, 2-oxoglutarate 4-dioxygenase (proline 4-hydroxylase), alpha II polypeptide [Source:MGI Symbol;Acc:MGI:894286]	11	54100095	1	ENSMF00250000000707	PROLYL 4 HYDROXYLASE SUBUNIT ALPHA PRECURSOR 4 PH ALPHA EC_1.14.11.2 PROCOLLAGEN PROLINE 2 OXOGLUTARATE 4 DIOXYGENASE SUBUNIT ALPHA
Tex15	9.00	2.72E-03	ENSMUSG00000009628	testis expressed gene 15 [Source:MGI Symbol;Acc:MGI:1934816]	8	33516738	1	ENSMF00250000008242	TESTIS EXPRESSED SEQUENCE 15
Piwi12	8.91	1.37E-02	ENSMUSG00000033644	piwi-like RNA-mediated gene silencing 2 [Source:MGI Symbol;Acc:MGI:1930036]	14	70372480	-1	ENSMF00250000001106	CANCER/TESTIS ANTIGEN 42 CT42
Scml2	8.61	2.76E-02	ENSMUSG00000000037	sex comb on midleg-like 2 (Drosophila) [Source:MGI Symbol;Acc:MGI:1340042]	X	161117193	1	ENSMF00250000001294	PIWI
Zscan4f	8.47	5.36E-05	ENSMUSG00000070828	sex comb on midleg-like 2 (Drosophila) [Source:MGI Symbol;Acc:MGI:1340042]	X	161117193	1	ENSMF00250000001294	SEX COMB ON MIDLEG
Tdrkh	8.43	7.09E-03	ENSMUSG00000041912	zinc finger and SCAN domain containing 4F [Source:MGI Symbol;Acc:MGI:3708485]	7	11397915	1	ENSMF00380000124789	ZINC FINGER AND SCAN DOMAIN CONTAINING 4
Gm2016	8.37	1.49E-04	ENSMUSG00000072905	tudor and KH domain containing protein [Source:MGI Symbol;Acc:MGI:1919884]	3	94413296	1	ENSMF00250000006342	TUDOR AND KH DOMAIN CONTAINING TUDOR DOMAIN CONTAINING 2
				predicted gene 2016 [Source:MGI Symbol;Acc:MGI:3780185]	12	87874072	1	ENSMF00250000002567	EUKARYOTIC TRANSLATION INITIATION FACTOR 1A EIF 1A EUKARYOTIC TRANSLATION INITIATION FACTOR 4C EIF 4C

Stk31	7.57	1.66E-02	ENSMUSG00000023403	serine threonine kinase 31 [Source:MGI Symbol;Acc:MGI:1924735]	6	49395604	1	ENSMF00250000006411	SERINE/THREONINE KINASE 31 EC_2.7.11.1
Zscan4c	7.10	1.62E-03	ENSMUSG00000054272	zinc finger and SCAN domain containing 4C [Source:MGI Symbol;Acc:MGI:2685243]	7	11005722	1	ENSMF00380000124789	ZINC FINGER AND SCAN DOMAIN CONTAINING 4
Fam213a	6.56	3.39E-03	ENSMUSG000000021792	family with sequence similarity 213, member A [Source:MGI Symbol;Acc:MGI:1917814]	14	40993740	-1	ENSMF00250000005616	REDOX REGULATORY FAM213A PEROXIREDOXIN 2 ACTIVATED IN M CSF STIMULATED MONOCYTES PAMM
Mov10i1	6.09	1.74E-02	ENSMUSG000000015365	Moloney leukemia virus 10-like 1 [Source:MGI Symbol;Acc:MGI:1891384]	15	88982909	1	ENSMF00250000001745	HELICASE EC_3.6.4.13 MOLONEY LEUKEMIA VIRUS 10
Tbx3	4.63	5.96E-03	ENSMUSG000000018604	T-box 3 [Source:MGI Symbol;Acc:MGI:98495]	5	119670669	1	ENSMF00730001521675	T BOX TRANSCRIPTION FACTOR T BOX
d8_increase									
Gene Name	foldChange	padj	Ensembl Gene ID	Description	Chromosome Name	Gene Start (bp)	Strand	Ensembl Protein Family ID(s)	Ensembl Family Description
Tex11	Inf	3.60E-13	ENSMUSG000000009670	testis expressed gene 11 [Source:MGI Symbol;Acc:MGI:1933237]	X	100838648	-1	ENSMF00250000004461	TESTIS EXPRESSED SEQUENCE 11
Ddx4	Inf	7.27E-22	ENSMUSG000000021758	DEAD (Asp-Glu-Ala-Asp) box polypeptide 4 [Source:MGI Symbol;Acc:MGI:102670]	13	112598333	-1	ENSMF00730001521481	PROBABLE ATP DEPENDENT RNA HELICASE DDX4 EC_3.6.4.13 DEAD BOX 4 VASA HOMOLOG
Dydc1	Inf	2.17E-05	ENSMUSG000000021790	DPY30 domain containing 1 [Source:MGI Symbol;Acc:MGI:1916746]	14	41072911	1	ENSMF00500000276292	DPY30 DOMAIN CONTAINING 1
Prph	Inf	4.09E-02	ENSMUSG000000023484	peripherin [Source:MGI Symbol;Acc:MGI:97774]	15	99055174	1	ENSMF00730001521291	VIMENTIN
Barhl1	Inf	4.70E-02	ENSMUSG000000026805	BarH-like 1 (Drosophila) [Source:MGI Symbol;Acc:MGI:1859288]	2	28907679	-1	ENSMF00500000270620	BARH HOMEODOMAIN HOMEOBOX CONNECTOR ENHANCER OF KINASE SUPPRESSOR OF RAS 1 CONNECTOR ENHANCER OF KSR 1 CNK1 HCNK1 CONNECTOR ENHANCER OF KSR
Cnksr1	Inf	4.34E-02	ENSMUSG000000028841	connector enhancer of kinase suppressor of Ras 1 [Source:MGI Symbol;Acc:MGI:2670958]	4	134228041	-1	ENSMF00500000272606	ENHANCER OF KSR 1 CNK1 HCNK1 CONNECTOR ENHANCER OF KSR
2210406010 Rik	Inf	3.03E-02	ENSMUSG000000039563	RIKEN cDNA 2210406010 gene [Source:MGI Symbol;Acc:MGI:1923960]	5	36447611	-1		
Mael	Inf	1.45E-18	ENSMUSG000000040629	maelstrom homolog (Drosophila) [Source:MGI Symbol;Acc:MGI:2138453]	1	166201385	-1	ENSMF00250000010002	MAELSTROM HOMOLOG
Tex13	Inf	1.05E-09	ENSMUSG000000042386	testis expressed gene 13 [Source:MGI Symbol;Acc:MGI:1890544]	X	140808307	-1	ENSMF00260000051441	TESTIS EXPRESSED SEQUENCE
4932442L08 Rik	Inf	7.93E-03	ENSMUSG000000043549	RIKEN cDNA 4932442L08 gene [Source:MGI Symbol;Acc:MGI:1921682]	X	94355053	-1	ENSMF00500000287930	AMBIGUOUS
Slc16a5	Inf	1.76E-02	ENSMUSG000000045775	solute carrier family 16 (monocarboxylic acid transporters), member 5 [Source:MGI Symbol;Acc:MGI:2443515]	11	115462474	1	ENSMF00730001521446	MONOCARBOXYLATE TRANSPORTER MCT SOLUTE CARRIER FAMILY 16 MEMBER
Fgfbp1	Inf	4.60E-02	ENSMUSG000000048373	fibroblast growth factor binding protein 1 [Source:MGI Symbol;Acc:MGI:1096350]	5	43978865	-1	ENSMF00500000274600	FIBROBLAST GROWTH FACTOR BINDING 1 PRECURSOR FGF BP FGF BP1 FGF BINDING 1 FGFBP 1
Ldoc1	Inf	6.52E-12	ENSMUSG000000057615	leucine zipper, down-regulated in cancer 1 [Source:MGI Symbol;Acc:MGI:2685212]	X	61709614	1	ENSMF00500000275348	LDOC1
Zfp36i3	Inf	4.51E-02	ENSMUSG000000059334	zinc finger protein 36, C3H type-like 3 [Source:MGI Symbol;Acc:MGI:3525151]	X	53772686	-1	ENSMF00730001525417	ZINC FINGER 36 TYPE 3
Pak6	Inf	3.43E-02	ENSMUSG000000074923	p21 protein (Cdc42/Rac)-activated kinase 6 [Source:MGI Symbol;Acc:MGI:2679420]	2	118663303	1	ENSMF00730001521739	SERINE/THREONINE KINASE PAK EC_2.7.11.1 P21 ACTIVATED KINASE PAK
Gm6083	Inf	4.46E-02	ENSMUSG000000078182	predicted gene 6083 [Source:MGI Symbol;Acc:MGI:3779550]	5	29538153	1		
Tfap2c	76.36	1.49E-54	ENSMUSG000000028640	transcription factor AP-2, gamma [Source:MGI Symbol;Acc:MGI:106032]	2	172549593	1	ENSMF00250000001076	TRANSCRIPTION FACTOR AP 2 AP2 ACTIVATING ENHANCER BINDING 2

Rhox6	69.99	5.98E-29	ENSMUSG00000006200	reproductive homeobox 6 [Source:MGI Symbol;Acc:MGI:1202888]	X	37826910	1	ENSMF00600000923513	HOMEBOX ON X CHROMOSOME
Rhox9	61.87	1.47E-26	ENSMUSG00000068048	reproductive homeobox 9 [Source:MGI Symbol;Acc:MGI:1890128]	X	37899097	-1	ENSMF00600000923513	HOMEBOX ON X CHROMOSOME
Rnf17	58.71	1.87E-42	ENSMUSG00000000365	ring finger protein 17 [Source:MGI Symbol;Acc:MGI:1353419]	14	56402697	1	ENSMF00260000050809	RING FINGER 17
Acsl6	44.86	1.18E-04	ENSMUSG00000020333	acyl-CoA synthetase long-chain family member 6 [Source:MGI Symbol;Acc:MGI:894291]	11	54303798	1	ENSMF00500000269666	LONG CHAIN FATTY ACID COA LIGASE EC_6.2.1.3 LONG CHAIN ACYL COA SYNTHETASE LACS
Elf3	42.65	3.41E-05	ENSMUSG00000003051	E74-like factor 3 [Source:MGI Symbol;Acc:MGI:1101781]	1	135253574	-1	ENSMF00500000272439	ETS RELATED TRANSCRIPTION FACTOR ELF 3 E74 FACTOR 3 EPITHELIAL RESTRICTED WITH SERINE BOX EPITHELIUM RESTRICTED ETS ESX EPITHELIUM SPECIFIC ETS
Stk31	38.75	4.08E-04	ENSMUSG00000023403	serine threonine kinase 31 [Source:MGI Symbol;Acc:MGI:1924735]	6	49395604	1	ENSMF00250000006411	TRANSCRIPTION FACTOR 1 ESE 1 SERINE/THREONINE KINASE 31 EC_2.7.11.1
Syce1	27.79	1.85E-06	ENSMUSG00000025480	synaptonemal complex central element protein 1 [Source:MGI Symbol;Acc:MGI:1921325]	7	140777229	-1	ENSMF00500000272982	SYNAPTONEMAL COMPLEX CENTRAL ELEMENT 1
Fabp3-ps1	23.64	2.86E-02	ENSMUSG00000056366	fatty acid binding protein 3, muscle and heart, pseudogene 1 [Source:MGI Symbol;Acc:MGI:101929]	10	86731754	-1	ENSMF00670001235367	FATTY ACID BINDING PROTEIN TYPE FATTY ACID BINDING FABP FATTY ACID BINDING
Xlr4a	22.37	2.96E-04	ENSMUSG00000079845	X-linked lymphocyte-regulated 4A [Source:MGI Symbol;Acc:MGI:3574098]	X	73074345	-1	ENSMF00250000008051	X LINKED LYMPHOCYTE REGULATED
Sycp3	15.05	6.52E-12	ENSMUSG00000020059	synaptonemal complex protein 3 [Source:MGI Symbol;Acc:MGI:109542]	10	88459569	1	ENSMF00500000271407	SYNAPTONEMAL COMPLEX 3 SCP 3
Gjb2	13.73	2.12E-08	ENSMUSG00000046352	gap junction protein, beta 2 [Source:MGI Symbol;Acc:MGI:95720]	14	57098600	-1	ENSMF00740001589167	GAP JUNCTION BETA CONNEXIN
Tex19.1	13.73	4.75E-23	ENSMUSG00000039329	testis expressed gene 19.1 [Source:MGI Symbol;Acc:MGI:1920929]	11	121146143	1	ENSMF00600000922032	TESTIS EXPRESSED 19 1 TESTIS EXPRESSED 19A TESTIS EXPRESSED SEQUENCE
AU015836	12.99	1.45E-27	ENSMUSG00000081044	expressed sequence AU015836 [Source:MGI Symbol;Acc:MGI:2147954]	X	93968659	1	ENSMF00670001255111	AMBIGUOUS
Abcb1a	12.70	2.51E-02	ENSMUSG00000040584	ATP-binding cassette, sub-family B (MDR/TAP), member 1A [Source:MGI Symbol;Acc:MGI:97570]	5	8660077	1	ENSMF00730001521159	MULTIDRUG RESISTANCE EC_3.6.3.44 ATP BINDING CASSETTE SUB FAMILY B MEMBER P GLYCOPROTEIN
Taf7l	12.58	1.32E-03	ENSMUSG00000009596	TAF7-like RNA polymerase II, TATA box binding protein (TBP)-associated factor [Source:MGI Symbol;Acc:MGI:1921719]	X	134460118	-1	ENSMF00250000002692	TRANSCRIPTION INITIATION FACTOR TFIID SUBUNIT 7 RNA POLYMERASE II ASSOCIATED FACTOR TRANSCRIPTION INITIATION FACTOR TFIID KDA SUBUNIT
Btbd11	12.36	9.27E-04	ENSMUSG00000020042	BTB (POZ) domain containing 11 [Source:MGI Symbol;Acc:MGI:1921257]	10	85386814	1	ENSMF00250000001718	ANKYRIN REPEAT AND BTB/POZ DOMAIN CONTAINING BTBD11 BTB/POZ DOMAIN CONTAINING 11
Syng1	12.08	2.16E-02	ENSMUSG00000022415	synaptogyrin 1 [Source:MGI Symbol;Acc:MGI:1328323]	15	80091334	1	ENSMF00670001235552	SYNAPTOGYRIN
AU015836	12.04	1.69E-12	ENSMUSG00000055936	expressed sequence AU015836 [Source:MGI Symbol;Acc:MGI:2147954]	X	93968682	1	ENSMF00500000271881	MITOCHONDRIAL INTERMEMBRANE SPACE IMPORT AND ASSEMBLY 40 COILED COIL HELIX COILED COIL HELIX DOMAIN CONTAINING 4
Als2cl	11.58	3.55E-04	ENSMUSG00000044037	ALS2 C-terminal like [Source:MGI Symbol;Acc:MGI:2447532]	9	110879870	1	ENSMF00250000002591	ALSN AMYOTROPHIC LATERAL SCLEROSIS 2
Mageb16	11.48	2.22E-11	ENSMUSG00000046942	melanoma antigen family B, 16 [Source:MGI Symbol;Acc:MGI:1919217]	X	79623231	-1	ENSMF00360000109863	MELANOMA ASSOCIATED ANTIGEN CANCER/TESTIS ANTIGEN 1 CT1 MAGE ANTIGEN

Gm4779	11.37	4.97E-02	ENSMUSG00000045010	predicted gene 4779 [Source:MGI Symbol;Acc:MGI:3646776]	X	101790053	-1		
Dppa5a	10.21	5.55E-03	ENSMUSG00000060461	developmental pluripotency associated 5A [Source:MGI Symbol;Acc:MGI:101800]	9	78367052	-1	ENSM00610000953441	DEVELOPMENTAL PLURIPOTENCY ASSOCIATED
Gjb3	10.01	7.90E-05	ENSMUSG00000042367	gap junction protein, beta 3 [Source:MGI Symbol;Acc:MGI:95721]	4	127325235	-1	ENSM00740001589183	GAP JUNCTION BETA CONNEXIN
Esrrb	9.89	1.22E-02	ENSMUSG000000021255	estrogen related receptor, beta [Source:MGI Symbol;Acc:MGI:1346832]	12	86361117	1	ENSM00440000236877	STEROID HORMONE RECEPTOR ESTROGEN RECEPTOR ESTROGEN RELATED RECEPTOR ERR NUCLEAR RECEPTOR SUBFAMILY 3 GROUP B MEMBER
4930506M07Rik	9.68	7.22E-06	ENSMUSG000000041362	RIKEN cDNA 4930506M07 gene [Source:MGI Symbol;Acc:MGI:1918903]	19	58973358	-1	ENSM00250000005645	SHOOTIN 1
Plbd1	9.39	8.24E-03	ENSMUSG00000030214	phospholipase B domain containing 1 [Source:MGI Symbol;Acc:MGI:1914107]	6	136612070	-1	ENSM00600000921313	PHOSPHOLIPASE B PRECURSOR EC_3.1.1.- LAMA LAMINA ANCESTOR HOMOLOG PHOSPHOLIPASE B DOMAIN CONTAINING
4930447C04Rik	9.08	3.02E-23	ENSMUSG000000021098	RIKEN cDNA 4930447C04 gene [Source:MGI Symbol;Acc:MGI:1923051]	12	72881109	-1	ENSM00250000009318	SIX6OS1 SIX6 OPPOSITE STRAND TRANSCRIPT 1
Slc22a3	8.90	4.31E-02	ENSMUSG000000023828	solute carrier family 22 (organic cation transporter), member 3 [Source:MGI Symbol;Acc:MGI:1333817]	17	12419972	-1	ENSM00730001522106	SOLUTE CARRIER FAMILY 22 MEMBER ORGANIC CATION TRANSPORTER
Olfr31	8.84	4.97E-02	ENSMUSG000000072707	olfactory receptor 31 [Source:MGI Symbol;Acc:MGI:109304]	14	14328113	1	ENSM00730001521207	OLFACTORY RECEPTOR OLFACTORY RECEPTOR OR1
Chdh	8.72	2.20E-02	ENSMUSG00000015970	choline dehydrogenase [Source:MGI Symbol;Acc:MGI:1860776]	14	30009023	1	ENSM00750001632424	CHOLINE DEHYDROGENASE MITOCHONDRIAL PRECURSOR CDH CHD EC_1.1.99.1
Miip	8.72	3.52E-02	ENSMUSG000000029022	migration and invasion inhibitory protein [Source:MGI Symbol;Acc:MGI:106506]	4	147860778	-1	ENSM00250000007977	MIGRATION AND INVASION INHIBITORY INVASION INHIBITORY 45 IIP45
Sfmbt2	8.44	1.73E-55	ENSMUSG000000061186	Scm-like with four mbt domains 2 [Source:MGI Symbol;Acc:MGI:2447794]	2	10370510	1	ENSM00260000050568	SCM WITH FOUR MBT DOMAINS
Pramef12	8.33	6.82E-10	ENSMUSG000000028591	PRAME family member 12 [Source:MGI Symbol;Acc:MGI:1924882]	4	144391674	-1	ENSM00250000000393	PRAME FAMILY MEMBER
8030474K03Rik	8.11	3.52E-02	ENSMUSG000000046774	RIKEN cDNA 8030474K03 gene [Source:MGI Symbol;Acc:MGI:2685988]	X	101794656	1	ENSM00500000278298	UNCHARACTERIZED CXORF49
Gm1564	8.06	2.59E-04	ENSMUSG000000051455	predicted gene 1564 [Source:MGI Symbol;Acc:MGI:2686410]	11	102663716	1	ENSM00250000008597	UNCHARACTERIZED
Mikl	7.86	1.64E-02	ENSMUSG000000012519	mixed lineage kinase domain-like [Source:MGI Symbol;Acc:MGI:1921818]	8	111311797	-1	ENSM00250000007339	MIXED LINEAGE KINASE DOMAIN
Nefh	7.66	6.43E-05	ENSMUSG000000020396	neurofilament, heavy polypeptide [Source:MGI Symbol;Acc:MGI:97309]	11	4938754	-1	ENSM00730001521354	NEUROFILAMENT POLYPEPTIDE NF KDA NEUROFILAMENT NEUROFILAMENT TRIPLET
Wnt6	7.30	2.37E-02	ENSMUSG000000033227	wingless-related MMTV integration site 6 [Source:MGI Symbol;Acc:MGI:98960]	1	74771892	1	ENSM00730001522356	WNT 6
Tdrd1	7.26	1.59E-02	ENSMUSG000000025081	tudor domain containing 1 [Source:MGI Symbol;Acc:MGI:1933218]	19	56826209	1	ENSM00250000006700	TUDOR DOMAIN CONTAINING 1
Cacna1g	7.03	3.53E-02	ENSMUSG000000020866	calcium channel, voltage-dependent, T type, alpha 1G subunit [Source:MGI Symbol;Acc:MGI:1201678]	11	94408391	-1	ENSM00740001589106	VOLTAGE DEPENDENT T TYPE CALCIUM CHANNEL SUBUNIT ALPHA VOLTAGE GATED CALCIUM CHANNEL SUBUNIT ALPHA CAV3
Pparg	6.87	3.36E-02	ENSMUSG000000000440	peroxisome proliferator activated receptor gamma [Source:MGI Symbol;Acc:MGI:97747]	6	115361221	1	ENSM00250000000390	PEROXISOME PROLIFERATOR ACTIVATED RECEPTOR PPAR NUCLEAR RECEPTOR SUBFAMILY 1 GROUP C MEMBER

Sycp2	6.71	3.18E-06	ENSMUSG00000060445	synaptonemal complex protein 2 [Source:MGI Symbol;Acc:MGI:1933281]	2	178345293	-1	ENSMF00650001140037	SYNAPTONEMAL COMPLEX 2 SCP 2 SYNAPTONEMAL COMPLEX LATERAL ELEMENT
Sgk2	6.64	2.65E-02	ENSMUSG00000017868	serum/glucocorticoid regulated kinase 2 [Source:MGI Symbol;Acc:MGI:1351318]	2	162987330	1	ENSMF00730001521587	SERINE/THREONINE KINASE EC_2.7.11.1 SERUM/GLUCOCORTICOID REGULATED KINASE
Synb	6.55	4.24E-03	ENSMUSG00000047977	syncytin b [Source:MGI Symbol;Acc:MGI:3045308]	14	69289344	-1	ENSMF00600000921957	ERV FRD PROVIRUS ANCESTRAL ENV POLYPROTEIN PRECURSOR ENVELOPE POLYPROTEIN SYNCYTIN 2 [CONTAINS SURFACE SU ; TRANSMEMBRANE TM]
Phlda2	6.47	2.67E-13	ENSMUSG00000010760	pleckstrin homology-like domain, family A, member 2 [Source:MGI Symbol;Acc:MGI:1202307]	7	143501545	-1	ENSMF00500000282174	PLECKSTRIN HOMOLOGY DOMAIN FAMILY A MEMBER 2 IMPRINTED IN PLACENTA AND LIVER
L1cam	6.40	3.48E-03	ENSMUSG00000031391	L1 cell adhesion molecule [Source:MGI Symbol;Acc:MGI:96721]	X	73853778	-1	ENSMF00390000126295	NEURAL CELL ADHESION MOLECULE L1 L1 L1
Fabp3	6.28	1.11E-03	ENSMUSG00000028773	fatty acid binding protein 3, muscle and heart [Source:MGI Symbol;Acc:MGI:95476]	4	130308595	1	ENSMF00670001235367	FATTY ACID BINDING PROTEIN TYPE FATTY ACID BINDING FABP FATTY ACID BINDING
Ada	6.20	2.59E-02	ENSMUSG00000017697	adenosine deaminase [Source:MGI Symbol;Acc:MGI:87916]	2	163726584	-1	ENSMF00250000004973	ADENOSINE DEAMINASE EC_3.5.4.4 ADENOSINE AMINOHYDROLASE
2200002D01 Rik	6.19	1.17E-03	ENSMUSG00000030587	RIKEN cDNA 2200002D01 gene [Source:MGI Symbol;Acc:MGI:1919525]	7	29246561	-1	ENSMF00500000314208	UNKNOWN
Myb	6.01	9.86E-03	ENSMUSG00000019982	myeloblastosis oncogene [Source:MGI Symbol;Acc:MGI:97249]	10	21124930	-1	ENSMF00250000000873	MYB RELATED MYB MYB
Dlx5	5.97	2.96E-02	ENSMUSG00000029755	distal-less homeobox 5 [Source:MGI Symbol;Acc:MGI:101926]	6	6877805	-1	ENSMF00670001235355	HOMEODOMAIN
Dmtn	5.77	2.17E-04	ENSMUSG00000022099	dematin actin binding protein [Source:MGI Symbol;Acc:MGI:99670]	14	70602184	-1	ENSMF00500000271390	DEMATEIN DEMATEIN ACTIN BINDING ERYTHROCYTE MEMBRANE BAND 4 9
Tspan17	5.68	2.49E-03	ENSMUSG00000025875	tetraspanin 17 [Source:MGI Symbol;Acc:MGI:1921507]	13	54789377	1	ENSMF00500000269784	TETRASPANIN TSPAN TRANSMEMBRANE 4 SUPERFAMILY MEMBER
Tpsg1	5.63	4.63E-02	ENSMUSG00000033200	tryptase gamma 1 [Source:MGI Symbol;Acc:MGI:1349391]	17	25369273	1	ENSMF00500000269970	PRECURSOR
Zbtb7c	5.59	9.21E-03	ENSMUSG00000044646	zinc finger and BTB domain containing 7C [Source:MGI Symbol;Acc:MGI:2443302]	18	75820178	1	ENSMF00500000273708	ZINC FINGER AND BTB DOMAIN CONTAINING 7C ZINC FINGER AND BTB DOMAIN CONTAINING 36
Nxf7	5.52	2.41E-05	ENSMUSG00000031410	nuclear RNA export factor 7 [Source:MGI Symbol;Acc:MGI:2159343]	X	135579555	-1	ENSMF00250000001240	NUCLEAR RNA EXPORT FACTOR 1 TIP ASSOCIATED TIP ASSOCIATING EXPORT FACTOR TAP
Olr1	5.49	2.79E-03	ENSMUSG00000030162	oxidized low density lipoprotein (lectin-like) receptor 1 [Source:MGI Symbol;Acc:MGI:1261434]	6	129485246	-1	ENSMF00500000273171	OXIDIZED LOW DENSITY LIPOPROTEIN RECEPTOR 1 OX LDL RECEPTOR 1 LECTIN OXIDIZED LDL RECEPTOR 1 LOX 1 LECTIN OXLDL RECEPTOR 1 LECTIN TYPE OXIDIZED LDL RECEPTOR 1 [CONTAINS OXIDIZED LOW DENSITY LIPOPROTEIN RECEPTOR 1 SOLUBLE
Chpf	5.20	1.56E-02	ENSMUSG00000032997	chondroitin polymerizing factor [Source:MGI Symbol;Acc:MGI:106576]	1	75474569	-1	ENSMF00250000002081	CHONDROITIN SULFATE SYNTHASE 2 EC_2.4.1.175 EC_2.4.1.- 226 CHONDROITIN GLUCURONYLTRANSFERASE 2 CHONDROITIN POLYMERIZING FACTOR CHPF GLUCURONOSYL N ACETYLGALACTOSAMINYL PROTEOGLYCAN 4 BETA N ACETYLGALACTOSAMINYLTRANSFERASE II N ACETYLGALACTOSAMINYL PROTEOG

Trap1a	5.14	1.73E-05	ENSMUSG000000051257	tumor rejection antigen P1A [Source:MGI Symbol;Acc:MGI:98818]	X	139333683	1	ENSMF00250000032604	TUMOR REJECTION ANTIGEN P815A
Xist	4.93	3.67E-05	ENSMUSG000000086503	inactive X specific transcripts [Source:MGI Symbol;Acc:MGI:98974]	X	103460375	-1		
Frk	4.89	4.74E-02	ENSMUSG000000019779	fyn-related kinase [Source:MGI Symbol;Acc:MGI:103265]	10	34483400	1	ENSMF00730001521177	TYROSINE KINASE EC_2.7.10.2
Ass1	4.81	4.63E-02	ENSMUSG000000076441	argininosuccinate synthetase 1 [Source:MGI Symbol;Acc:MGI:88090]	2	31470207	1	ENSMF00250000002152	ARGININOSUCCINATE SYNTHASE EC_6.3.4.5 CITRULLINE ASPARTATE LIGASE
AU018091	4.79	3.55E-02	ENSMUSG000000054753	expressed sequence AU018091 [Source:MGI Symbol;Acc:MGI:2142124]	7	3154664	-1	ENSMF00250000000444	CATIONIC AMINO ACID TRANSPORTER SOLUTE CARRIER FAMILY 7 MEMBER
Sfn	4.73	3.14E-04	ENSMUSG000000047281	stratifin [Source:MGI Symbol;Acc:MGI:1891831]	4	133600556	-1	ENSMF00730001521154	UNKNOWN
Nfix	4.70	3.16E-03	ENSMUSG000000001911	nuclear factor I/X [Source:MGI Symbol;Acc:MGI:97311]	8	84699876	-1	ENSMF00250000000587	NUCLEAR FACTOR 1 TYPE NF1 NUCLEAR FACTOR CCAAT BOX BINDING TRANSCRIPTION FACTOR CTF NUCLEAR FACTOR NF NFI TGGCA BINDING
Slc30a2	4.64	4.60E-02	ENSMUSG000000028836	solute carrier family 30 (zinc transporter), member 2 [Source:MGI Symbol;Acc:MGI:106637]	4	134343181	1	ENSMF00250000001206	ZINC TRANSPORTER ZNT SOLUTE CARRIER FAMILY 30 MEMBER
Gm15070	4.63	4.07E-03	ENSMUSG000000072934	predicted gene 15070 [Source:MGI Symbol;Acc:MGI:3641805]	X	144456581	1		
Eps8l2	4.59	2.29E-02	ENSMUSG000000025504	EPS8-like 2 [Source:MGI Symbol;Acc:MGI:2138828]	7	141338880	1	ENSMF005000000270023	EPIDERMAL GROWTH FACTOR RECEPTOR KINASE SUBSTRATE 8 EPS8 EPIDERMAL GROWTH FACTOR RECEPTOR PATHWAY SUBSTRATE 8 RELATED EPS8 RELATED
Nefl	4.59	1.64E-02	ENSMUSG000000022055	neurofilament, light polypeptide [Source:MGI Symbol;Acc:MGI:97313]	14	68083863	1	ENSMF00730001521354	NEUROFILAMENT POLYPEPTIDE NF KDA NEUROFILAMENT NEUROFILAMENT TRIPLET
Magohb	4.52	1.30E-02	ENSMUSG000000030188	mago-nashi homolog B (Drosophila) [Source:MGI Symbol;Acc:MGI:1913691]	6	131284388	-1	ENSMF002500000005116	MAGO NASHI HOMOLOG
Krt7	4.40	2.00E-05	ENSMUSG000000023039	keratin 7 [Source:MGI Symbol;Acc:MGI:96704]	15	101411043	1	ENSMF002500000000206	KERATIN TYPE II CYTOSKELETAL CYTOKERATIN CK KERATIN TYPE II KERATIN
3830417A13 Rik	4.33	2.95E-06	ENSMUSG000000031179	RIKEN cDNA 3830417A13 gene [Source:MGI Symbol;Acc:MGI:1917946]	X	64173548	1	ENSMF00360000109863	MELANOMA ASSOCIATED ANTIGEN CANCER/TESTIS ANTIGEN 1 CT1 MAGE ANTIGEN
Fcor	4.31	3.59E-02	ENSMUSG0000000089665	Foxo1 corepressor [Source:MGI Symbol;Acc:MGI:1915484]	8	3671188	-1		
Spta1	4.30	1.67E-28	ENSMUSG000000026532	spectrin alpha, erythrocytic 1 [Source:MGI Symbol;Acc:MGI:98385]	1	174172776	1	ENSMF00740001589109	SPECTRIN ALPHA CHAIN NON ERYTHROCYTIC 1 ALPHA II SPECTRIN FODRIN ALPHA CHAIN
Grik3	4.26	3.46E-02	ENSMUSG000000001985	glutamate receptor, ionotropic, kainate 3 [Source:MGI Symbol;Acc:MGI:95816]	4	125490700	1	ENSMF00720001492013	GLUTAMATE RECEPTOR IONOTROPIC KAINATE PRECURSOR GLUTAMATE RECEPTOR
Gstm5	4.25	2.63E-06	ENSMUSG000000004032	glutathione S-transferase, mu 5 [Source:MGI Symbol;Acc:MGI:1309466]	3	107895821	1	ENSMF005000000269733	GLUTATHIONE S TRANSFERASE EC_2.5.1.18 GST CLASS MU
Tdrp	4.21	2.18E-05	ENSMUSG0000000050052	testis development related protein [Source:MGI Symbol;Acc:MGI:1919398]	8	13952009	-1	ENSMF00250000010007	TESTIS DEVELOPMENT RELATED
Klf1	3.99	1.20E-02	ENSMUSG0000000054191	Kruppel-like factor 1 (erythroid) [Source:MGI Symbol;Acc:MGI:1342771]	8	84901928	1	ENSMF005000000273940	KRUEPPEL FACTOR 1 ERYTHROID KRUEPPEL TRANSCRIPTION FACTOR EKL
Slc30a10	3.91	4.65E-06	ENSMUSG000000026614	solute carrier family 30, member 10 [Source:MGI Symbol;Acc:MGI:2685058]	1	185454848	1	ENSMF00750001632501	ZINC TRANSPORTER 10 ZNT 10 SOLUTE CARRIER FAMILY 30 MEMBER 10

Kcnk1	3.89	5.10E-05	ENSMUSG00000033998	potassium channel, subfamily K, member 1 [Source:MGI Symbol;Acc:MGI:109322]	8	125995102	1	ENSMF00600000921306	POTASSIUM CHANNEL SUBFAMILY K MEMBER 1 INWARD RECTIFYING POTASSIUM CHANNEL TWIK 1
Akr1b8	3.85	3.15E-02	ENSMUSG00000029762	aldo-keto reductase family 1, member B8 [Source:MGI Symbol;Acc:MGI:107673]	6	34354119	1	ENSMF00730001521171	ALCOHOL DEHYDROGENASE [NADP +] EC_1.1.1.2 ALDEHYDE REDUCTASE ALDO KETO REDUCTASE FAMILY 1 MEMBER A1
Nefm	3.83	5.75E-03	ENSMUSG00000022054	neurofilament, medium polypeptide [Source:MGI Symbol;Acc:MGI:97314]	14	68082590	-1	ENSMF00730001521354	NEUROFILAMENT POLYPEPTIDE NF KDA NEUROFILAMENT NEUROFILAMENT TRIPLET
Nup210	3.81	4.63E-02	ENSMUSG00000030091	nucleoporin 210 [Source:MGI Symbol;Acc:MGI:1859555]	6	91013068	-1	ENSMF00250000001437	NUCLEAR PORE MEMBRANE GLYCOPROTEIN 210 PRECURSOR NUCLEAR PORE GP210 NUCLEAR ENVELOPE PORE MEMBRANE POM 210 POM210 NUCLEOPORIN NUP210 PORE MEMBRANE OF 210 KDA
Pycr2	3.74	1.62E-04	ENSMUSG00000026520	pyrroline-5-carboxylate reductase family, member 2 [Source:MGI Symbol;Acc:MGI:1277956]	1	180904274	1	ENSMF00500000269896	PYRROLINE 5 CARBOXYLATE REDUCTASE 3 P5C REDUCTASE 3 P5CR 3 EC_1.5.1.2 PYRROLINE 5 CARBOXYLATE REDUCTASE
Enpp4	3.61	2.49E-03	ENSMUSG00000023961	ectonucleotide pyrophosphatase/phosphodiesterase 4 [Source:MGI Symbol;Acc:MGI:2682634]	17	44096308	-1	ENSMF00730001521747	BIS 5' ADENOSYL TRIPHOSPHATASE ENPP4 PRECURSOR EC_3.6.1.29 AP3A HYDROLASE AP3AASE ECTONUCLEOTIDE PYROPHOSPHATASE/PHOSPHODIESTERAS E FAMILY MEMBER 4 E NPP 4 NPP 4
Gm4879	3.59	7.71E-06	ENSMUSG00000048261	predicted pseudogene 4879 [Source:MGI Symbol;Acc:MGI:3648111]	7	13178903	1		
Dusp9	3.57	1.51E-05	ENSMUSG00000031383	dual specificity phosphatase 9 [Source:MGI Symbol;Acc:MGI:2387107]	X	73639419	1	ENSMF00500000269961	DUAL SPECIFICITY PHOSPHATASE EC_3.1.3.16 EC_3.1.3.- 48 MITOGEN ACTIVATED KINASE PHOSPHATASE 3 MAP KINASE PHOSPHATASE 3 MKP 3 SODIUM COUPLED NEUTRAL AMINO ACID TRANSPORTER AMINO ACID
Slc38a5	3.55	1.23E-02	ENSMUSG00000031170	solute carrier family 38, member 5 [Source:MGI Symbol;Acc:MGI:2148066]	X	8271133	1	ENSMF00250000000644	TRANSPORTER SOLUTE CARRIER FAMILY 38 MEMBER SYSTEM A AMINO ACID TRANSPORTER 1 SYSTEM N AMINO ACID TRANSPORTER
Pmaip1	3.45	1.38E-03	ENSMUSG00000024521	phorbol-12-myristate-13-acetate-induced protein 1 [Source:MGI Symbol;Acc:MGI:1930146]	18	66458604	1	ENSMF00670001246165	PHORBOL 12 MYRISTATE 13 ACETATE INDUCED 1 NOXA
Syt13	3.43	4.07E-02	ENSMUSG00000027220	synaptotagmin XIII [Source:MGI Symbol;Acc:MGI:1933945]	2	92915098	1	ENSMF00400000131978	SYNAPTOTAGMIN 13 SYNAPTOTAGMIN XIII SYTXIII
Igfbp2	3.38	2.28E-13	ENSMUSG00000039323	insulin-like growth factor binding protein 2 [Source:MGI Symbol;Acc:MGI:96437]	1	72824503	1	ENSMF00500000271485	INSULIN GROWTH FACTOR BINDING 2 PRECURSOR IGF BINDING 2 IGFBP 2
F2rl1	3.36	7.52E-03	ENSMUSG00000021678	coagulation factor II (thrombin) receptor- like 1 [Source:MGI Symbol;Acc:MGI:101910]	13	95511732	-1	ENSMF00670001235374	PROTEINASE ACTIVATED RECEPTOR PRECURSOR PAR COAGULATION FACTOR II RECEPTOR THROMBIN RECEPTOR
Ppl	3.35	3.13E-02	ENSMUSG00000039457	periplakin [Source:MGI Symbol;Acc:MGI:1194898]	16	5086291	-1	ENSMF00500000270485	ENVOPLAKIN 210 KDA CORNIFIED ENVELOPE PRECURSOR P210
Zfp276	3.28	3.39E-03	ENSMUSG00000001065	zinc finger protein (C2H2 type) 276 [Source:MGI Symbol;Acc:MGI:1888495]	8	123254195	1	ENSMF00480000262826	ZINC FINGER 276 ZFP 276
Galns	3.22	3.34E-02	ENSMUSG00000015027	galactosamine (N-acetyl)-6-sulfate sulfatase [Source:MGI Symbol;Acc:MGI:1355303]	8	122578238	-1	ENSMF00600000921289	PRECURSOR

Slc9b1	3.17	1.15E-02	ENSMUSG00000050150	solute carrier family 9, subfamily B (NHA1, cation proton antiporter 1), member 1 [Source:MGI Symbol;Acc:MGI:1921696]	3	135348029	1	ENSMF00250000001905	MITOCHONDRIAL SODIUM/HYDROGEN EXCHANGER 9B2 MITOCHONDRIAL NA + /H + EXCHANGER NHA2 NA + /H + EXCHANGER DOMAIN CONTAINING 2 NHE DOMAIN CONTAINING 2 SODIUM/HYDROGEN EXCHANGER DOMAIN CONTAINING 2 SOLUTE CARRIER FAMILY 9 SUBFAMILY B MEMBER 2
Plac1	3.15	9.61E-03	ENSMUSG00000061082	placental specific protein 1 [Source:MGI Symbol;Acc:MGI:1926287]	X	53069995	-1	ENSMF005000000274827	PLACENTA SPECIFIC 1 PRECURSOR
Tspan33	3.11	2.43E-03	ENSMUSG000000001763	tetraspanin 33 [Source:MGI Symbol;Acc:MGI:1919012]	6	29694222	1	ENSMF005000000269784	TETRASPANIN TSPAN TRANSMEMBRANE 4 SUPERFAMILY MEMBER
Fam129a	3.09	4.60E-02	ENSMUSG000000026483	family with sequence similarity 129, member A [Source:MGI Symbol;Acc:MGI:2137237]	1	151571186	1	ENSMF002500000002649	NIBAN
Tbx3	3.07	5.53E-07	ENSMUSG000000018604	T-box 3 [Source:MGI Symbol;Acc:MGI:98495]	5	119670669	1	ENSMF00730001521675	T BOX TRANSCRIPTION FACTOR T BOX
Cubn	3.05	1.15E-05	ENSMUSG000000026726	cubilin (intrinsic factor-cobalamin receptor) [Source:MGI Symbol;Acc:MGI:1931256]	2	13276338	-1	ENSMF00740001589341	CUBILIN PRECURSOR 460 KDA RECEPTOR INTRINSIC FACTOR COBALAMIN RECEPTOR INTRINSIC FACTOR VITAMIN B12 RECEPTOR
Zfp473	3.03	2.94E-04	ENSMUSG000000048012	zinc finger protein 473 [Source:MGI Symbol;Acc:MGI:2442697]	7	44731481	-1	ENSMF002500000000002	ZINC FINGER
Dnah8	3.02	2.12E-02	ENSMUSG000000033826	dynein, axonemal, heavy chain 8 [Source:MGI Symbol;Acc:MGI:107714]	17	30624354	1	ENSMF00730001521578	DYNEIN HEAVY CHAIN AXONEMAL AXONEMAL BETA DYNEIN HEAVY CHAIN CILIARY DYNEIN HEAVY CHAIN
Rpp14	2.99	3.85E-03	ENSMUSG000000023156	ribonuclease P 14 subunit [Source:MGI Symbol;Acc:MGI:1914303]	14	8080367	1	ENSMF005000000275786	RIBONUCLEASE P SUBUNIT P14 EC_3.1.26.5
Kcnh6	2.98	5.39E-03	ENSMUSG000000001901	potassium voltage-gated channel, subfamily H (eag-related), member 6 [Source:MGI Symbol;Acc:MGI:2684139]	11	106008124	1	ENSMF00730001521633	POTASSIUM VOLTAGE GATED CHANNEL SUBFAMILY H MEMBER 2 ETHER A GO GO RELATED GENE POTASSIUM CHANNEL 1 ERG 1 EAG RELATED 1 ETHER A GO GO RELATED 1 VOLTAGE GATED POTASSIUM CHANNEL SUBUNIT KV11 1
Cdh1	2.97	8.02E-13	ENSMUSG000000000303	cadherin 1 [Source:MGI Symbol;Acc:MGI:88354]	8	106603351	1	ENSMF00730001521172	CADHERIN PRECURSOR CADHERIN CADHERIN
Nanog	2.97	2.25E-06	ENSMUSG000000012396	Nanog homeobox [Source:MGI Symbol;Acc:MGI:1919200]	6	122707489	1	ENSMF002500000006769	HOMEBOX NANOG HOMEBOX TRANSCRIPTION FACTOR NANOG
Arf5	2.93	4.61E-04	ENSMUSG000000020440	ADP-ribosylation factor 5 [Source:MGI Symbol;Acc:MGI:99434]	6	28423560	1	ENSMF00730001521124	ADP RIBOSYLATION FACTOR
F10	2.89	4.54E-04	ENSMUSG000000031444	coagulation factor X [Source:MGI Symbol;Acc:MGI:103107]	8	13037308	1	ENSMF002500000000442	COAGULATION FACTOR PRECURSOR [CONTAINS FACTOR LIGHT CHAIN; FACTOR HEAVY CHAIN]
Spint1	2.88	2.47E-04	ENSMUSG000000027315	serine protease inhibitor, Kunitz type 1 [Source:MGI Symbol;Acc:MGI:1338033]	2	119237362	1	ENSMF005000000271220	KUNITZ TYPE PROTEASE INHIBITOR 1 PRECURSOR HEPATOCYTE GROWTH FACTOR ACTIVATOR INHIBITOR TYPE 1 HAI 1
Cltb	2.87	2.49E-03	ENSMUSG000000047547	clathrin, light polypeptide (Lcb) [Source:MGI Symbol;Acc:MGI:1921575]	13	54592401	-1	ENSMF002500000001836	CLATHRIN LIGHT CHAIN
Adck3	2.87	3.65E-02	ENSMUSG000000026489	aarF domain containing kinase 3 [Source:MGI Symbol;Acc:MGI:1914676]	1	180165238	-1	ENSMF002500000002062	CHAPERONE ACTIVITY OF BC1 COMPLEX MITOCHONDRIAL PRECURSOR CHAPERONE ABC1 EC_2.7.11.- AARF DOMAIN CONTAINING KINASE 3

Smarcd2	2.76	7.59E-03	ENSMUSG00000078619	SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 2 [Source:MGI Symbol;Acc:MGI:1933621]	11	106263179	-1	ENSMF00250000001625	SWI/SNF RELATED MATRIX ASSOCIATED ACTIN DEPENDENT REGULATOR OF CHROMATIN SUBFAMILY D MEMBER KDA BRG 1/BRM ASSOCIATED FACTOR SUBUNIT BRG1 ASSOCIATED FACTOR
Hoxa10	2.75	6.80E-03	ENSMUSG00000000938	homeobox A10 [Source:MGI Symbol;Acc:MGI:96171]	6	52231197	-1	ENSMF00500000269956	HOMEODOMAIN HOX
Crispld1	2.75	1.51E-04	ENSMUSG000000025776	cysteine-rich secretory protein LCCL domain containing 1 [Source:MGI Symbol;Acc:MGI:1934666]	1	17727045	1	ENSMF00500000269954	CYSTEINE RICH SECRETORY LCCL DOMAIN CONTAINING PRECURSOR
Slc25a37	2.73	1.16E-12	ENSMUSG000000034248	solute carrier family 25, member 37 [Source:MGI Symbol;Acc:MGI:1914962]	14	69241848	-1	ENSMF00250000002181	MITOCHONDRIAL IRON TRANSPORTER Solute carrier family 25 member
B4galt3	2.72	1.08E-04	ENSMUSG000000052423	UDP-Gal:betaGlcNAc beta 1,4-galactosyltransferase, polypeptide 3 [Source:MGI Symbol;Acc:MGI:1928767]	1	171270328	1	ENSMF00250000000603	BETA 1 4 GALACTOSYLTRANSFERASE BETA 1 4 GALTASE BETA4GAL B4GAL EC_2.4.1.- UDP GAL:BETA GLCNAC BETA 1 4 GALACTOSYLTRANSFERASE UDP GALACTOSE:BETA N ACETYLGALACTOSAMINE BETA 1 4 GALACTOSYLTRANSFERASE [INCLUDES N ACETYLLACTOSAMINE SYNTHASE NAL SYNTHASE ; BETA N
Pdlim4	2.71	2.18E-02	ENSMUSG000000020388	PDZ and LIM domain 4 [Source:MGI Symbol;Acc:MGI:1353470]	11	54054928	-1	ENSMF00250000001129	PDZ AND LIM DOMAIN
Bmp1	2.71	3.34E-02	ENSMUSG000000022098	bone morphogenetic protein 1 [Source:MGI Symbol;Acc:MGI:88176]	14	70474557	-1	ENSMF005700000851071	PRECURSOR
Emp1	2.70	1.91E-02	ENSMUSG000000030208	epithelial membrane protein 1 [Source:MGI Symbol;Acc:MGI:107941]	6	135362931	1	ENSMF00720001492064	EPITHELIAL MEMBRANE 1 EMP 1 TUMOR ASSOCIATED MEMBRANE
Gm12174	2.69	2.06E-04	ENSMUSG000000080776	predicted gene 12174 [Source:MGI Symbol;Acc:MGI:3651722]	11	46727818	1		
Cpne7	2.69	6.44E-05	ENSMUSG000000034796	copine VII [Source:MGI Symbol;Acc:MGI:2142747]	8	123117374	1	ENSMF00730001521337	COPINE COPINE
Chchd1	2.67	1.09E-03	ENSMUSG000000063787	coiled-coil-helix-coiled-coil-helix domain containing 1 [Source:MGI Symbol;Acc:MGI:1913371]	14	20703027	1	ENSMF00500000275238	COILED COIL HELIX COILED COIL HELIX DOMAIN CONTAINING 1 28S RIBOSOMAL S37 MITOCHONDRIAL MRP S37
Sgk1	2.63	4.90E-02	ENSMUSG000000019970	serum/glucocorticoid regulated kinase 1 [Source:MGI Symbol;Acc:MGI:1340062]	10	21882184	1	ENSMF00730001521587	SERINE/THREONINE KINASE EC_2.7.11.1 SERUM/GLUCOCORTICOID REGULATED KINASE
Aamp	2.62	2.63E-05	ENSMUSG000000006299	angio-associated migratory protein [Source:MGI Symbol;Acc:MGI:107809]	1	74279840	-1	ENSMF00250000004282	ANGIO ASSOCIATED MIGRATORY CELL
Serpind1	2.61	1.37E-02	ENSMUSG000000022766	serine (or cysteine) peptidase inhibitor, clade D, member 1 [Source:MGI Symbol;Acc:MGI:96051]	16	17331371	1	ENSMF00440000236979	HEPARIN COFACTOR 2 PRECURSOR HEPARIN COFACTOR II HC II PROTEASE INHIBITOR LEUSERPIN 2 SERPIN D1
Snord19	2.59	8.20E-03	ENSMUSG000000077797	small nucleolar RNA, C/D box 19 [Source:MGI Symbol;Acc:MGI:3819524]	14	31016206	-1		
Gm13225	2.58	1.42E-02	ENSMUSG000000078503	predicted gene 13225 [Source:MGI Symbol;Acc:MGI:3652161]	4	145510759	1	ENSMF00250000000002	ZINC FINGER
Stk19	2.55	1.09E-03	ENSMUSG000000061207	serine/threonine kinase 19 [Source:MGI Symbol;Acc:MGI:1860085]	17	34823993	-1	ENSMF00250000007308	SERINE/THREONINE KINASE 19 EC_2.7.11.1 RP1
Tcf3	2.53	1.37E-04	ENSMUSG000000020167	transcription factor 3 [Source:MGI Symbol;Acc:MGI:98510]	10	80409514	-1	ENSMF00250000000724	TRANSCRIPTION FACTOR CLASS HELIX LOOP HELIX TRANSCRIPTION FACTOR
Dbi	2.52	2.57E-12	ENSMUSG000000026385	diazepam binding inhibitor [Source:MGI Symbol;Acc:MGI:94865]	1	120113280	-1	ENSMF00670001239746	ACYL COA BINDING ACBP DIAZEPAM BINDING INHIBITOR DBI ENDOZEPINE EP

Cenpi	2.52	3.39E-03	ENSMUSG00000031262	centromere protein I [Source:MGI Symbol;Acc:MGI:2147897]	X	134308084	1	ENSMF00250000006170	CENTROMERE I CENP I FSH PRIMARY RESPONSE 1 FOLLICULAR STIMULATING HORMONE PRIMARY RESPONSE LEUCINE RICH PRIMARY RESPONSE 1
Dock5	2.52	1.59E-03	ENSMUSG00000044447	dedicator of cytokinesis 5 [Source:MGI Symbol;Acc:MGI:2652871]	14	67751928	-1	ENSMF00250000000526	DEDICATOR OF CYTOKINESIS
Rcc1	2.51	9.13E-04	ENSMUSG00000028896	regulator of chromosome condensation 1 [Source:MGI Symbol;Acc:MGI:1913989]	4	132331919	-1	ENSMF00500000270636	REGULATOR OF CHROMOSOME CONDENSATION CHROMOSOME CONDENSATION 1
BC067074	2.51	2.95E-02	ENSMUSG00000021763	cDNA sequence BC067074 [Source:MGI Symbol;Acc:MGI:3040697]	13	113317084	1	ENSMF00570000851341	CHONDROITIN SULFATE PROTEOGLYCAN 4 PRECURSOR CHONDROITIN SULFATE PROTEOGLYCAN NG2
Gypa	2.49	2.66E-05	ENSMUSG00000051839	glycophorin A [Source:MGI Symbol;Acc:MGI:95880]	8	80494045	1	ENSMF00260000053088	GLYCOPHORIN A CD235A ANTIGEN
Btn1a1	2.47	1.22E-02	ENSMUSG00000000706	butyrophilin, subfamily 1, member A1 [Source:MGI Symbol;Acc:MGI:103118]	13	23456992	-1	ENSMF00500000269634	BUTYROPHILIN PRECURSOR
Zfp809	2.47	2.06E-03	ENSMUSG00000057982	zinc finger protein 809 [Source:MGI Symbol;Acc:MGI:2143362]	9	22225714	1	ENSMF00250000000002	ZINC FINGER
Orc2	2.47	1.18E-08	ENSMUSG00000026037	origin recognition complex, subunit 2 [Source:MGI Symbol;Acc:MGI:1328306]	1	58462771	-1	ENSMF00500000271072	ORIGIN RECOGNITION COMPLEX SUBUNIT 2
Nkx1-2	2.46	3.89E-02	ENSMUSG00000048528	NK1 transcription factor related, locus 2 (Drosophila) [Source:MGI Symbol;Acc:MGI:104806]	7	132594878	-1	ENSMF00670001236636	NK1 TRANSCRIPTION FACTOR RELATED 2 HOMEOBOX SAX 1 NKX 1 1
Col5a2	2.43	8.85E-08	ENSMUSG00000026042	collagen, type V, alpha 2 [Source:MGI Symbol;Acc:MGI:88458]	1	45374321	-1	ENSMF00250000000184	COLLAGEN ALPHA I CHAIN PRECURSOR ALPHA TYPE I COLLAGEN
Cdadcl	2.43	3.53E-02	ENSMUSG00000021982	cytidine and dCMP deaminase domain containing 1 [Source:MGI Symbol;Acc:MGI:1919141]	14	59560896	-1	ENSMF00250000004445	CYTIDINE AND DCMP DEAMINASE DOMAIN CONTAINING 1
Ccdc38	2.43	5.34E-04	ENSMUSG00000036168	coiled-coil domain containing 38 [Source:MGI Symbol;Acc:MGI:2444738]	10	93540632	1	ENSMF00680001303626	COILED COIL DOMAIN CONTAINING
Slc43a3	2.43	9.60E-05	ENSMUSG00000027074	solute carrier family 43, member 3 [Source:MGI Symbol;Acc:MGI:1931054]	2	84936579	1	ENSMF00500000271307	SOLUTE CARRIER FAMILY 43 MEMBER 3
Anxa3	2.39	1.20E-02	ENSMUSG00000029484	annexin A3 [Source:MGI Symbol;Acc:MGI:1201378]	5	96793385	1	ENSMF00740001589071	ANNEXIN ANNEXIN ANNEXIN
Gm2830	2.38	7.38E-03	ENSMUSG00000086567	predicted gene 2830 [Source:MGI Symbol;Acc:MGI:3781002]	13	54499705	-1		
Kcnj13	2.38	2.62E-06	ENSMUSG00000079436	potassium inwardly-rectifying channel, subfamily J, member 13 [Source:MGI Symbol;Acc:MGI:3781032]	1	87386363	-1	ENSMF00730001521400	INWARD RECTIFIER POTASSIUM CHANNEL INWARD RECTIFIER K + CHANNEL POTASSIUM CHANNEL INWARDLY RECTIFYING SUBFAMILY J MEMBER
Hbb-bh1	2.37	3.15E-07	ENSMUSG00000052217	hemoglobin Z, beta-like embryonic chain [Source:MGI Symbol;Acc:MGI:96024]	7	103841636	-1	ENSMF00250000000136	HEMOGLOBIN SUBUNIT BETA BETA GLOBIN HEMOGLOBIN BETA CHAIN
Klhl13	2.37	1.21E-07	ENSMUSG00000036782	kelch-like 13 [Source:MGI Symbol;Acc:MGI:1914705]	X	23219271	-1	ENSMF00270000056443	KELCH
Adra2b	2.36	1.36E-02	ENSMUSG00000058620	adrenergic receptor, alpha 2b [Source:MGI Symbol;Acc:MGI:87935]	2	127363208	1	ENSMF00260000050343	ALPHA 2B ADRENERGIC RECEPTOR ALPHA 2B ADRENORECEPTOR ALPHA 2B ADRENORECEPTOR ALPHA 2BAR
Mitd1	2.36	7.15E-04	ENSMUSG00000026088	MIT, microtubule interacting and transport, domain containing 1 [Source:MGI Symbol;Acc:MGI:1916278]	1	37874801	-1	ENSMF00250000004794	MIT DOMAIN CONTAINING 1
Smyd3	2.36	1.72E-04	ENSMUSG00000055067	SET and MYND domain containing 3 [Source:MGI Symbol;Acc:MGI:1916976]	1	178951960	-1	ENSMF00500000271430	HISTONE LYSINE N METHYLTRANSFERASE SMYD3 EC 2.1.1.43 SET AND MYND DOMAIN CONTAINING 3 ZINC FINGER MYND DOMAIN CONTAINING 1

Pcdh1	2.35	3.41E-04	ENSMUSG000000051375	protocadherin 1 [Source:MGI Symbol;Acc:MGI:104692]	18	38185915	-1	ENSMF00250000000558	PROTOCOLADHERIN 11 X LINKED PRECURSOR PROTOCOLADHERIN 11 PROTOCOLADHERIN ON THE X CHROMOSOME PCDH X
Ddx18	2.33	2.43E-03	ENSMUSG000000001674	DEAD (Asp-Glu-Ala-Asp) box polypeptide 18 [Source:MGI Symbol;Acc:MGI:1914192]	1	121553835	-1	ENSMF00730001521630	ATP DEPENDENT RNA HELICASE HAS1 EC_3.6.4.13
Tuba4a	2.33	7.11E-05	ENSMUSG000000026202	tubulin, alpha 4A [Source:MGI Symbol;Acc:MGI:1095410]	1	75214974	-1	ENSMF002500000000217	TUBULIN ALPHA CHAIN
Atp11a	2.32	1.58E-09	ENSMUSG000000031441	ATPase, class VI, type 11A [Source:MGI Symbol;Acc:MGI:1354735]	8	12757014	1	ENSMF00730001521628	PROBABLE PHOSPHOLIPID TRANSPORTING ATPASE EC_3.6.3.1 ATPASE CLASS VI TYPE
Nfatc4	2.31	3.52E-04	ENSMUSG000000023411	nuclear factor of activated T cells, cytoplasmic, calcineurin dependent 4 [Source:MGI Symbol;Acc:MGI:1920431]	14	55824795	1	ENSMF00260000050482	NUCLEAR FACTOR OF ACTIVATED T CELLS CYTOPLASMIC 1 NF ATC1 NFATC1 NFAT TRANSCRIPTION COMPLEX CYTOSOLIC COMPONENT NF ATC NFATC
Tal1	2.29	5.54E-05	ENSMUSG000000028717	T cell acute lymphocytic leukemia 1 [Source:MGI Symbol;Acc:MGI:98480]	4	115056426	1	ENSMF005000000272863	T CELL ACUTE LYMPHOCYTIC LEUKEMIA 1 TAL 1 STEM CELL
Acads	2.28	1.99E-02	ENSMUSG000000029545	acyl-Coenzyme A dehydrogenase, short chain [Source:MGI Symbol;Acc:MGI:87868]	5	115110299	-1	ENSMF00730001522195	SHORT CHAIN SPECIFIC ACYL COA DEHYDROGENASE MITOCHONDRIAL PRECURSOR SCAD EC_1.3.8.1 BUTYRYL COA DEHYDROGENASE
Nufip1	2.28	2.06E-02	ENSMUSG000000022009	nuclear fragile X mental retardation protein interacting protein 1 [Source:MGI Symbol;Acc:MGI:1351474]	14	76110891	1	ENSMF002500000008028	NUCLEAR FRAGILE X MENTAL RETARDATION INTERACTING 1 NUCLEAR FMRP INTERACTING 1
Esco2	2.27	1.22E-02	ENSMUSG000000022034	establishment of cohesion 1 homolog 2 (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1919238]	14	65819038	-1	ENSMF002500000002569	N ACETYLTRANSFERASE ESCO2 EC_2.3.1.- ESTABLISHMENT OF COHESION 1 HOMOLOG 2 ECO1 HOMOLOG 2
Hba-x	2.26	2.24E-15	ENSMUSG000000055609	hemoglobin X, alpha-like embryonic chain in Hba complex [Source:MGI Symbol;Acc:MGI:96019]	11	32276400	1	ENSMF005000000269637	HEMOGLOBIN SUBUNIT ALPHA ALPHA GLOBIN HEMOGLOBIN ALPHA CHAIN
Lypd1	2.25	7.75E-03	ENSMUSG000000026344	Ly6/Plaur domain containing 1 [Source:MGI Symbol;Acc:MGI:1919835]	1	125867622	-1	ENSMF002500000006765	LY6/PLAUR DOMAIN CONTAINING 1 PRECURSOR
Snrpf	2.24	3.15E-02	ENSMUSG000000020018	small nuclear ribonucleoprotein polypeptide F [Source:MGI Symbol;Acc:MGI:1917128]	10	93583029	-1	ENSMF00670001236821	SMALL NUCLEAR RIBONUCLEOPROTEIN F SNRNP F SM F SM F SMF
Lrp8	2.23	1.48E-02	ENSMUSG000000028613	low density lipoprotein receptor-related protein 8, apolipoprotein e receptor [Source:MGI Symbol;Acc:MGI:1340044]	4	107802261	1	ENSMF00740001589117	LOW DENSITY LIPOPROTEIN RECEPTOR RECEPTOR
Kctd9	2.23	1.62E-04	ENSMUSG000000034327	potassium channel tetramerisation domain containing 9 [Source:MGI Symbol;Acc:MGI:2145579]	14	67715937	1	ENSMF002500000002619	BTB/POZ DOMAIN CONTAINING KCTD9
Hspb1	2.23	1.30E-03	ENSMUSG000000004951	heat shock protein 1 [Source:MGI Symbol;Acc:MGI:96240]	5	135887919	1	ENSMF005000000270924	HEAT SHOCK BETA 1 HSPB1 HEAT SHOCK 27 KDA HSP 27
Nek2	2.23	2.75E-04	ENSMUSG000000026622	NIMA (never in mitosis gene a)-related expressed kinase 2 [Source:MGI Symbol;Acc:MGI:109359]	1	191821444	1	ENSMF005000000270350	KINASE EC_2.7.11.1
4933431E20 Rik	2.22	2.68E-02	ENSMUSG000000086968	RIKEN cDNA 4933431E20 gene [Source:MGI Symbol;Acc:MGI:3584041]	3	107888850	-1		

Marc2	2.21	7.40E-10	ENSMUSG00000073481	mitochondrial amidoxime reducing component 2 [Source:MGI Symbol;Acc:MGI:1914497]	1	184813068	-1	ENSMF00500000270661	MOSC DOMAIN CONTAINING 2 MITOCHONDRIAL PRECURSOR EC 1 MITOCHONDRIAL AMIDOXIME REDUCING COMPONENT 2 MOCO SULFURASE C TERMINAL DOMAIN CONTAINING 2 MOLYBDENUM COFACTOR SULFURASE C TERMINAL DOMAIN CONTAINING 2
Dcp1b	2.21	1.25E-02	ENSMUSG00000041477	DCP1 decapping enzyme homolog B (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:2442404]	6	119175252	1	ENSMF00480000262815	DECAPPING ENZYME 1B EC 3
Gata1	2.20	3.39E-02	ENSMUSG00000031162	GATA binding protein 1 [Source:MGI Symbol;Acc:MGI:95661]	X	7959260	-1	ENSMF00730001521743	TRANSCRIPTION FACTOR
Gm12020	2.19	2.21E-06	ENSMUSG00000081302	predicted gene 12020 [Source:MGI Symbol;Acc:MGI:3650978]	11	18325630	-1		
Tamm41	2.18	4.31E-02	ENSMUSG00000030316	TAM41, mitochondrial translocator assembly and maintenance protein, homolog (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1916221]	6	115004381	-1	ENSMF00500000271930	MITOCHONDRIAL TRANSLOCATOR ASSEMBLY AND MAINTENANCE 41 HOMOLOG PRECURSOR TAM41 MMP37 PROTEIN MITOCHONDRIAL
Rpl36-ps2	2.18	4.43E-02	ENSMUSG00000024205	ribosomal protein L36, pseudogene 2 [Source:MGI Symbol;Acc:MGI:3650081]	11	76601319	1		
Zfp961	2.18	1.32E-03	ENSMUSG00000052446	zinc finger protein 961 [Source:MGI Symbol;Acc:MGI:3583954]	8	71951038	1	ENSMF00730001521153	ZINC FINGER
Emid1	2.17	4.95E-03	ENSMUSG00000034164	EMI domain containing 1 [Source:MGI Symbol;Acc:MGI:2155091]	11	5106265	-1	ENSMF00380000124756	EMI DOMAIN CONTAINING 1 PRECURSOR EMILIN AND MULTIMERIN DOMAIN CONTAINING 1 EMU1
Usp21	2.17	6.29E-04	ENSMUSG00000053483	ubiquitin specific peptidase 21 [Source:MGI Symbol;Acc:MGI:1353665]	1	171281945	-1	ENSMF00730001521805	UBIQUITIN CARBOXYL TERMINAL HYDROLASE 2 EC_3.4.19.12.41 KDA UBIQUITIN SPECIFIC PROTEASE DEUBIQUITINATING ENZYME 2 UBIQUITIN THIOESTERASE 2 UBIQUITIN SPECIFIC PROCESSING PROTEASE 2 MYC PROTO ONCOGENE PROTO ONCOGENE C MYC TRANSCRIPTION FACTOR P64
Myc	2.17	5.58E-04	ENSMUSG00000022346	myelocytomatosis oncogene [Source:MGI Symbol;Acc:MGI:97250]	15	61985391	1	ENSMF00730001521899	ONCOGENE C MYC TRANSCRIPTION FACTOR P64
Hilpda	2.17	1.49E-02	ENSMUSG00000043421	hypoxia inducible lipid droplet associated [Source:MGI Symbol;Acc:MGI:1916823]	6	29272488	1	ENSMF00500000304547	UNKNOWN
Mcm6	2.16	1.01E-07	ENSMUSG00000026355	minichromosome maintenance deficient 6 (MIS5 homolog, S. pombe) (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1298227]	1	128331591	-1	ENSMF00500000270166	DNA REPLICATION LICENSING FACTOR MCM6 EC_3.6.4.12
Bcor	2.16	2.64E-05	ENSMUSG00000040363	BCL6 interacting corepressor [Source:MGI Symbol;Acc:MGI:1918708]	X	12036740	-1	ENSMF00500000270158	BCL 6 COREPRESSOR 1 BCOR L1 BCOR 1
Hic2	2.15	4.98E-03	ENSMUSG00000050240	hypermethylated in cancer 2 [Source:MGI Symbol;Acc:MGI:1929869]	16	17233572	1	ENSMF00600000921379	HYPERMETHYLATED IN CANCER
Tsen34	2.15	4.77E-02	ENSMUSG00000035585	tRNA splicing endonuclease 34 homolog (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1913328]	7	3693375	1	ENSMF00430000230248	TRNA SPLICING ENDONUCLEASE SUBUNIT SEN34 EC_3.1.27.9 LEUKOCYTE RECEPTOR CLUSTER MEMBER 5 TRNA INTRON ENDONUCLEASE SEN34
Abcb6	2.14	2.50E-02	ENSMUSG00000026198	ATP-binding cassette, sub-family B (MDR/TAP), member 6 [Source:MGI Symbol;Acc:MGI:1921354]	1	75171717	-1	ENSMF00730001521565	ATP BINDING CASSETTE SUB FAMILY B MEMBER 6 MITOCHONDRIAL UBIQUITOUSLY EXPRESSED MAMMALIAN ABC HALF TRANSPORTER
Pdia4	2.14	2.11E-07	ENSMUSG00000025823	protein disulfide isomerase associated 4 [Source:MGI Symbol;Acc:MGI:104864]	6	47796142	-1	ENSMF00740001589147	DISULFIDE ISOMERASE PRECURSOR EC_5.3.4.1 ENDOPLASMIC RETICULUM RESIDENT ER ENDOPLASMIC RETICULUM RESIDENT ER

Sec61g	2.12	9.88E-05	ENSMUSG00000078974	SEC61, gamma subunit [Source:MGI Symbol;Acc:MGI:1202066]	11	16500530	-1	ENSMF00500000275476	UNKNOWN
Ralb	2.11	2.07E-04	ENSMUSG00000004451	v-ral simian leukemia viral oncogene homolog B (ras related) [Source:MGI Symbol;Acc:MGI:1927244]	1	119470305	-1	ENSMF00500000270233	RAS RELATED PRECURSOR
Gm16433	2.11	2.20E-02	ENSMUSG00000043024	predicted gene 16433 [Source:MGI Symbol;Acc:MGI:3645626]	6	108563445	-1		
Atic	2.11	7.35E-06	ENSMUSG00000026192	5-aminoimidazole-4-carboxamide ribonucleotide formyltransferase/IMP cyclohydrolase [Source:MGI Symbol;Acc:MGI:1351352]	1	71557150	1	ENSMF00250000003624	BIFUNCTIONAL PURINE BIOSYNTHESIS PHOSPHORIBOSYLAMINOIMIDAZOLECARB OXAMIDE FORMYLTRANSFERASE EC_2.1.2.3 5 AMINOIMIDAZOLE 4 CARBOXAMIDE RIBONUCLEOTIDE FORMYLTRANSFERASE AICAR TRANSFORMYLASE ; IMP CYCLOHYDROLASE EC_3.5.4.- 10 ATIC IMP SYNTHASE INOSINICASE] NF KAPPA B INHIBITOR BETA NF KAPPA BIB I KAPPA B BETA IKB B IKB BETA IKAPPABBETA PLATELET DERIVED GROWTH FACTOR SUBUNIT A PRECURSOR PDGF SUBUNIT A PDGF 1 PLATELET DERIVED GROWTH FACTOR A CHAIN PLATELET DERIVED GROWTH FACTOR ALPHA POLYPEPTIDE
Nfkbib	2.10	7.93E-03	ENSMUSG00000030595	nuclear factor of kappa light polypeptide gene enhancer in B cells inhibitor, beta [Source:MGI Symbol;Acc:MGI:104752]	7	28758251	-1	ENSMF00260000051136	NF KAPPA B INHIBITOR BETA NF KAPPA BIB I KAPPA B BETA IKB B IKB BETA IKAPPABBETA PLATELET DERIVED GROWTH FACTOR SUBUNIT A PRECURSOR PDGF SUBUNIT A PDGF 1 PLATELET DERIVED GROWTH FACTOR A CHAIN PLATELET DERIVED GROWTH FACTOR ALPHA POLYPEPTIDE
Pdgfa	2.10	1.46E-04	ENSMUSG00000025856	platelet derived growth factor, alpha [Source:MGI Symbol;Acc:MGI:97527]	5	138976014	-1	ENSMF00500000270837	PLATELET DERIVED GROWTH FACTOR SUBUNIT A PRECURSOR PDGF SUBUNIT A PDGF 1 PLATELET DERIVED GROWTH FACTOR A CHAIN PLATELET DERIVED GROWTH FACTOR ALPHA POLYPEPTIDE
Zfp958	2.09	3.42E-02	ENSMUSG00000058748	zinc finger protein 958 [Source:MGI Symbol;Acc:MGI:2385298]	8	4625840	1	ENSMF00730001521153	ZINC FINGER
Wdr12	2.08	3.93E-02	ENSMUSG00000026019	WD repeat domain 12 [Source:MGI Symbol;Acc:MGI:1927241]	1	60076868	-1	ENSMF00250000004615	RIBOSOME BIOGENESIS WDR12
Tagln2	2.08	3.69E-05	ENSMUSG00000026547	transgelin 2 [Source:MGI Symbol;Acc:MGI:1312985]	1	172500047	1	ENSMF00500000270015	TRANSGELIN
Nop2	2.08	2.21E-02	ENSMUSG00000038279	NOP2 nucleolar protein [Source:MGI Symbol;Acc:MGI:107891]	6	125131883	1	ENSMF00250000006350	RIBOSOMAL RNA METHYLTRANSFERASE NOP2 EC_2.1.1.- NUCLEOLAR 1 NUCLEOLAR 2 HOMOLOG PROLIFERATING CELL NUCLEOLAR ANTIGEN P120 PROLIFERATION ASSOCIATED NUCLEOLAR P120
Ncl	2.07	1.75E-13	ENSMUSG00000026234	nucleolin [Source:MGI Symbol;Acc:MGI:97286]	1	86344719	-1	ENSMF00500000270420	NUCLEOLIN
Gata3	2.07	2.28E-03	ENSMUSG00000015619	GATA binding protein 3 [Source:MGI Symbol;Acc:MGI:95663]	2	9857078	-1	ENSMF00730001521743	TRANSCRIPTION FACTOR
Nif3l1	2.06	3.76E-02	ENSMUSG00000026036	Ngg1 interacting factor 3-like 1 (S. pombe) [Source:MGI Symbol;Acc:MGI:1929485]	1	58445151	1	ENSMF00500000270871	NIF3 1
Rrs1	2.06	1.51E-02	ENSMUSG00000061024	RRS1 ribosome biogenesis regulator homolog (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1929721]	1	9545408	1	ENSMF00500000271445	RIBOSOME BIOGENESIS REGULATORY HOMOLOG
Mbnl3	2.06	6.06E-03	ENSMUSG00000036109	muscleblind-like 3 (Drosophila) [Source:MGI Symbol;Acc:MGI:2444912]	X	51117269	-1	ENSMF00250000000919	MUSCLEBLIND
Gm13092	2.06	1.39E-02	ENSMUSG000000085787	predicted gene 13092 [Source:MGI Symbol;Acc:MGI:3649661]	4	150315177	-1		
Rps6ka6	2.06	1.37E-06	ENSMUSG00000025665	ribosomal protein S6 kinase polypeptide 6 [Source:MGI Symbol;Acc:MGI:1914321]	X	111388192	-1	ENSMF00570000851006	RIBOSOMAL S6 KINASE ALPHA S6K ALPHA EC_2.7.11.1.90 KDA RIBOSOMAL S6 KINASE P90 RSK MAP KINASE ACTIVATED KINASE MAPK ACTIVATED KINASE MAPKAP KINASE MAPKAPK RIBOSOMAL S6 KINASE RSK

Ralgds	2.05	4.25E-02	ENSMUSG00000026821	ral guanine nucleotide dissociation stimulator [Source:MGI Symbol;Acc:MGI:107485]	2	28513125	1	ENSMF00690001356594	RAL GUANINE NUCLEOTIDE DISSOCIATION STIMULATOR RALGDS
Mki67ip	2.04	2.10E-03	ENSMUSG00000026377	Mki67 (FHA domain) interacting nucleolar phosphoprotein [Source:MGI Symbol;Acc:MGI:1915199]	1	118321839	1	ENSMF00500000271318	MKI67 FHA DOMAIN INTERACTING NUCLEOLAR PHOSPHOPROTEIN NUCLEOLAR INTERACTING WITH THE FHA DOMAIN OF PKI 67
Mios	2.03	2.74E-02	ENSMUSG00000042447	missing oocyte, meiosis regulator, homolog (Drosophila) [Source:MGI Symbol;Acc:MGI:2182066]	6	8209222	1	ENSMF00500000271280	WD REPEAT CONTAINING MIO
Gm15964	2.03	4.60E-02	ENSMUSG00000085337	predicted gene 15964 [Source:MGI Symbol;Acc:MGI:3802003]	16	91611468	1		
Hbb-bh0	2.02	2.37E-03	ENSMUSG00000085700	hemoglobin, beta, pseudogene bh0 [Source:MGI Symbol;Acc:MGI:96023]	7	103850020	-1		
Nat10	2.02	8.45E-04	ENSMUSG00000027185	N-acetyltransferase 10 [Source:MGI Symbol;Acc:MGI:2138939]	2	103721256	-1	ENSMF00250000003274	AMBIGUOUS
Hspe1-ps2	2.02	1.25E-05	ENSMUSG00000049246	heat shock protein 1 (chaperonin 10), pseudogene 2 [Source:MGI Symbol;Acc:MGI:1935162]	12	81399812	1		
Kansl3	2.02	2.05E-03	ENSMUSG00000010453	KAT8 regulatory NSL complex subunit 3 [Source:MGI Symbol;Acc:MGI:1918055]	1	36335730	-1	ENSMF00250000003188	KAT8 REGULATORY NSL COMPLEX SUBUNIT 3 NSL COMPLEX NSL3 NON SPECIFIC LETHAL 3 HOMOLOG
Rhno1	2.00	9.89E-03	ENSMUSG00000048668	RAD9-HUS1-RAD1 interacting nuclear orphan 1 [Source:MGI Symbol;Acc:MGI:1915315]	6	128357000	-1	ENSMF00250000009576	RAD9 HUS1 RAD1 INTERACTING NUCLEAR ORPHAN 1
Nutf2	2.00	5.17E-06	ENSMUSG00000008450	nuclear transport factor 2 [Source:MGI Symbol;Acc:MGI:1915301]	8	105860634	1	ENSMF00500000272390	NUCLEAR TRANSPORT FACTOR 2 NTF 2
Snhg11	2.00	8.84E-03	ENSMUSG00000044349	small nucleolar RNA host gene 11 [Source:MGI Symbol;Acc:MGI:2441845]	2	158375638	1	ENSMF00500000306327	UNKNOWN
Lama4	2.00	2.10E-03	ENSMUSG00000019846	laminin, alpha 4 [Source:MGI Symbol;Acc:MGI:109321]	10	38965515	1	ENSMF00740001589148	LAMININ SUBUNIT ALPHA PRECURSOR LAMININ SUBUNIT ALPHA LAMININ SUBUNIT ALPHA LAMININ SUBUNIT ALPHA
Trmt11	1.99	1.18E-02	ENSMUSG00000053286	tRNA methyltransferase 1 like [Source:MGI Symbol;Acc:MGI:1916185]	1	151428648	1	ENSMF00250000005394	TRMT1 EC_2.1.1.-
Gm12918	1.98	4.12E-02	ENSMUSG00000066315	predicted gene 12918 [Source:MGI Symbol;Acc:MGI:3652005]	4	10848403	1		
Ccdc25	1.98	9.00E-03	ENSMUSG00000022035	coiled-coil domain containing 25 [Source:MGI Symbol;Acc:MGI:1914429]	14	65837302	1	ENSMF00670001235546	COILED COIL DOMAIN CONTAINING 25
Snora75	1.98	2.00E-03	ENSMUSG00000064837	small nucleolar RNA, H/ACA box 75 [Source:MGI Symbol;Acc:MGI:3819511]	1	86351169	-1		
Gm16586	1.97	5.50E-04	ENSMUSG00000089788	predicted gene 16586 [Source:MGI Symbol;Acc:MGI:4415006]	1	178321108	-1		
Mdm4-ps	1.96	5.73E-03	ENSMUSG00000081739	transformed mouse 3T3 cell double minute 4, pseudogene [Source:MGI Symbol;Acc:MGI:2136991]	X	128261411	1		
Rab3gap1	1.95	1.30E-02	ENSMUSG00000036104	RAB3 GTPase activating protein subunit 1 [Source:MGI Symbol;Acc:MGI:2445001]	1	127868773	1	ENSMF00250000004358	RAB3 GTPASE ACTIVATING CATALYTIC SUBUNIT RAB3 GTPASE ACTIVATING 130 KDA SUBUNIT RAB3 GAP P130 RAB3 GAP
Nop58	1.95	1.23E-09	ENSMUSG00000026020	NOP58 ribonucleoprotein [Source:MGI Symbol;Acc:MGI:1933184]	1	59685006	1	ENSMF00730001521756	NUCLEOLAR 58
Gm12913	1.95	1.21E-02	ENSMUSG00000082697	predicted gene 12913 [Source:MGI Symbol;Acc:MGI:3650682]	4	78773677	-1		
Hspe1	1.94	6.49E-06	ENSMUSG00000073676	heat shock protein 1 (chaperonin 10) [Source:MGI Symbol;Acc:MGI:104680]	1	55088132	1	ENSMF00670001235755	10 KDA HEAT SHOCK PROTEIN MITOCHONDRIAL HSP10.10 KDA CHAPERONIN CHAPERONIN 10 CPN10

Gnl3	1.94	2.69E-06	ENSMUSG00000042354	guanine nucleotide binding protein-like 3 (nucleolar) [Source:MGI Symbol;Acc:MGI:1353651]	14	31012434	-1	ENSMF00550000743151	GUANINE NUCLEOTIDE BINDING 3
Cdkn1c	1.94	8.14E-05	ENSMUSG00000037664	cyclin-dependent kinase inhibitor 1C (P57) [Source:MGI Symbol;Acc:MGI:104564]	7	143458350	-1	ENSMF00600000922343	CYCLIN DEPENDENT KINASE INHIBITOR 1C CYCLIN DEPENDENT KINASE INHIBITOR P57 P57KIP2
Tceb1	1.93	2.44E-06	ENSMUSG000000079658	transcription elongation factor B (SIII), polypeptide 1 [Source:MGI Symbol;Acc:MGI:1915173]	1	16642766	-1	ENSMF00500000272323	TRANSCRIPTION ELONGATION FACTOR B POLYPEPTIDE 1 ELONGIN 15 KDA SUBUNIT ELONGIN C ELOC RNA POLYMERASE II TRANSCRIPTION FACTOR SIII SUBUNIT C SIII P15 STROMAL MEMBRANE ASSOCIATED SMAP1B HOMOLOG
Nt5c3	1.93	4.60E-02	ENSMUSG000000029780	5'-nucleotidase, cytosolic III [Source:MGI Symbol;Acc:MGI:1927186]	6	56882400	-1	ENSMF00250000002417	7 METHYLGUANOSINE PHOSPHATE SPECIFIC 5' NUCLEOTIDASE EC_3.1.3.- CYTOSOLIC 5' NUCLEOTIDASE 3B CYTOSOLIC 5' NUCLEOTIDASE III CN III EC_3.1.3.5
Tyw5	1.93	9.08E-03	ENSMUSG000000048495	tRNA-yW synthesizing protein 5 [Source:MGI Symbol;Acc:MGI:1915986]	1	57388237	-1	ENSMF00250000008246	TRNA WYBUTOSINE SYNTHESIZING 5 EC_1.14.11.-
Gimap4	1.92	2.84E-03	ENSMUSG000000054435	GTPase, IMAP family member 4 [Source:MGI Symbol;Acc:MGI:1349656]	6	48684549	1	ENSMF00750001632343	GTPASE IMAP FAMILY MEMBER IMMUNITY ASSOCIATED NUCLEOTIDE IAN
Naa16	1.92	5.54E-03	ENSMUSG000000022020	N(alpha)-acetyltransferase 16, NatA auxiliary subunit [Source:MGI Symbol;Acc:MGI:1914147]	14	79334204	-1	ENSMF00250000001517	N ALPHA ACETYLTRANSFERASE NATA AUXILIARY SUBUNIT NMDA RECEPTOR REGULATED 1
Nvl	1.92	7.76E-04	ENSMUSG000000026516	nuclear VCP-like [Source:MGI Symbol;Acc:MGI:1914709]	1	181093423	-1	ENSMF00570000851171	NUCLEAR VALOSIN CONTAINING NVLP NUCLEAR VCP
Gnptab	1.91	2.74E-02	ENSMUSG000000035311	N-acetylglucosamine-1-phosphate transferase, alpha and beta subunits [Source:MGI Symbol;Acc:MGI:3643902]	10	88379132	1	ENSMF00250000002969	N ACETYLGLUCOSAMINE 1 PHOSPHOTRANSFERASE SUBUNITS ALPHA/BETA PRECURSOR EC_2.7.8.17 GLCNAC 1 PHOSPHOTRANSFERASE SUBUNITS ALPHA/BETA STEALTH GNPTAB UDP N ACETYLGLUCOSAMINE 1 PHOSPHOTRANSFERASE SUBUNITS ALPHA/BETA [CONTAINS N ACETYLGLUCOSAMINE 1 PHOSPHOTRANS
Wdr75	1.91	2.17E-04	ENSMUSG000000025995	WD repeat domain 75 [Source:MGI Symbol;Acc:MGI:1920924]	1	45795166	1	ENSMF00250000002757	WD REPEAT CONTAINING 75
Hspb8	1.91	4.32E-02	ENSMUSG000000041548	heat shock protein 8 [Source:MGI Symbol;Acc:MGI:2135756]	5	116408491	-1	ENSMF00500000272825	HEAT SHOCK BETA 8 HSPB8 ALPHA CRYSTALLIN C CHAIN SMALL STRESS HSP22
Cenpj	1.89	5.58E-03	ENSMUSG000000064128	centromere protein J [Source:MGI Symbol;Acc:MGI:2684927]	14	56526761	-1	ENSMF00500000271009	CENTROMERE J CENP J
Dtl	1.88	1.59E-02	ENSMUSG000000037474	denticleless homolog (Drosophila) [Source:MGI Symbol;Acc:MGI:1924093]	1	191537365	-1	ENSMF00250000003251	DENTICLELESS HOMOLOG
Vamp4	1.88	5.58E-03	ENSMUSG000000026696	vesicle-associated membrane protein 4 [Source:MGI Symbol;Acc:MGI:1858730]	1	162570515	1	ENSMF00500000273038	VESICLE ASSOCIATED MEMBRANE 4 VAMP 4
Chmp1a	1.87	4.45E-04	ENSMUSG000000000743	charged multivesicular body protein 1A [Source:MGI Symbol;Acc:MGI:1920159]	8	123204264	-1	ENSMF00600000921337	CHARGED MULTIVESICULAR BODY 1B CHROMATIN MODIFYING 1B CHMP1B NUCLEASE SENSITIVE ELEMENT BINDING 1 CCAAT BINDING TRANSCRIPTION FACTOR I SUBUNIT A CBF A ENHANCER FACTOR I SUBUNIT A EFT A Y BOX TRANSCRIPTION FACTOR Y BOX BINDING 1 YB 1
Ybx3	1.87	7.05E-05	ENSMUSG000000030189	Y box protein 3 [Source:MGI Symbol;Acc:MGI:2137670]	6	131364858	-1	ENSMF00670001235454	

Hbb-y	1.87	1.25E-05	ENSMUSG00000052187	hemoglobin Y, beta-like embryonic chain [Source:MGI Symbol;Acc:MGI:96027]	7	103851745	-1	ENSMF00250000000136	HEMOGLOBIN SUBUNIT BETA BETA GLOBIN HEMOGLOBIN BETA CHAIN
Tuba1c	1.86	3.08E-06	ENSMUSG00000043091	tubulin, alpha 1C [Source:MGI Symbol;Acc:MGI:1095409]	15	99029891	1	ENSMF00250000000217	TUBULIN ALPHA CHAIN
Tfrc	1.85	5.59E-07	ENSMUSG00000022797	transferrin receptor [Source:MGI Symbol;Acc:MGI:98822]	16	32608920	1	ENSMF00500000270210	TRANSFERRIN RECEPTOR 1 TR TFR TFR1 TRFR CD71 ANTIGEN
Sin3b	1.85	1.99E-02	ENSMUSG00000031622	transcriptional regulator, SIN3B (yeast) [Source:MGI Symbol;Acc:MGI:107158]	8	72723288	1	ENSMF00570000851098	PAIRED AMPHIPATHIC HELIX HISTONE DEACETYLASE COMPLEX SUBUNIT TRANSCRIPTIONAL COREPRESSOR
Nsmce4a	1.85	4.01E-02	ENSMUSG00000040331	non-SMC element 4 homolog A (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1915122]	7	130532523	-1	ENSMF00250000004702	EP300 INTERACTING INHIBITOR OF DIFFERENTIATION 3 EID 3 EID 1 INHIBITOR OF DIFFERENTIATION 3 NON STRUCTURAL MAINTENANCE OF CHROMOSOMES ELEMENT 4 HOMOLOG B NS4EB NON SMC ELEMENT 4 HOMOLOG B
Kctd3	1.85	2.27E-02	ENSMUSG00000026608	potassium channel tetramerisation domain containing 3 [Source:MGI Symbol;Acc:MGI:2444629]	1	188971098	-1	ENSMF00250000002046	SH3KBP1 BINDING 1
Rpl39	1.84	4.60E-02	ENSMUSG00000079641	ribosomal protein L39 [Source:MGI Symbol;Acc:MGI:1914498]	X	37082520	-1	ENSMF00500000274679	UNKNOWN
Ppp1r15b	1.84	4.24E-03	ENSMUSG00000046062	protein phosphatase 1, regulatory (inhibitor) subunit 15b [Source:MGI Symbol;Acc:MGI:2444211]	1	133131143	1	ENSMF00250000008284	PHOSPHATASE 1 REGULATORY SUBUNIT 15B
Heatr3	1.84	4.51E-02	ENSMUSG00000031657	HEAT repeat containing 3 [Source:MGI Symbol;Acc:MGI:2444491]	8	88137855	1	ENSMF00250000005490	HEAT REPEAT CONTAINING 3
Psmc6	1.84	1.21E-02	ENSMUSG00000021832	proteasome (prosome, macropain) 26S subunit, ATPase, 6 [Source:MGI Symbol;Acc:MGI:1914339]	14	45329824	1	ENSMF00720001492034	26S PROTEASE REGULATORY SUBUNIT 10B 26S PROTEASOME AAA ATPASE SUBUNIT RPT4 PROTEASOME 26S SUBUNIT ATPASE 6 PROTEASOME SUBUNIT P42
Iars2	1.84	6.74E-03	ENSMUSG00000026618	isoleucine-tRNA synthetase 2, mitochondrial [Source:MGI Symbol;Acc:MGI:1919586]	1	185284726	-1	ENSMF00500000270016	ISOLEUCINE TRNA LIGASE MITOCHONDRIAL EC_6.1.1.5 ISOLEUCYL TRNA SYNTHETASE ILERS
Prdx6	1.83	1.31E-03	ENSMUSG00000026701	peroxiredoxin 6 [Source:MGI Symbol;Acc:MGI:894320]	1	161240112	-1	ENSMF00730001522010	PEROXIREDOXIN 6 EC_1.11.1.15 1 CYS PEROXIREDOXIN 1 CYS PRX ACIDIC CALCIUM INDEPENDENT PHOSPHOLIPASE A2 AIPLA2 EC_3.1.1.- ANTIOXIDANT 2 NON SELENIUM GLUTATHIONE PEROXIDASE NSGPX EC_1.11.-.- 1 9
Snord82	1.83	4.24E-03	ENSMUSG00000064823	small nucleolar RNA, C/D box 82 [Source:MGI Symbol;Acc:MGI:1931502]	1	86356261	-1		
Nfe2	1.83	3.07E-02	ENSMUSG00000058794	nuclear factor, erythroid derived 2 [Source:MGI Symbol;Acc:MGI:97308]	15	103248212	-1	ENSMF00690001356632	NUCLEAR FACTOR ERYTHROID 2 RELATED FACTOR 2 NF E2 RELATED FACTOR 2 NFE2 RELATED FACTOR 2 NUCLEAR FACTOR ERYTHROID DERIVED 2 2
Morc4	1.83	2.53E-04	ENSMUSG00000031434	microrchidia 4 [Source:MGI Symbol;Acc:MGI:1922996]	X	139821632	-1	ENSMF00250000003084	MORC FAMILY CW TYPE ZINC FINGER ZINC FINGER CW TYPE COILED COIL DOMAIN
Cox20	1.82	9.15E-03	ENSMUSG00000026500	COX20 Cox2 chaperone [Source:MGI Symbol;Acc:MGI:1913609]	1	178319130	1	ENSMF00520000517962	CYTOCHROME C OXIDASE 20 HOMOLOG
Bms1	1.82	5.54E-05	ENSMUSG00000030138	BMS1 homolog, ribosome assembly protein (yeast) [Source:MGI Symbol;Acc:MGI:2446132]	6	118383383	-1	ENSMF00250000002877	BMS1

Cacybp	1.81	1.19E-02	ENSMUSG00000014226	calcyclin binding protein [Source:MGI Symbol;Acc:MGI:1270839]	1	160202367	-1	ENSMF00250000005060	CALCYCLIN BINDING CACYBP
Oat	1.81	4.77E-02	ENSMUSG00000030934	ornithine aminotransferase [Source:MGI Symbol;Acc:MGI:97394]	7	132557475	-1	ENSMF00500000270057	ORNITHINE AMINOTRANSFERASE EC_2.6.1.13 ORNITHINE OXO ACID AMINOTRANSFERASE
Ppid	1.81	7.76E-04	ENSMUSG00000027804	peptidylprolyl isomerase D (cyclophilin D) [Source:MGI Symbol;Acc:MGI:1914988]	3	79591342	1	ENSMF00730001521742	PEPTIDYL PROLYL CIS TRANS ISOMERASE D PPIASE D EC_5.2.1.8 ROTAMASE D
Usp37	1.80	1.34E-02	ENSMUSG00000033364	ubiquitin specific peptidase 37 [Source:MGI Symbol;Acc:MGI:2442483]	1	74435510	-1	ENSMF00250000004084	UBIQUITIN CARBOXYL TERMINAL HYDROLASE 37 EC_3.4.19.12 DEUBIQUITINATING ENZYME 37 UBIQUITIN THIOESTERASE 37 UBIQUITIN SPECIFIC PROCESSING PROTEASE 37
Fgfr1op2	1.80	2.14E-03	ENSMUSG00000040242	FGFR1 oncogene partner 2 [Source:MGI Symbol;Acc:MGI:1914779]	6	146577203	1	ENSMF00500000271325	FGFR1 ONCOGENE PARTNER 2 HOMOLOG
Cyb5r3	1.80	1.99E-02	ENSMUSG00000018042	cytochrome b5 reductase 3 [Source:MGI Symbol;Acc:MGI:94893]	15	83153494	-1	ENSMF00730001521809	NADH CYTOCHROME B5 REDUCTASE B5R EC_1.6.2.2
Swi5	1.80	2.17E-04	ENSMUSG00000044627	SWI5 recombination repair homolog (yeast) [Source:MGI Symbol;Acc:MGI:1920181]	2	32278816	-1	ENSMF00500000295186	DNA REPAIR SWI5 HOMOLOG SAE3 HOMOLOG
Emg1	1.79	7.49E-03	ENSMUSG00000004268	EMG1 nucleolar protein homolog (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1315195]	6	124704381	-1	ENSMF00250000006317	RIBOSOMAL RNA SMALL SUBUNIT METHYLTRANSFERASE NEP1 18S RRNA PSEUDOURIDINE N1 METHYLTRANSFERASE NEP1 NUCLEOLAR
Gm13339	1.79	8.74E-05	ENSMUSG000000082884	predicted gene 13339 [Source:MGI Symbol;Acc:MGI:3650221]	2	22590024	-1		
Ndufa5	1.79	2.14E-03	ENSMUSG000000023089	NADH dehydrogenase (ubiquinone) 1 alpha subcomplex, 5 [Source:MGI Symbol;Acc:MGI:1915452]	6	24518666	-1	ENSMF00670001236297	NADH DEHYDROGENASE [UBIQUINONE] 1 ALPHA SUBCOMPLEX SUBUNIT 5 COMPLEX I SUBUNIT B13 COMPLEX I 13KD B CI 13KD B NADH UBIQUINONE OXIDOREDUCTASE 13 KDA B SUBUNIT SOSS COMPLEX SUBUNIT B1 NUCLEIC ACID BINDING 2 OLIGONUCLEOTIDE/OLIGOSACCHARIDE BINDING FOLD CONTAINING 2B SENSOR OF SINGLE STRAND DNA COMPLEX SUBUNIT B1 SENSOR OF SSDNA SUBUNIT B1 SOSS B1 SINGLE STRANDED DNA BINDING 1
Nabp1	1.79	8.42E-03	ENSMUSG000000026107	nucleic acid binding protein 1 [Source:MGI Symbol;Acc:MGI:1923258]	1	51469498	-1	ENSMF00250000004294	
Ank1	1.79	6.26E-03	ENSMUSG000000031543	ankyrin 1, erythroid [Source:MGI Symbol;Acc:MGI:88024]	8	22974844	1	ENSMF00500000269628	ANKYRIN ANK ANKYRIN
Tkt	1.79	3.45E-02	ENSMUSG000000021957	transketolase [Source:MGI Symbol;Acc:MGI:105992]	14	30548359	1	ENSMF00250000001413	TRANSKETOLASE EC_2.2.1.1
Cdca2	1.79	1.15E-02	ENSMUSG000000048922	cell division cycle associated 2 [Source:MGI Symbol;Acc:MGI:1919787]	14	67676331	-1	ENSMF00260000051327	CELL DIVISION CYCLE ASSOCIATED 2
Rpl31	1.79	1.39E-03	ENSMUSG000000073702	ribosomal protein L31 [Source:MGI Symbol;Acc:MGI:2149632]	1	39367851	1	ENSMF00670001235422	60S RIBOSOMAL L31
Xrcc5	1.78	5.85E-03	ENSMUSG000000026187	X-ray repair complementing defective repair in Chinese hamster cells 5 [Source:MGI Symbol;Acc:MGI:104517]	1	72307421	1	ENSMF00250000004231	X RAY REPAIR CROSS COMPLEMENTING 5 EC_3.6.4.- ATP DEPENDENT DNA HELICASE 2 SUBUNIT 2 ATP DEPENDENT DNA HELICASE II 80 KDA SUBUNIT CTC BOX BINDING FACTOR 85 KDA SUBUNIT CTC85 CTCBF DNA REPAIR XRCC5 KU AUTOANTIGEN P86 NUCLEAR FACTOR IV

Hspd1	1.78	7.48E-06	ENSMUSG00000025980	heat shock protein 1 (chaperonin) [Source:MGI Symbol;Acc:MGI:96242]	1	55077835	-1	ENSMF00250000001409	60 KDA HEAT SHOCK PROTEIN MITOCHONDRIAL 60 KDA CHAPERONIN CHAPERONIN 60 CPN60 HEAT SHOCK 60 HSP 60 HSP60
Mrpl51	1.78	9.30E-03	ENSMUSG00000030335	mitochondrial ribosomal protein L51 [Source:MGI Symbol;Acc:MGI:1913743]	6	125191801	1	ENSMF00500000274585	39S RIBOSOMAL L51 MITOCHONDRIAL PRECURSOR L51MT MRP L51 BMRP 64 BMRP64
Tra2a	1.77	1.47E-03	ENSMUSG00000029817	transformer 2 alpha homolog (Drosophila) [Source:MGI Symbol;Acc:MGI:1933972]	6	49243921	-1	ENSMF00600000921261	TRANSFORMER 2 HOMOLOG BETA TRA 2 BETA TRA2 BETA SPLICING FACTOR ARGININE/SERINE RICH 10
Cenpf	1.77	9.87E-05	ENSMUSG00000026605	centromere protein F [Source:MGI Symbol;Acc:MGI:1313302]	1	189640599	-1	ENSMF00250000003245	TRANSFORMER 2 HOMOLOG B CENTROMERE F PRECURSOR CENP F AH ANTIGEN KINETOCHORE CENPF MITOSIN
Arpc4	1.76	8.76E-03	ENSMUSG00000079426	actin related protein 2/3 complex, subunit 4 [Source:MGI Symbol;Acc:MGI:1915339]	6	113378113	1	ENSMF00250000003587	ACTIN RELATED 2/3 COMPLEX SUBUNIT 4 ARP2/3 COMPLEX 20 KDA P20 ARC
Hmha1	1.76	1.26E-02	ENSMUSG00000035697	histocompatibility (minor) HA-1 [Source:MGI Symbol;Acc:MGI:1917969]	10	80016653	1	ENSMF00250000001346	RHO GTPASE ACTIVATING 29 RHO TYPE GTPASE ACTIVATING 29
Fkbp4	1.75	6.38E-05	ENSMUSG00000030357	FK506 binding protein 4 [Source:MGI Symbol;Acc:MGI:95543]	6	128429735	-1	ENSMF00500000270053	PEPTIDYL PROLYL CIS TRANS ISOMERASE FKBP5 PPIASE FKBP5 EC. 5.2.1.8.51 KDA FK506 BINDING 51 KDA FKBP FKBP 51 FK506 BINDING 5 FKBP 5 ROTAMASE
Las1l	1.75	1.45E-02	ENSMUSG00000057421	LAS1-like (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1923380]	X	95935335	-1	ENSMF00250000006418	RIBOSOMAL BIOGENESIS LAS1L LAS1 HOMOLOG
Casp2	1.75	4.97E-02	ENSMUSG00000029863	caspase 2 [Source:MGI Symbol;Acc:MGI:97295]	6	42264985	1	ENSMF00400000131899	CASPASE 2 PRECURSOR CASP 2 EC_3.4.22.55 NEURAL PRECURSOR CELL EXPRESSED DEVELOPMENTALLY DOWN REGULATED 2 NEDD 2 PROTEASE ICH 1 [CONTAINS CASPASE 2 SUBUNIT P18; CASPASE 2 SUBUNIT P13; CASPASE 2 SUBUNIT P12]
Gm16589	1.74	6.80E-03	ENSMUSG00000074482	predicted gene 16589 [Source:MGI Symbol;Acc:MGI:4418561]	8	4087543	1		
Nucks1	1.74	2.08E-05	ENSMUSG00000026434	nuclear casein kinase and cyclin-dependent kinase substrate 1 [Source:MGI Symbol;Acc:MGI:1934811]	1	131910458	1	ENSMF00600000921550	NUCLEAR UBIQUITOUS CASEIN AND CYCLIN DEPENDENT KINASE SUBSTRATE 1
Asb4	1.74	1.24E-02	ENSMUSG00000042607	ankyrin repeat and SOCS box-containing 4 [Source:MGI Symbol;Acc:MGI:1929751]	6	5383386	1	ENSMF00480000262822	ANKYRIN REPEAT AND SOCS BOX 4 ASB 4
Degs1	1.74	9.21E-03	ENSMUSG00000038633	degenerative spermatocyte homolog 1 (Drosophila) [Source:MGI Symbol;Acc:MGI:1097711]	1	182275772	-1	ENSMF00250000002237	SPHINGOLIPID DELTA 4 DESATURASE DES1 EC_1.14.-.- DEGENERATIVE SPERMATOCYTE HOMOLOG 1
Obsl1	1.74	4.00E-02	ENSMUSG00000026211	obscurin-like 1 [Source:MGI Symbol;Acc:MGI:2138628]	1	75479310	-1	ENSMF00740001589077	EC_2.7.11.1
Rpl13	1.74	9.09E-04	ENSMUSG00000000740	ribosomal protein L13 [Source:MGI Symbol;Acc:MGI:105922]	8	123102350	1	ENSMF00500000270284	60S RIBOSOMAL L13
Rab23	1.73	1.78E-02	ENSMUSG000000004768	RAB23, member RAS oncogene family [Source:MGI Symbol;Acc:MGI:99833]	1	33719882	1	ENSMF00400000131956	RAS RELATED RAB 23 PRECURSOR
Sgol2	1.73	1.23E-02	ENSMUSG00000026039	shugoshin-like 2 (S. pombe) [Source:MGI Symbol;Acc:MGI:1098767]	1	57995971	1	ENSMF00250000005926	SHUGOSHIN 2 SHUGOSHIN 2 SGO2
Selk	1.73	4.60E-02	ENSMUSG00000042682	selenoprotein K [Source:MGI Symbol;Acc:MGI:1931466]	14	29968308	1	ENSMF006070001236822	SELENOPROTEIN K SELK
Tpr	1.73	3.79E-07	ENSMUSG000000006005	translocated promoter region [Source:MGI Symbol;Acc:MGI:1922066]	1	150392838	1	ENSMF00560000771074	NUCLEOPROTEIN TPR NPC ASSOCIATED INTRANUCLEAR TRANSLOCATED PROMOTER REGION AND NUCLEAR BASKET

Mcm3	1.73	7.55E-03	ENSMUSG00000041859	minichromosome maintenance deficient 3 (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:101845]	1	20802974	-1	ENSMF00500000270133	DNA REPLICATION LICENSING FACTOR MCM3 EC_3.6.4.12
Nolc1	1.73	3.13E-02	ENSMUSG00000015176	nucleolar and coiled-body phosphoprotein 1 [Source:MGI Symbol;Acc:MGI:1918019]	19	46075863	1	ENSMF00500000272162	NUCLEOLAR AND COILED BODY PHOSPHOPROTEIN 1.140 KDA NUCLEOLAR PHOSPHOPROTEIN NOPP140 NUCLEOLAR 130 KDA NUCLEOLAR PHOSPHOPROTEIN P130
Trim6	1.72	3.31E-02	ENSMUSG00000072244	tripartite motif-containing 6 [Source:MGI Symbol;Acc:MGI:2137352]	7	104218793	1	ENSMF00600000921153	TRIPARTITE MOTIF CONTAINING 5 EC_6.3.2.- TRIM5ALPHA
Ttll4	1.72	2.28E-02	ENSMUSG00000033257	tubulin tyrosine ligase-like family, member 4 [Source:MGI Symbol;Acc:MGI:1914784]	1	74661745	1	ENSMF00500000269966	TUBULIN POLYGLUTAMYLASE EC 6 TUBULIN TYROSINE LIGASE
Sugt1	1.72	7.04E-03	ENSMUSG00000022024	SGT1, suppressor of G2 allele of SKP1 (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1915205]	14	79587691	1	ENSMF00500000271163	SUPPRESSOR OF G2 ALLELE OF SKP1 HOMOLOG
Mcf2	1.71	2.35E-02	ENSMUSG00000024150	multiple coagulation factor deficiency 2 [Source:MGI Symbol;Acc:MGI:2183439]	17	87254658	-1	ENSMF00670001236008	MULTIPLE COAGULATION FACTOR DEFICIENCY 2 PRECURSOR NEURAL STEM CELL DERIVED NEURONAL SURVIVAL
Hmgn5	1.71	5.54E-05	ENSMUSG00000031245	high-mobility group nucleosome binding domain 5 [Source:MGI Symbol;Acc:MGI:1355295]	X	109004534	-1	ENSMF00600000925254	HIGH MOBILITY GROUP NUCLEOSOME BINDING DOMAIN CONTAINING 5 NUCLEOSOME BINDING 1
Pot1a	1.71	5.00E-02	ENSMUSG00000029676	protection of telomeres 1A [Source:MGI Symbol;Acc:MGI:2141503]	6	25743737	-1	ENSMF00250000005672	PROTECTION OF TELOMERES 1 POT1 TELOMERE END BINDING
Gigyf2	1.71	7.62E-05	ENSMUSG00000048000	GRB10 interacting GYF protein 2 [Source:MGI Symbol;Acc:MGI:2138584]	1	87326998	1	ENSMF00740001589295	PERQ AMINO ACID RICH WITH GYF DOMAIN CONTAINING 2 TRINUCLEOTIDE REPEAT CONTAINING GENE 15
Cspp1	1.70	8.37E-04	ENSMUSG00000056763	centrosome and spindle pole associated protein 1 [Source:MGI Symbol;Acc:MGI:2681832]	1	10038218	1	ENSMF00400000131873	CENTROSOME AND SPINDLE POLE ASSOCIATED 1
Sept8	1.70	6.52E-03	ENSMUSG00000018398	septin 8 [Source:MGI Symbol;Acc:MGI:894310]	11	53519257	1	ENSMF00350000105408	SEPTIN
Cflar	1.70	1.28E-02	ENSMUSG00000026031	CASP8 and FADD-like apoptosis regulator [Source:MGI Symbol;Acc:MGI:1336166]	1	58711508	1	ENSMF00250000004126	CASP8 AND FADD APOPTOSIS REGULATOR PRECURSOR CASPASE HOMOLOG CASH CASPASE EIGHT RELATED CASPER CASPASE APOPTOSIS REGULATORY CLARP CELLULAR FLICE INHIBITORY C FLIP FADD ANTIAPOPTOTIC MOLECULE 1 FLAME 1 INHIBITOR OF FLICE I FLICE MACH RELATED INDUCER OF
Dlk1	1.69	1.69E-05	ENSMUSG00000040856	delta-like 1 homolog (Drosophila) [Source:MGI Symbol;Acc:MGI:94900]	12	109452823	1	ENSMF00500000271565	DELTA HOMOLOG 1 PRECURSOR DLK 1 [CONTAINS FETAL ANTIGEN 1 FA1]
Rps24-ps3	1.69	2.45E-02	ENSMUSG000000081049	ribosomal protein S24, pseudogene 3 [Source:MGI Symbol;Acc:MGI:3644407]	X	79195047	1		
Rpl31-ps8	1.69	2.87E-02	ENSMUSG000000067870	ribosomal protein L31, pseudogene 8 [Source:MGI Symbol;Acc:MGI:3647726]	15	90764246	-1		
Capn7	1.69	5.02E-04	ENSMUSG000000021893	calpain 7 [Source:MGI Symbol;Acc:MGI:1338030]	14	31336638	1	ENSMF00250000005718	CALPAIN PROTEASE EC_3.4.22.- CYSTEINE PROTEASE
Cbx3	1.69	3.46E-03	ENSMUSG000000029836	chromobox 3 [Source:MGI Symbol;Acc:MGI:108515]	6	51470360	1	ENSMF00600000921203	CHROMOBOX HOMOLOG
Gm12141	1.69	3.14E-05	ENSMUSG000000058809	predicted gene 12141 [Source:MGI Symbol;Acc:MGI:3651246]	11	41498737	1		HETEROCHROMATIN 1 HOMOLOG HP1
Gm10800	1.69	4.98E-06	ENSMUSG00000075014	predicted gene 10800 [Source:MGI Symbol;Acc:MGI:3641657]	2	98666547	-1	ENSMF00360000113264	AMBIGUOUS

Ahctf1	1.68	1.56E-04	ENSMUSG00000026491	AT hook containing transcription factor 1 [Source:MGI Symbol;Acc:MGI:1915033]	1	179744894	-1	ENSFM00250000003426	ELYS EMBRYONIC LARGE MOLECULE DERIVED FROM YOLK SAC MEL 28 AT HOOK CONTAINING TRANSCRIPTION FACTOR 1
Vdac2	1.68	3.23E-03	ENSMUSG000000021771	voltage-dependent anion channel 2 [Source:MGI Symbol;Acc:MGI:106915]	14	21831269	1	ENSFM00250000001189	VOLTAGE DEPENDENT ANION SELECTIVE CHANNEL VDAC OUTER MITOCHONDRIAL MEMBRANE PORIN
Glul	1.68	1.68E-03	ENSMUSG000000026473	glutamate-ammonia ligase (glutamine synthetase) [Source:MGI Symbol;Acc:MGI:95739]	1	153899944	1	ENSFM00750001632335	GLUTAMINE SYNTHETASE GS EC_6.3.1.2 GLUTAMATE DECARBOXYLASE EC_4.1.1.-15 GLUTAMATE AMMONIA LIGASE
Psmc11	1.66	3.40E-02	ENSMUSG000000017428	proteasome (prosome, macropain) 26S subunit, non-ATPase, 11 [Source:MGI Symbol;Acc:MGI:1916327]	11	80428615	1	ENSFM00250000003951	26S PROTEASOME NON ATPASE REGULATORY SUBUNIT 26S PROTEASOME REGULATORY SUBUNIT RPN6
Rnaseh2b	1.66	1.14E-02	ENSMUSG000000021932	ribonuclease H2, subunit B [Source:MGI Symbol;Acc:MGI:1914403]	14	62292589	1	ENSFM00250000005849	RIBONUCLEASE H2 SUBUNIT B RNASE H2 SUBUNIT B RIBONUCLEASE HI SUBUNIT B
Rbm28	1.66	3.62E-02	ENSMUSG000000029701	RNA binding motif protein 28 [Source:MGI Symbol;Acc:MGI:2655711]	6	29123573	-1	ENSFM00500000271376	RNA BINDING 28 RNA BINDING MOTIF 28
Mpp6	1.65	2.39E-02	ENSMUSG000000038388	membrane protein, palmitoylated 6 (MAGUK p55 subfamily member 6) [Source:MGI Symbol;Acc:MGI:1927340]	6	50110241	1	ENSFM00730001521911	MAGUK P55 SUBFAMILY MEMBER 2 DISCS LARGE HOMOLOG 2 MPP2
Kctd18	1.65	1.25E-02	ENSMUSG000000054770	potassium channel tetramerisation domain containing 18 [Source:MGI Symbol;Acc:MGI:3603813]	1	57955101	-1	ENSFM00250000007671	BTB/POZ DOMAIN CONTAINING KCTD18
Dedd	1.64	3.32E-02	ENSMUSG000000013973	death effector domain-containing [Source:MGI Symbol;Acc:MGI:1333874]	1	171329145	1	ENSFM00250000005413	DNA BINDING DEATH EFFECTOR DOMAIN CONTAINING 2 DED CONTAINING FLAME 3 FADD ANTI APOPTOTIC MOLECULE 3
Eif5b	1.64	2.08E-05	ENSMUSG000000026083	eukaryotic translation initiation factor 5B [Source:MGI Symbol;Acc:MGI:2441772]	1	37998010	1	ENSFM00250000003138	EUKARYOTIC TRANSLATION INITIATION FACTOR 5B EIF 5B TRANSLATION INITIATION FACTOR IF 2
Mettl3	1.63	3.42E-02	ENSMUSG000000022160	methytransferase like 3 [Source:MGI Symbol;Acc:MGI:1927165]	14	52294668	-1	ENSFM00250000006886	N6 ADENOSINE METHYLTRANSFERASE 70 KDA SUBUNIT MT A70 EC_2.1.1.62 METHYLTRANSFERASE 3
Grb10	1.63	1.54E-04	ENSMUSG000000020176	growth factor receptor bound protein 10 [Source:MGI Symbol;Acc:MGI:103232]	11	11930508	-1	ENSFM00250000001938	GROWTH FACTOR RECEPTOR BOUND ADAPTER
Ipo5	1.63	1.20E-02	ENSMUSG000000030662	importin 5 [Source:MGI Symbol;Acc:MGI:1917822]	14	120911194	1	ENSFM00250000002607	IMPORTIN SUBUNIT BETA 3
Txndc9	1.63	3.39E-02	ENSMUSG000000058407	thioredoxin domain containing 9 [Source:MGI Symbol;Acc:MGI:2138153]	1	37983867	-1	ENSFM00500000271323	KARYOPHERIN BETA 3 THIOREDOXIN DOMAIN CONTAINING 9
Srp14	1.63	1.56E-02	ENSMUSG000000009549	signal recognition particle 14 [Source:MGI Symbol;Acc:MGI:107169]	2	118475850	-1	ENSFM00670001236179	ATP BINDING ASSOCIATED WITH CELL DIFFERENTIATION SIGNAL RECOGNITION PARTICLE 14 KDA SRP14
Tex30	1.62	4.32E-02	ENSMUSG000000026049	testis expressed 30 [Source:MGI Symbol;Acc:MGI:1922873]	1	44086613	-1	ENSFM00250000008585	TESTIS EXPRESSED SEQUENCE 30
Mphosph8	1.62	1.09E-03	ENSMUSG000000079184	M-phase phosphoprotein 8 [Source:MGI Symbol;Acc:MGI:1922589]	14	56668248	1	ENSFM00250000006145	M PHASE PHOSPHOPROTEIN 8
Rps24	1.62	6.04E-03	ENSMUSG000000025290	ribosomal protein S24 [Source:MGI Symbol;Acc:MGI:98147]	14	24490681	1	ENSFM00500000270090	40S RIBOSOMAL S24
Sf3b1	1.62	1.51E-04	ENSMUSG000000025982	splicing factor 3b, subunit 1 [Source:MGI Symbol;Acc:MGI:1932339]	1	54985169	-1	ENSFM00250000003034	SPLICING FACTOR 3B SUBUNIT PRE SPLICING FACTOR SF3B 155 KDA SUBUNIT S SPLICEOSOME ASSOCIATED 155 SAP 155
Ints6	1.61	3.44E-02	ENSMUSG000000035161	integrator complex subunit 6 [Source:MGI Symbol;Acc:MGI:1202397]	14	62676330	-1	ENSFM00250000001970	INTEGRATOR COMPLEX SUBUNIT 6 INT6

Arl4c	1.61	3.86E-02	ENSMUSG00000049866	ADP-ribosylation factor-like 4C [Source:MGI Symbol;Acc:MGI:2445172]	1	88673125	-1	ENSMF00500000270123	ADP RIBOSYLATION FACTOR ADP RIBOSYLATION FACTOR TRIFUNCTIONAL PURINE BIOSYNTHETIC ADENOSINE 3[INCLUDES PHOSPHORIBOSYLAMINE GLYCINE LIGASE EC_6.3.4.13 GLYCINAMIDE RIBONUCLEOTIDE SYNTHETASE GARS PHOSPHORIBOSYLGLYCINAMIDE SYNTHETASE ; PHOSPHORIBOSYLFORMYLGLYCINAMIDIN E CYCLO LIGASE EC_6.3.3.- 1 AIR SYNTHAS
Gart	1.61	3.81E-02	ENSMUSG00000022962	phosphoribosylglycinamide formyltransferase [Source:MGI Symbol;Acc:MGI:95654]	16	91621186	-1	ENSMF00250000001726	60S RIBOSOMAL L32
Rpl32	1.61	3.18E-02	ENSMUSG00000057841	ribosomal protein L32 [Source:MGI Symbol;Acc:MGI:98038]	6	115805505	-1	ENSMF00500000270098	ZINC FINGER
Zfp322a	1.61	4.62E-02	ENSMUSG00000046351	zinc finger protein 322A [Source:MGI Symbol;Acc:MGI:2442566]	13	23353103	-1	ENSMF00250000000002	KINESIN KIF14
Kif14	1.60	3.84E-02	ENSMUSG00000041498	kinesin family member 14 [Source:MGI Symbol;Acc:MGI:1098226]	1	136467958	1	ENSMF00730001522291	PROHIBITIN 2
Phb2	1.60	1.15E-02	ENSMUSG00000004264	prohibitin 2 [Source:MGI Symbol;Acc:MGI:102520]	6	124712336	1	ENSMF00730001521744	ANKYRIN REPEAT DOMAIN CONTAINING
Ankrd26	1.60	4.11E-02	ENSMUSG00000007827	ankyrin repeat domain 26 [Source:MGI Symbol;Acc:MGI:1917887]	6	118502564	-1	ENSMF00570000851034	UNKNOWN
Myeov2	1.60	1.13E-02	ENSMUSG000000073616	myeloma overexpressed 2 [Source:MGI Symbol;Acc:MGI:1914165]	1	92637145	-1	ENSMF00670001249188	CLASPIN
Clspn	1.60	2.84E-02	ENSMUSG00000042489	claspin [Source:MGI Symbol;Acc:MGI:2445153]	4	126556935	1	ENSMF00250000004951	POLYBROMO 1 BRG1 ASSOCIATED FACTOR 180 BAF180
Pbrm1	1.60	3.42E-04	ENSMUSG00000042323	polybromo 1 [Source:MGI Symbol;Acc:MGI:1923998]	14	31019138	1	ENSMF00570000851187	LYSINE SPECIFIC DEMETHYLASE EC_1.14.11.- HISTONE DEMETHYLASE JUMONJI/ARID DOMAIN CONTAINING
Kdm5b	1.60	1.18E-03	ENSMUSG00000042207	lysine (K)-specific demethylase 5B [Source:MGI Symbol;Acc:MGI:1922855]	1	134560171	1	ENSMF00250000000658	60S RIBOSOMAL L7
Rpl7	1.59	1.77E-02	ENSMUSG00000043716	ribosomal protein L7 [Source:MGI Symbol;Acc:MGI:98073]	1	16101295	-1	ENSMF00250000000871	60S RIBOSOMAL L18
Rpl18	1.59	2.90E-02	ENSMUSG00000059070	ribosomal protein L18 [Source:MGI Symbol;Acc:MGI:98003]	7	45715457	1	ENSMF00250000002707	ZINC FINGER CCCH DOMAIN CONTAINING 11A
Zc3h11a	1.58	1.43E-02	ENSMUSG00000026464	zinc finger CCCH type containing 11A [Source:MGI Symbol;Acc:MGI:1917829]	1	133619871	-1	ENSMF00250000004239	POLY [ADP RIBOSE] POLYMERASE 1 PARP 1 EC_2.4.2.30 ADP RIBOSYLTRANSFERASE DIPHTHERIA TOXIN 1 ARTD1 NAD + ADP RIBOSYLTRANSFERASE 1 ADPRT 1 POLY[ADP RIBOSE] SYNTHASE 1
Parp2	1.58	1.99E-02	ENSMUSG00000036023	poly (ADP-ribose) polymerase family, member 2 [Source:MGI Symbol;Acc:MGI:1341112]	14	50807946	1	ENSMF00250000001234	PRE SPLICING FACTOR SPF27 BREAST CARCINOMA AMPLIFIED SEQUENCE 2 DNA AMPLIFIED IN MAMMARY CARCINOMA 1
Bcas2	1.58	2.50E-02	ENSMUSG00000005687	breast carcinoma amplified sequence 2 [Source:MGI Symbol;Acc:MGI:1915433]	3	103171655	1	ENSMF00250000005778	PARAFIBROMIN CELL DIVISION CYCLE 73 HOMOLOG HYPERPARATHYROIDISM 2
Cdc73	1.58	5.26E-03	ENSMUSG00000026361	cell division cycle 73, Paf1/RNA polymerase II complex component [Source:MGI Symbol;Acc:MGI:2384876]	1	143598797	-1	ENSMF00250000003369	DISKS LARGE HOMOLOG 5 DISCS LARGE P DLG PLACENTA AND PROSTATE DLG
Dlg5	1.58	3.43E-02	ENSMUSG00000021782	discs, large homolog 5 (Drosophila) [Source:MGI Symbol;Acc:MGI:1918478]	14	24133953	-1	ENSMF00360000109935	GLYCINE CLEAVAGE SYSTEM H PROTEIN MITOCHONDRIAL PRECURSOR
Gcsh	1.58	4.17E-02	ENSMUSG00000034424	glycine cleavage system protein H (aminomethyl carrier) [Source:MGI Symbol;Acc:MGI:1915383]	8	116981810	-1	ENSMF00500000271167	
H19	1.57	6.12E-05	ENSMUSG00000000031	H19 fetal liver mRNA [Source:MGI Symbol;Acc:MGI:95891]	7	142575529	-1		

Gas5	1.57	5.96E-03	ENSMUSG00000053332	growth arrest specific 5 [Source:MGI Symbol;Acc:MGI:95659]	1	161034422	1		
Bex1	1.57	7.28E-03	ENSMUSG00000050071	brain expressed gene 1 [Source:MGI Symbol;Acc:MGI:1328321]	X	136213972	-1	ENSMF00600000921661	BRAIN EXPRESSED X LINKED
Glud1	1.57	3.07E-02	ENSMUSG000000021794	glutamate dehydrogenase 1 [Source:MGI Symbol;Acc:MGI:95753]	14	34310727	1	ENSMF00250000001520	GLUTAMATE DEHYDROGENASE MITOCHONDRIAL GDH EC_1.4.1.3 GOLGI RESIDENT GCP60 ACYL COA BINDING DOMAIN CONTAINING 3 GOLGI COMPLEX ASSOCIATED 1 GOCAP1 GOLGI PHOSPHOPROTEIN 1 GOLPH1 PBR AND PKA ASSOCIATED 7 PERIPHERAL BENZODIAZEPINE RECEPTOR ASSOCIATED PAP7 UBIQUITIN CARBOXYL TERMINAL HYDROLASE ISOZYME L5 UCH L5 EC_3.4.19.12 UBIQUITIN C TERMINAL HYDROLASE UCH37 UBIQUITIN THIOESTERASE L5
Acbd3	1.57	1.84E-02	ENSMUSG000000026499	acyl-Coenzyme A binding domain containing 3 [Source:MGI Symbol;Acc:MGI:2181074]	1	180726043	1	ENSMF00500000270849	60S RIBOSOMAL L22
Uchl5	1.57	1.64E-02	ENSMUSG000000018189	ubiquitin carboxyl-terminal esterase L5 [Source:MGI Symbol;Acc:MGI:1914848]	1	143777278	1	ENSMF00670001235447	KINASE EC_2.7.11.1 KINASE MAPK/ERK KINASE KINASE KINASE MEK KINASE KINASE MEKKK KINASE WD REPEAT AND HMG BOX DNA BINDING 1 ACIDIC NUCLEOPLASMIC DNA BINDING 1 AND 1 ADENYLOSUCCINATE SYNTHETASE AMPASE ADSS EC_6.3.4.4 IMP ASPARTATE LIGASE COILED COIL HELIX COILED COIL HELIX DOMAIN CONTAINING MITOCHONDRIAL PRECURSOR
Rpl22	1.56	1.89E-02	ENSMUSG000000028936	ribosomal protein L22 [Source:MGI Symbol;Acc:MGI:99262]	4	152325742	1	ENSMF00600000921476	PITUITARY TUMOR TRANSFORMING GENE
AY036118	1.56	2.21E-02	ENSMUSG000000045999	cDNA sequence AY036118 [Source:MGI Symbol;Acc:MGI:2158419]	17	39848103	-1		
Map4k4	1.56	7.91E-03	ENSMUSG000000026074	mitogen-activated protein kinase kinase kinase 4 [Source:MGI Symbol;Acc:MGI:1349394]	1	39900913	1	ENSMF00260000050335	40S RIBOSOMAL
Wdhd1	1.56	4.60E-02	ENSMUSG000000037572	WD repeat and HMG-box DNA binding protein 1 [Source:MGI Symbol;Acc:MGI:2443514]	14	47240944	-1	ENSMF00500000271028	SINGLE STRANDED DNA BINDING PROTEIN MITOCHONDRIAL PRECURSOR MT SSB MTSSB
Adss	1.55	7.59E-03	ENSMUSG000000015961	adenylosuccinate synthetase, non muscle [Source:MGI Symbol;Acc:MGI:87948]	1	177762962	-1	ENSMF00250000002012	CYCLIN T
Chchd2	1.55	3.41E-04	ENSMUSG000000070493	coiled-coil-helix-coiled-coil-helix domain containing 2 [Source:MGI Symbol;Acc:MGI:1261428]	5	129881156	-1	ENSMF00600000921422	CENTROSOME ASSOCIATED 350 CEP350 CENTROSOME ASSOCIATED OF 350 KDA STAPHYLOCOCCAL NUCLEASE DOMAIN CONTAINING 1.100 KDA COACTIVATOR P100 CO ACTIVATOR
Pttg1	1.55	2.54E-02	ENSMUSG000000020415	pituitary tumor-transforming gene 1 [Source:MGI Symbol;Acc:MGI:1353578]	11	43420250	-1	ENSMF00250000006475	
Gm5844	1.55	3.59E-02	ENSMUSG000000082896	predicted gene 5844 [Source:MGI Symbol;Acc:MGI:3645252]	3	18008806	1		
Rps15a	1.55	4.45E-02	ENSMUSG000000008683	ribosomal protein S15A [Source:MGI Symbol;Acc:MGI:2389091]	7	118104378	-1	ENSMF00250000002123	
Ssbp1	1.55	1.59E-03	ENSMUSG000000029911	single-stranded DNA binding protein 1 [Source:MGI Symbol;Acc:MGI:1920040]	6	40471352	1	ENSMF00250000006324	
Ccnt2	1.55	3.05E-02	ENSMUSG000000026349	cyclin T2 [Source:MGI Symbol;Acc:MGI:1920199]	1	127774164	1	ENSMF00500000270241	
Cep350	1.55	1.44E-02	ENSMUSG000000033671	centrosomal protein 350 [Source:MGI Symbol;Acc:MGI:1921331]	1	155844966	-1	ENSMF00250000005164	
Snd1	1.54	1.23E-02	ENSMUSG000000001424	staphylococcal nuclease and tudor domain containing 1 [Source:MGI Symbol;Acc:MGI:1929266]	6	28475139	1	ENSMF00250000002294	
Gm6206	1.54	1.65E-02	ENSMUSG000000048949	predicted pseudogene 6206 [Source:MGI Symbol;Acc:MGI:3644890]	X	103162894	-1		
Rpl36a	1.53	1.50E-03	ENSMUSG000000079435	ribosomal protein L36A [Source:MGI Symbol;Acc:MGI:1201789]	X	134585654	1	ENSMF00500000270574	60S RIBOSOMAL L36A

Supt16	1.53	2.87E-03	ENSMUSG00000035726	suppressor of Ty 16 [Source:MGI Symbol;Acc:MGI:1890948]	14	52160419	-1	ENSMF00250000002938	FACT COMPLEX SUBUNIT SPT16 FACILITATES CHROMATIN TRANSCRIPTION COMPLEX SUBUNIT SPT16
Tpt1	1.53	1.17E-03	ENSMUSG00000060126	tumor protein, translationally-controlled 1 [Source:MGI Symbol;Acc:MGI:104890]	14	75845093	1	ENSMF00500000270782	TRANSLATIONALLY CONTROLLED TUMOR TCTP
Rpl36a-ps1	1.51	4.22E-02	ENSMUSG00000060377	ribosomal protein L36A, pseudogene 1 [Source:MGI Symbol;Acc:MGI:3642585]	14	98993980	-1		
d14_increase									
Gene Name	foldChange	padj	Ensembl Gene ID	Description	Chromosome Name	Gene Start (bp)	Strand	Ensembl Protein Family ID(s)	Ensembl Family Description
Prl8a9	Inf	3.92E-05	ENSMUSG00000006490	prolactin family8, subfamily a, member 9 [Source:MGI Symbol;Acc:MGI:1914560]	13	27558009	-1	ENSMF00500000272419	PROLACTIN PRECURSOR PLACENTAL PROLACTIN PLP PRL PROLACTIN C PLP C
Tex11	Inf	6.43E-10	ENSMUSG00000009670	testis expressed gene 11 [Source:MGI Symbol;Acc:MGI:1933237]	X	100838648	-1	ENSMF00250000004461	TESTIS EXPRESSED SEQUENCE 11
Prl7d1	Inf	2.70E-06	ENSMUSG000000021348	prolactin family 7, subfamily d, member 1 [Source:MGI Symbol;Acc:MGI:97619]	13	27709016	-1	ENSMF00670001239515	PROLACTIN 7B1 PRECURSOR PLACENTAL PROLACTIN N PLP N PRL N
Tdrd1	Inf	2.12E-05	ENSMUSG000000025081	tudor domain containing 1 [Source:MGI Symbol;Acc:MGI:1933218]	19	56826209	1	ENSMF00250000006700	TUDOR DOMAIN CONTAINING 1
Syce1	Inf	3.88E-08	ENSMUSG000000025480	synaptonemal complex central element protein 1 [Source:MGI Symbol;Acc:MGI:1921325]	7	140777229	-1	ENSMF00500000272982	SYNAPTONEMAL COMPLEX CENTRAL ELEMENT 1
Slc35d2	Inf	8.22E-03	ENSMUSG000000033114	solute carrier family 35, member D2 [Source:MGI Symbol;Acc:MGI:1917734]	13	64096310	-1	ENSMF00250000002064	UDP N ACETYLGUCOSAMINE/UDP GLUCOSE/GDP MANNOSE TRANSPORTER SOLUTE CARRIER FAMILY 35 MEMBER D2
Tle6	Inf	4.34E-03	ENSMUSG000000034758	transducin-like enhancer of split 6, homolog of Drosophila E(spl) [Source:MGI Symbol;Acc:MGI:2149593]	10	81590904	-1	ENSMF00500000274291	TRANSDUCIN ENHANCER 6
1810019J16 Rik	Inf	1.14E-06	ENSMUSG000000037600	RIKEN cDNA 1810019J16 gene [Source:MGI Symbol;Acc:MGI:1916323]	4	133518963	1	ENSMF00250000007966	UNCHARACTERIZED
Prl3b1	Inf	1.07E-04	ENSMUSG000000038891	prolactin family 3, subfamily b, member 1 [Source:MGI Symbol;Acc:MGI:97607]	13	27242430	1	ENSMF00500000275122	PROLACTIN 3B1 PRECURSOR CHORIONIC SOMATOMAMMOTROPIN HORMONE 2 PLACENTAL LACTOGEN II PL II
Flt3	Inf	1.70E-02	ENSMUSG000000042817	FMS-like tyrosine kinase 3 [Source:MGI Symbol;Acc:MGI:95559]	5	147330741	-1	ENSMF00730001521364	MAST/STEM CELL GROWTH FACTOR RECEPTOR KIT PRECURSOR SCFR EC_2.7.10.1 PROTO ONCOGENE C KIT TYROSINE KINASE KIT
Ccdc37	Inf	4.03E-02	ENSMUSG000000048794	coiled-coil domain containing 37 [Source:MGI Symbol;Acc:MGI:2141635]	6	90403736	-1	ENSMF00680001303626	COILED COIL DOMAIN CONTAINING
Hrh1	Inf	4.96E-04	ENSMUSG000000053004	histamine receptor H1 [Source:MGI Symbol;Acc:MGI:107619]	6	114397936	1	ENSMF00730001522477	HISTAMINE H1 RECEPTOR H1R HH1R
Kcnp1	Inf	3.92E-02	ENSMUSG000000053519	Kv channel-interacting protein 1 [Source:MGI Symbol;Acc:MGI:1917607]	11	33629339	-1	ENSMF00410000138464	KV CHANNEL INTERACTING A TYPE POTASSIUM CHANNEL MODULATORY POTASSIUM CHANNEL INTERACTING
Prl2c3	Inf	1.02E-02	ENSMUSG000000056457	prolactin family 2, subfamily c, member 3 [Source:MGI Symbol;Acc:MGI:1341833]	13	12790822	-1	ENSMF00500000273358	PROLACTIN PRECURSOR MITOGEN REGULATED PROLIFERIN
Skap1	Inf	3.98E-02	ENSMUSG000000057058	src family associated phosphoprotein 1 [Source:MGI Symbol;Acc:MGI:1925723]	11	96464593	1	ENSMF00250000003206	SRC KINASE ASSOCIATED PHOSPHOPROTEIN 2 SRC FAMILY ASSOCIATED PHOSPHOPROTEIN 2
Gm12569	Inf	1.69E-02	ENSMUSG000000061469	predicted gene 12569 [Source:MGI Symbol;Acc:MGI:3650740]	11	51233465	1		
Psg27	Inf	1.36E-03	ENSMUSG000000070797	pregnancy-specific glycoprotein 27 [Source:MGI Symbol;Acc:MGI:1891359]	7	18556515	-1	ENSMF00740001589489	CARCINOEMBRYONIC ANTIGEN RELATED CELL ADHESION MOLECULE PRECURSOR
Gm14434	Inf	1.60E-03	ENSMUSG000000078881	predicted gene 14434 [Source:MGI Symbol;Acc:MGI:3702417]	2	176473278	-1	ENSMF00730001521153	ZINC FINGER

Prl2c2	Inf	3.94E-02	ENSMUSG00000079092	prolactin family 2, subfamily c, member 2 [Source:MGI Symbol;Acc:MGI:97618]	13	12996132	-1	ENSMF00500000273358	PROLACTIN PRECURSOR MITOGEN REGULATED PROLIFERIN
Mael	92.91	6.40E-10	ENSMUSG00000040629	maelstrom homolog (Drosophila) [Source:MGI Symbol;Acc:MGI:2138453]	1	166201385	-1	ENSMF00250000010002	MAELSTROM HOMOLOG
Tex13	63.91	3.08E-08	ENSMUSG00000042386	testis expressed gene 13 [Source:MGI Symbol;Acc:MGI:1890544]	X	140808307	-1	ENSMF00260000051441	TESTIS EXPRESSED SEQUENCE
Rnf17	54.26	6.34E-22	ENSMUSG00000000365	ring finger protein 17 [Source:MGI Symbol;Acc:MGI:1353419]	14	56402697	1	ENSMF00260000050809	RING FINGER 17
Ddx4	35.14	1.99E-06	ENSMUSG000000021758	DEAD (Asp-Glu-Ala-Asp) box polypeptide 4 [Source:MGI Symbol;Acc:MGI:102670]	13	112598333	-1	ENSMF00730001521481	PROBABLE ATP DEPENDENT RNA HELICASE DDX4 EC_3.6.4.13 DEAD BOX 4 VASA HOMOLOG
Taf7l	33.27	1.65E-16	ENSMUSG000000009596	TAF7-like RNA polymerase II, TATA box binding protein (TBP)-associated factor [Source:MGI Symbol;Acc:MGI:1921719]	X	134460118	-1	ENSMF00250000002692	TRANSCRIPTION INITIATION FACTOR TFIID SUBUNIT 7 RNA POLYMERASE II ASSOCIATED FACTOR TRANSCRIPTION INITIATION FACTOR TFIID KDA SUBUNIT
Psg29	30.95	1.09E-08	ENSMUSG000000023159	pregnancy-specific glycoprotein 29 [Source:MGI Symbol;Acc:MGI:1891361]	7	17203477	1	ENSMF00740001589489	CARCINOEMBRYONIC ANTIGEN RELATED CELL ADHESION MOLECULE PRECURSOR
Hal	28.23	1.16E-02	ENSMUSG000000020017	histidine ammonia lyase [Source:MGI Symbol;Acc:MGI:96010]	10	93488768	1	ENSMF00500000271176	HISTIDINE AMMONIA LYASE HISTIDASE EC_4.3.1.3
Ssh3	25.59	2.29E-02	ENSMUSG000000034616	slingshot homolog 3 (Drosophila) [Source:MGI Symbol;Acc:MGI:2683546]	19	4261668	-1	ENSMF00250000000620	PHOSPHATASE SLINGSHOT HOMOLOG EC_3.1.3.16 EC_3.1.3.- 48 SSH SSH
Gm4779	25.10	5.87E-03	ENSMUSG000000045010	predicted gene 4779 [Source:MGI Symbol;Acc:MGI:3646776]	X	101790053	-1		
Prl6a1	24.19	1.10E-02	ENSMUSG000000069259	prolactin family 6, subfamily a, member 1 [Source:MGI Symbol;Acc:MGI:1206579]	13	27312627	1	ENSMF00500000279930	PROLACTIN 6A1 PRECURSOR PLACENTAL PROLACTIN B PLP B PRL B
Sv2b	24.05	2.46E-02	ENSMUSG000000053025	synaptic vesicle glycoprotein 2 b [Source:MGI Symbol;Acc:MGI:1927338]	7	75114897	-1	ENSMF00250000000744	SYNAPTIC VESICLE GLYCOPROTEIN
Epn3	23.91	3.13E-05	ENSMUSG000000010080	epsin 3 [Source:MGI Symbol;Acc:MGI:1919139]	11	94489599	-1	ENSMF00500000269762	EPSIN EPS 15 INTERACTING
Brinp3	23.72	4.63E-02	ENSMUSG000000035131	bone morphogenetic protein/retinoic acid inducible neural specific 3 [Source:MGI Symbol;Acc:MGI:2443035]	1	146495629	1	ENSMF00250000001886	DELETED IN BLADDER CANCER 1 PRECURSOR FAM5A
Prr16	21.44	2.82E-02	ENSMUSG000000073565	proline rich 16 [Source:MGI Symbol;Acc:MGI:1918623]	18	51117898	1	ENSMF00250000010663	PROLINE RICH 16
Plac1	20.97	6.83E-09	ENSMUSG000000061082	placental specific protein 1 [Source:MGI Symbol;Acc:MGI:1926287]	X	53069995	-1	ENSMF00500000274827	PLACENTA SPECIFIC 1 PRECURSOR
Mageb16	19.18	6.61E-16	ENSMUSG000000046942	melanoma antigen family B, 16 [Source:MGI Symbol;Acc:MGI:1919217]	X	79623231	-1	ENSMF00360000109863	MELANOMA ASSOCIATED ANTIGEN CANCER/TESTIS ANTIGEN 1 CT1 MAGE ANTIGEN
1600012P17 Rik	17.59	2.43E-13	ENSMUSG000000047661	RIKEN cDNA 1600012P17 gene [Source:MGI Symbol;Acc:MGI:1919275]	1	158967701	-1	ENSMF00250000032562	AMBIGUOUS
Pde10a	17.48	5.23E-12	ENSMUSG000000023868	phosphodiesterase 10A [Source:MGI Symbol;Acc:MGI:1345143]	17	8525372	1	ENSMF00740001589139	CGMP SPECIFIC 3' 5' CYCLIC PHOSPHODIESTERASE EC_3.1.4.35
Stk31	17.18	1.54E-03	ENSMUSG000000023403	serine threonine kinase 31 [Source:MGI Symbol;Acc:MGI:1924735]	6	49395604	1	ENSMF002500000006411	SERINE/THREONINE KINASE 31 EC_2.7.11.1
Zbp1	16.97	4.87E-03	ENSMUSG000000027514	Z-DNA binding protein 1 [Source:MGI Symbol;Acc:MGI:1927449]	2	173206612	-1	ENSMF00250000007714	Z DNA BINDING 1 TUMOR STROMA AND ACTIVATED MACROPHAGE DLM 1
B3gnt7	15.95	3.15E-03	ENSMUSG000000079445	UDP-GlcNAc:betaGal beta-1,3-N- acetylglucosaminyltransferase 7 [Source:MGI Symbol;Acc:MGI:2384394]	1	86303221	1	ENSMF00480000262744	UDP GLCNAC:BETAGAL BETA 1 3 N ACETYLGUCOSAMINYLTRANSFERASE BGNT BETA 1 3 GN BETA 1 3 N ACETYLGUCOSAMINYLTRANSFERASE BETA3GN EC_2.4.1.-
Prl2b1	15.01	3.91E-13	ENSMUSG000000069258	prolactin family 2, subfamily b, member 1 [Source:MGI Symbol;Acc:MGI:1861444]	13	27383339	-1	ENSMF00500000280970	PROLACTIN 2B1 PRECURSOR PLACENTAL PROLACTIN K PLP K PRL K
Tpbpa	14.36	3.01E-78	ENSMUSG000000033834	trophoblast specific protein alpha [Source:MGI Symbol;Acc:MGI:98795]	13	60938692	-1	ENSMF00500000287467	TROPHOBLAST SPECIFIC ALPHA PRECURSOR

Gm10451	13.73	2.63E-02	ENSMUSG00000073000	predicted gene 10451 [Source:MGI Symbol;Acc:MGI:3641898]	12	76444560	1	ENSMF00360000117034	UNKNOWN
Tpbpb	13.62	6.43E-10	ENSMUSG00000062705	trophoblast specific protein beta [Source:MGI Symbol;Acc:MGI:2151721]	13	60901297	-1	ENSMF00500000287467	TROPHOBLAST SPECIFIC ALPHA PRECURSOR
Tnfrsf9	13.24	2.58E-20	ENSMUSG00000028965	tumor necrosis factor receptor superfamily, member 9 [Source:MGI Symbol;Acc:MGI:1101059]	4	150914562	1	ENSMF00320000100305	TUMOR NECROSIS FACTOR RECEPTOR SUPERFAMILY MEMBER 9 PRECURSOR 4
Oas1g	13.13	3.56E-06	ENSMUSG00000066861	2'-5' oligoadenylate synthetase 1G [Source:MGI Symbol;Acc:MGI:97429]	5	120876142	-1	ENSMF00570000851068	1BB LIGAND RECEPTOR T CELL ANTIGEN 4 1BB CD137 ANTIGEN
Elf3	13.08	3.03E-05	ENSMUSG00000003051	E74-like factor 3 [Source:MGI Symbol;Acc:MGI:1101781]	1	135253574	-1	ENSMF00500000272439	2' 5' OLIGOADENYLATE SYNTHASE 2 5' OLIGO A SYNTHASE 2 5A SYNTHASE EC_2.7.7.84
Slc6a14	11.95	4.74E-02	ENSMUSG00000031089	solute carrier family 6 (neurotransmitter transporter), member 14 [Source:MGI Symbol;Acc:MGI:1890216]	X	21714896	1	ENSMF00730001521205	ETS RELATED TRANSCRIPTION FACTOR ELF 3 E74 FACTOR 3 EPITHELIAL RESTRICTED WITH SERINE BOX
Sycp3	11.43	2.53E-06	ENSMUSG00000020059	synaptonemal complex protein 3 [Source:MGI Symbol;Acc:MGI:109542]	10	88459569	1	ENSMF00500000271407	EPITHELIUM RESTRICTED ETS ESX EPITHELIUM SPECIFIC ETS
Olf31	11.37	3.13E-02	ENSMUSG00000072707	olfactory receptor 31 [Source:MGI Symbol;Acc:MGI:109304]	14	14328113	1	ENSMF00730001521207	TRANSCRIPTION FACTOR 1 ESE 1
E130012A19 Rik	11.35	9.04E-05	ENSMUSG00000043439	RIKEN cDNA E130012A19 gene [Source:MGI Symbol;Acc:MGI:2143991]	11	97627393	-1	ENSMF00250000010096	SODIUM AND CHLORIDE DEPENDENT GLYCINE TRANSPORTER GLYT SOLUTE CARRIER FAMILY 6 MEMBER
1600014K23 Rik	11.28	5.56E-04	ENSMUSG00000035491	RIKEN cDNA 1600014K23 gene [Source:MGI Symbol;Acc:MGI:1919246]	X	85249679	1	ENSMF00500000269681	SYNAPTONEMAL COMPLEX 3 SCP 3
Chdh	10.76	1.09E-11	ENSMUSG00000015970	choline dehydrogenase [Source:MGI Symbol;Acc:MGI:1860776]	14	30009023	1	ENSMF00750001632424	OLFACTORY RECEPTOR OLFACTORY RECEPTOR OR1
Sct	10.63	1.08E-03	ENSMUSG00000038580	secretin [Source:MGI Symbol;Acc:MGI:99466]	7	141278331	-1	ENSMF00670001240503	UNCHARACTERIZED
Cmpk2	10.54	3.25E-03	ENSMUSG00000020638	cytidine monophosphate (UMP-CMP) kinase 2, mitochondrial [Source:MGI Symbol;Acc:MGI:99830]	12	26469204	1	ENSMF00250000007029	FERRITIN HEAVY CHAIN FERRITIN H SUBUNIT EC_1.16.3.1
Irx4	10.49	4.91E-02	ENSMUSG00000021604	Iroquois related homeobox 4 (Drosophila) [Source:MGI Symbol;Acc:MGI:1355275]	13	73260497	1	ENSMF00600000921344	CHOLINE DEHYDROGENASE
Plac8	10.42	1.77E-05	ENSMUSG00000029322	placenta-specific 8 [Source:MGI Symbol;Acc:MGI:2445289]	5	100553725	-1	ENSMF00670001236710	MITOCHONDRIAL PRECURSOR CDH CHD EC_1.1.99.1
Pramef12	9.86	3.27E-19	ENSMUSG00000028591	PRAME family member 12 [Source:MGI Symbol;Acc:MGI:1924882]	4	144391674	-1	ENSMF00250000000393	SECRETIN PRECURSOR
Slc5a5	9.63	1.72E-02	ENSMUSG00000000792	solute carrier family 5 (sodium iodide symporter), member 5 [Source:MGI Symbol;Acc:MGI:2149330]	8	70882889	-1	ENSMF00250000000525	UMP CMP KINASE 2 MITOCHONDRIAL PRECURSOR EC_2.7.4.14 NUCLEOSIDE DIPHOSPHATE KINASE EC_2.7.4.- 6
Fabp3-ps1	9.56	6.54E-04	ENSMUSG00000056366	fatty acid binding protein 3, muscle and heart, pseudogene 1 [Source:MGI Symbol;Acc:MGI:101929]	10	86731754	-1	ENSMF00670001235367	IROQUOIS CLASS HOMEODOMAIN IRX 4 IROQUOIS HOMEODOMAIN 4
Serpnb9g	9.31	4.85E-07	ENSMUSG00000057726	serine (or cysteine) peptidase inhibitor, clade B, member 9g [Source:MGI Symbol;Acc:MGI:1919260]	13	33484790	1	ENSMF00500000269596	PLACENTA SPECIFIC GENE 8
Ctsr	8.98	7.09E-03	ENSMUSG00000055679	cathepsin R [Source:MGI Symbol;Acc:MGI:1861723]	13	61159214	-1	ENSMF00250000000108	PRAME FAMILY MEMBER
Mkl1	8.86	3.45E-02	ENSMUSG00000012519	mixed lineage kinase domain-like [Source:MGI Symbol;Acc:MGI:1921818]	8	111311797	-1	ENSMF00250000007339	SODIUM COUPLED MONOCARBOXYLATE TRANSPORTER SODIUM MONOCARBOXYLATE COTRANSPORTER SODIUM SOLUTE CARRIER FAMILY 5 MEMBER

Scnn1a	8.84	1.32E-02	ENSMUSG00000030340	sodium channel, nonvoltage-gated 1 alpha [Source:MGI Symbol;Acc:MGI:101782]	6	125320659	1	ENSMF00250000001147	AMILORIDE SENSITIVE SODIUM CHANNEL SUBUNIT EPITHELIAL NA + CHANNEL SUBUNIT ENAC NONVOLTAGE GATED SODIUM CHANNEL 1 SUBUNIT
Smc1b	8.74	4.44E-03	ENSMUSG00000022432	structural maintenance of chromosomes 1B [Source:MGI Symbol;Acc:MGI:2154049]	15	85064691	-1	ENSMF00500000269864	STRUCTURAL MAINTENANCE OF CHROMOSOMES 1A SMC 1A SMC 1A
Gm1564	8.56	5.47E-03	ENSMUSG00000051455	predicted gene 1564 [Source:MGI Symbol;Acc:MGI:2686410]	11	102663716	1	ENSMF002500000008597	UNCHARACTERIZED
Adamts16	8.32	3.03E-05	ENSMUSG00000049538	a disintegrin-like and metallopeptidase (reprolysin type) with thrombospondin type 1 motif, 16 [Source:MGI Symbol;Acc:MGI:2429637]	13	70727802	-1	ENSMF00740001589080	A DISINTEGRIN AND METALLOPROTEINASE WITH THROMBOSPONDIN MOTIFS PRECURSOR ADAM TS ADAM ADAMTS EC_3.4.24.-
Serpnb9e	8.22	1.49E-11	ENSMUSG00000062342	serine (or cysteine) peptidase inhibitor, clade B, member 9e [Source:MGI Symbol;Acc:MGI:894672]	13	33249612	1	ENSMF00500000269596	SERPIN
Serpnb9f	8.18	6.50E-06	ENSMUSG00000038327	serine (or cysteine) peptidase inhibitor, clade B, member 9f [Source:MGI Symbol;Acc:MGI:894671]	13	33324077	1	ENSMF00500000269596	SERPIN
Serpnb9c	8.09	1.25E-09	ENSMUSG00000021404	serine (or cysteine) peptidase inhibitor, clade B, member 9c [Source:MGI Symbol;Acc:MGI:894669]	13	33149275	-1	ENSMF00500000269596	SERPIN
Gjb5	8.00	1.20E-04	ENSMUSG00000042357	gap junction protein, beta 5 [Source:MGI Symbol;Acc:MGI:95723]	4	127354809	-1	ENSMF00740001589183	GAP JUNCTION BETA CONNEXIN
3830417A13 Rik	7.57	2.87E-16	ENSMUSG00000031179	RIKEN cDNA 3830417A13 gene [Source:MGI Symbol;Acc:MGI:1917946]	X	64173548	1	ENSMF00360000109863	MELANOMA ASSOCIATED ANTIGEN CANCER/TESTIS ANTIGEN 1 CT1 MAGE ANTIGEN
Prl2a1	7.56	1.90E-11	ENSMUSG00000022886	prolactin family 2, subfamily a, member 1 [Source:MGI Symbol;Acc:MGI:1861446]	13	27801654	1	ENSMF00500000282109	PROLACTIN 2A1 PRECURSOR PLACENTAL PROLACTIN M PLP M PRL M
Pparg	7.45	5.03E-07	ENSMUSG00000000440	peroxisome proliferator activated receptor gamma [Source:MGI Symbol;Acc:MGI:97747]	6	115361221	1	ENSMF00250000000390	PEROXISOME PROLIFERATOR ACTIVATED RECEPTOR PPAR NUCLEAR RECEPTOR SUBFAMILY 1 GROUP C MEMBER
Gdpd3	7.42	2.96E-02	ENSMUSG00000030703	glycerophosphodiester phosphodiesterase domain containing 3 [Source:MGI Symbol;Acc:MGI:1915866]	7	126766414	1	ENSMF00250000003307	GLYCEROPHOSPHODIESTER PHOSPHODIESTERASE DOMAIN CONTAINING EC_3.1.-.-
Prl2c5	7.23	7.39E-03	ENSMUSG00000055360	prolactin family 2, subfamily c, member 5 [Source:MGI Symbol;Acc:MGI:1858413]	13	13182715	1	ENSMF00500000273358	PROLACTIN PRECURSOR MITOGEN REGULATED PROLIFERIN
Gm10720	7.22	1.49E-02	ENSMUSG00000074564	predicted gene 10720 [Source:MGI Symbol;Acc:MGI:3641687]	9	3015654	1	ENSMF00360000113264	AMBIGUOUS
Dnaic1	6.94	3.59E-02	ENSMUSG00000061322	dynein, axonemal, intermediate chain 1 [Source:MGI Symbol;Acc:MGI:1916172]	4	41569775	1	ENSMF00260000050907	DYNEIN INTERMEDIATE CHAIN 1 AXONEMAL AXONEMAL DYNEIN INTERMEDIATE CHAIN 1
Rassf6	6.93	7.19E-03	ENSMUSG00000029370	Ras association (RalGDS/AF-6) domain family member 6 [Source:MGI Symbol;Acc:MGI:1920496]	5	90603076	-1	ENSMF00500000270164	RAS ASSOCIATION DOMAIN CONTAINING
Tex19.1	6.75	2.81E-28	ENSMUSG00000039329	testis expressed gene 19.1 [Source:MGI Symbol;Acc:MGI:1920929]	11	121146143	1	ENSMF00600000922032	TESTIS EXPRESSED 19 1 TESTIS EXPRESSED 19A TESTIS EXPRESSED SEQUENCE
Zfp3613	6.65	4.13E-03	ENSMUSG00000059334	zinc finger protein 36, C3H type-like 3 [Source:MGI Symbol;Acc:MGI:3525151]	X	53772686	-1	ENSMF00730001525417	ZINC FINGER 36 TYPE 3
Trpm6	6.63	2.04E-03	ENSMUSG00000024727	transient receptor potential cation channel, subfamily M, member 6 [Source:MGI Symbol;Acc:MGI:2675603]	19	18749983	1	ENSMF00730001521288	TRANSIENT RECEPTOR POTENTIAL CATION CHANNEL SUBFAMILY M MEMBER LONG TRANSIENT RECEPTOR POTENTIAL CHANNEL
Prdm16	6.57	1.72E-02	ENSMUSG00000039410	PR domain containing 16 [Source:MGI Symbol;Acc:MGI:1917923]	4	154316125	-1	ENSMF00740001589192	MDS1 AND EVI1 COMPLEX LOCUS EVI1 ECOTROPIC VIRUS INTEGRATION SITE 1

Fam78b	6.54	3.73E-13	ENSMUSG00000060568	family with sequence similarity 78, member B [Source:MGI Symbol;Acc:MGI:2443050]	1	167001417	1	ENSMF00250000004685	FAM78A
Fabp3	6.52	4.13E-05	ENSMUSG00000028773	fatty acid binding protein 3, muscle and heart [Source:MGI Symbol;Acc:MGI:95476]	4	130308595	1	ENSMF00670001235367	FATTY ACID BINDING PROTEIN TYPE FATTY ACID BINDING FABP FATTY ACID BINDING
Sdr42e1	6.46	1.02E-02	ENSMUSG00000034308	short chain dehydrogenase/reductase family 42E, member 1 [Source:MGI Symbol;Acc:MGI:1921282]	8	117661399	-1	ENSMF00500000270655	SHORT CHAIN DEHYDROGENASE/REDUCTASE FAMILY 42E MEMBER EC_1.1.1.-
Abcd4	6.38	4.22E-02	ENSMUSG00000021240	ATP-binding cassette, sub-family D (ALD), member 4 [Source:MGI Symbol;Acc:MGI:1349217]	12	84602531	-1	ENSMF00720001492055	ATP BINDING CASSETTE SUB FAMILY D MEMBER 4 PMP70 RELATED P70R PEROXISOMAL MEMBRANE 1 PXPMP1 L PEROXISOMAL MEMBRANE 69 PMP69
Rasgrp1	6.27	1.93E-02	ENSMUSG00000027347	RAS guanyl releasing protein 1 [Source:MGI Symbol;Acc:MGI:1314635]	2	117279993	-1	ENSMF00250000001366	RAS GUANYL RELEASING CALCIUM AND DAG REGULATED GUANINE NUCLEOTIDE EXCHANGE FACTOR CALDAG
Adra2b	6.25	9.44E-17	ENSMUSG00000058620	adrenergic receptor, alpha 2b [Source:MGI Symbol;Acc:MGI:87935]	2	127363208	1	ENSMF00260000050343	ALPHA 2B ADRENERGIC RECEPTOR ALPHA 2B ADRENORECEPTOR ALPHA 2B ADRENOCEPTOR ALPHA 2BAR
4933402E13 Rik	6.23	6.95E-03	ENSMUSG00000045330	RIKEN cDNA 4933402E13 gene [Source:MGI Symbol;Acc:MGI:1921687]	X	62283499	1	ENSMF00360000109863	MELANOMA ASSOCIATED ANTIGEN CANCER/TESTIS ANTIGEN 1 CT1 MAGE ANTIGEN
Usp18	6.14	1.14E-03	ENSMUSG00000030107	ubiquitin specific peptidase 18 [Source:MGI Symbol;Acc:MGI:1344364]	6	121245906	1	ENSMF00260000051247	UBL CARBOXYL TERMINAL HYDROLASE 18 EC_3.4.19.- 43 KDA ISG15 SPECIFIC PROTEASE ISG15 SPECIFIC PROCESSING PROTEASE UBL THIOESTERASE 18
4930447C04 Rik	6.14	2.03E-09	ENSMUSG00000021098	RIKEN cDNA 4930447C04 gene [Source:MGI Symbol;Acc:MGI:1923051]	12	72881109	-1	ENSMF00250000009318	SIX6OS1 SIX6 OPPOSITE STRAND TRANSCRIPT 1
Rhox6	6.06	3.31E-14	ENSMUSG00000006200	reproductive homeobox 6 [Source:MGI Symbol;Acc:MGI:1202888]	X	37826910	1	ENSMF00600000923513	HOMEBOX ON X CHROMOSOME
Vstm4	6.06	4.15E-02	ENSMUSG00000050666	V-set and transmembrane domain containing 4 [Source:MGI Symbol;Acc:MGI:2444633]	14	32856756	1	ENSMF00250000007267	V SET AND TRANSMEMBRANE DOMAIN CONTAINING 4 PRECURSOR
Ghrh	6.05	3.69E-03	ENSMUSG00000027643	growth hormone releasing hormone [Source:MGI Symbol;Acc:MGI:95709]	2	157329497	-1	ENSMF00500000288089	SOMATOLIBERIN PRECURSOR GROWTH HORMONE RELEASING FACTOR GRF GROWTH HORMONE RELEASING HORMONE GHRH
Pappa2	6.00	9.50E-18	ENSMUSG00000073530	pappalysin 2 [Source:MGI Symbol;Acc:MGI:3051647]	1	158711727	-1	ENSMF00250000001846	PAPPALYSIN 1 PRECURSOR EC_3.4.24.79 INSULIN GROWTH FACTOR DEPENDENT IGF BINDING 4 PROTEASE IGF DEPENDENT IGFBP 4 PROTEASE IGFBP 4ASE PREGNANCY ASSOCIATED PLASMA A PAPP A
Gjb2	5.99	1.79E-22	ENSMUSG00000046352	gap junction protein, beta 2 [Source:MGI Symbol;Acc:MGI:95720]	14	57098600	-1	ENSMF00740001589167	GAP JUNCTION BETA CONNEXIN
Inhbb	5.93	2.03E-02	ENSMUSG00000037035	inhibin beta-B [Source:MGI Symbol;Acc:MGI:96571]	1	119415465	-1	ENSMF00250000001048	INHIBIN BETA CHAIN PRECURSOR ACTIVIN BETA CHAIN
Syp	5.93	1.02E-16	ENSMUSG00000031144	synaptophysin [Source:MGI Symbol;Acc:MGI:98467]	X	7638471	1	ENSMF00500000270007	SYNAPTOPHYSIN
Slc6a2	5.85	4.12E-02	ENSMUSG00000055368	solute carrier family 6 (neurotransmitter transporter, noradrenalin), member 2 [Source:MGI Symbol;Acc:MGI:1270850]	8	92960079	1	ENSMF00730001521312	SODIUM DEPENDENT TRANSPORTER TRANSPORTER SOLUTE CARRIER FAMILY 6 MEMBER
Cxcr2	5.79	1.84E-04	ENSMUSG00000026180	chemokine (C-X-C motif) receptor 2 [Source:MGI Symbol;Acc:MGI:105303]	1	74153989	1	ENSMF00730001521475	C X C CHEMOKINE RECEPTOR TYPE CXCR CXCR HIGH AFFINITY INTERLEUKIN 8 RECEPTOR IL 8R ANTIGEN

Stra6	5.78	3.52E-02	ENSMUSG00000032327	stimulated by retinoic acid gene 6 [Source:MGI Symbol;Acc:MGI:107742]	9	58063788	1	ENSMF00250000005421	STIMULATED BY RETINOIC ACID GENE 6
Sycp2	5.77	2.06E-02	ENSMUSG00000060445	synaptonemal complex protein 2 [Source:MGI Symbol;Acc:MGI:1933281]	2	178345293	-1	ENSMF00650001140037	SYNAPTONEMAL COMPLEX 2 SCP 2 SYNAPTONEMAL COMPLEX LATERAL ELEMENT
Sgk2	5.76	1.52E-03	ENSMUSG00000017868	serum/glucocorticoid regulated kinase 2 [Source:MGI Symbol;Acc:MGI:1351318]	2	162987330	1	ENSMF00730001521587	SERINE/THREONINE KINASE EC_2.7.11.1 SERUM/GLUCOCORTICOID REGULATED KINASE
Ldoc1	5.74	4.28E-06	ENSMUSG00000057615	leucine zipper, down-regulated in cancer 1 [Source:MGI Symbol;Acc:MGI:2685212]	X	61709614	1	ENSMF00500000275348	LDOC1
Liph	5.64	2.83E-02	ENSMUSG00000044626	lipase, member H [Source:MGI Symbol;Acc:MGI:2388029]	16	21953826	-1	ENSMF00570000851088	MEMBER PRECURSOR EC_3.1.1.-
Prlr	5.60	2.20E-03	ENSMUSG00000005268	prolactin receptor [Source:MGI Symbol;Acc:MGI:97763]	15	10177238	1	ENSMF00250000001054	PROLACTIN RECEPTOR PRECURSOR PRL R
Ap1m2	5.58	4.03E-02	ENSMUSG00000003309	adaptor protein complex AP-1, mu 2 subunit [Source:MGI Symbol;Acc:MGI:1336974]	9	21295457	-1	ENSMF00730001521549	AP 1 COMPLEX SUBUNIT MU 1 AP MU CHAIN FAMILY MEMBER MU1A ADAPTER RELATED COMPLEX 1 SUBUNIT MU 1 ADAPTOR COMPLEX AP 1 SUBUNIT MU 1 CLATHRIN ASSEMBLY COMPLEX 1 MU 1 MEDIUM CHAIN 1 GOLGI ADAPTOR HA1/AP1 ADAPTIN MU 1 SUBUNIT MU ADAPTIN 1 MU1A ADAPTIN
Tns4	5.57	4.63E-04	ENSMUSG00000017607	tensin 4 [Source:MGI Symbol;Acc:MGI:2144377]	11	99065678	-1	ENSMF00250000000591	TENSIN
Tmem14a	5.57	4.08E-02	ENSMUSG00000025933	transmembrane protein 14A [Source:MGI Symbol;Acc:MGI:1922962]	1	21218575	1	ENSMF00670001241816	TRANSMEMBRANE 14A
Dnase113	5.56	7.41E-03	ENSMUSG00000025279	deoxyribonuclease 1-like 3 [Source:MGI Symbol;Acc:MGI:1314633]	14	7964533	-1	ENSMF00250000001127	DEOXYRIBONUCLEASE PRECURSOR EC_3.1.21.- DNASE DEOXYRIBONUCLEASE I DNASE I POU DOMAIN CLASS 2 TRANSCRIPTION FACTOR OCTAMER BINDING OCT OCTAMER BINDING TRANSCRIPTION FACTOR OTF
Pou2f3	5.56	1.01E-02	ENSMUSG00000032015	POU domain, class 2, transcription factor 3 [Source:MGI Symbol;Acc:MGI:102565]	9	43123939	-1	ENSMF00730001521360	N ACETYLNEURAMINATE LYASE NALASE EC_4.1.3.3 N ACETYLNEURAMINATE PYRUVATE LYASE N ACETYLNEURAMINIC ACID ALDOLASE SIALATE LYASE SIALATE PYRUVATE LYASE SIALIC ACID ALDOLASE SIALIC ACID LYASE
Npl	5.46	3.87E-03	ENSMUSG00000042684	N-acetylneuraminate pyruvate lyase [Source:MGI Symbol;Acc:MGI:1921341]	1	153503016	-1	ENSMF00250000006100	2' 5' OLIGOADENYLATE SYNTHASE 2 5' OLIGO A SYNTHASE 2 5A SYNTHASE EC_2.7.7.84
Oas1a	5.45	1.54E-03	ENSMUSG00000052776	2'-5' oligoadenylate synthetase 1A [Source:MGI Symbol;Acc:MGI:2180860]	5	120896256	-1	ENSMF00570000851068	PRECURSOR
Optc	5.45	3.71E-03	ENSMUSG00000010311	opticin [Source:MGI Symbol;Acc:MGI:2151113]	1	133897199	-1	ENSMF00250000002721	UNCHARACTERIZED CXORF49
8030474K03 Rik	5.42	3.36E-02	ENSMUSG00000046774	RIKEN cDNA 8030474K03 gene [Source:MGI Symbol;Acc:MGI:2685988]	X	101794656	1	ENSMF00500000278298	
Nlrp5-ps	5.38	1.10E-03	ENSMUSG00000041596	NLR family, pyrin domain containing 5, pseudogene [Source:MGI Symbol;Acc:MGI:5010941]	7	14530654	-1		
Rsad2	5.36	1.54E-06	ENSMUSG00000020641	radical S-adenosyl methionine domain containing 2 [Source:MGI Symbol;Acc:MGI:1929628]	12	26442753	-1	ENSMF00250000006423	RADICAL S ADENOSYL METHIONINE DOMAIN CONTAINING 2 VIPERIN VIRUS INHIBITORY PROTEIN ENDOPLASMIC RETICULUM ASSOCIATED INTERFERON INDUCIBLE
Dlx3	5.32	6.06E-03	ENSMUSG00000001510	distal-less homeobox 3 [Source:MGI Symbol;Acc:MGI:94903]	11	95120089	1	ENSMF00670001235355	HOMEOBOX

Gm11385	5.32	3.90E-02	ENSMUSG00000081237	predicted gene 11385 [Source:MGI Symbol;Acc:MGI:3705792]	13	33217268	-1		
AU015836	5.29	2.13E-16	ENSMUSG00000081044	expressed sequence AU015836 [Source:MGI Symbol;Acc:MGI:2147954]	X	93968659	1	ENSMF00670001255111	AMBIGUOUS
Slc37a1	5.29	3.44E-02	ENSMUSG00000024036	solute carrier family 37 (glycerol-3-phosphate transporter), member 1 [Source:MGI Symbol;Acc:MGI:2446181]	17	31295483	1	ENSMF00750001632401	SUGAR PHOSPHATE EXCHANGER 2 SOLUTE CARRIER FAMILY 37 MEMBER 2
Tjp3	5.28	2.27E-02	ENSMUSG00000034917	tight junction protein 3 [Source:MGI Symbol;Acc:MGI:1351650]	10	81273207	-1	ENSMF00250000000691	TIGHT JUNCTION ZO TIGHT JUNCTION ZONA OCCLUDENS ZONULA OCCLUDENS
Zfpn1	5.24	4.89E-02	ENSMUSG00000049577	zinc finger protein, multitype 1 [Source:MGI Symbol;Acc:MGI:1095400]	8	122282141	1	ENSMF00740001589423	ZINC FINGER ZFPM1 FRIEND OF GATA 1 FOG 1 FRIEND OF GATA 1 ZINC FINGER MULTITYPE 1
Ppp2r2c	5.16	2.90E-08	ENSMUSG00000029120	protein phosphatase 2 (formerly 2A), regulatory subunit B (PR 52), gamma isoform [Source:MGI Symbol;Acc:MGI:2442660]	5	36868513	1	ENSMF00250000000829	SERINE/THREONINE PHOSPHATASE 2A 55 KDA REGULATORY SUBUNIT B PP2A SUBUNIT B B55 PP2A SUBUNIT B PR55 PP2A SUBUNIT B R2 PP2A SUBUNIT B
Gm11397	5.16	9.61E-03	ENSMUSG00000071452	predicted gene 11397 [Source:MGI Symbol;Acc:MGI:3709608]	13	33395761	1	ENSMF00500000269596	SERPIN
AU015836	5.15	6.81E-08	ENSMUSG00000055936	expressed sequence AU015836 [Source:MGI Symbol;Acc:MGI:2147954]	X	93968682	1	ENSMF00500000271881	MITOCHONDRIAL INTERMEMBRANE SPACE IMPORT AND ASSEMBLY 40 COILED COIL HELIX COILED COIL HELIX DOMAIN CONTAINING 4
Rhox9	5.14	8.45E-16	ENSMUSG00000068048	reproductive homeobox 9 [Source:MGI Symbol;Acc:MGI:1890128]	X	37899097	-1	ENSMF00600000923513	HOMEODOMAIN ON X CHROMOSOME
Wnt6	5.13	1.06E-02	ENSMUSG00000033227	wingless-related MMTV integration site 6 [Source:MGI Symbol;Acc:MGI:98960]	1	74771892	1	ENSMF00730001522356	WNT 6
Rbm38	5.09	2.37E-03	ENSMUSG00000027510	RNA binding motif protein 38 [Source:MGI Symbol;Acc:MGI:1889294]	2	173020498	1	ENSMF00250000001992	RNA BINDING RNA BINDING MOTIF
Tfap2c	5.00	9.05E-22	ENSMUSG00000028640	transcription factor AP-2, gamma [Source:MGI Symbol;Acc:MGI:106032]	2	172549593	1	ENSMF00250000001076	TRANSCRIPTION FACTOR AP 2 AP2 ACTIVATING ENHANCER BINDING 2
Car2	4.98	9.24E-12	ENSMUSG00000027562	carbonic anhydrase 2 [Source:MGI Symbol;Acc:MGI:88269]	3	14886426	1	ENSMF00450000242133	CARBONIC ANHYDRASE EC_4.2.1.1 CARBONATE DEHYDRATASE CARBONIC ANHYDRASE CA
Hoxb9	4.97	1.23E-02	ENSMUSG00000020875	homeobox B9 [Source:MGI Symbol;Acc:MGI:96190]	11	96271457	1	ENSMF00600000921180	HOMEODOMAIN HOX
Sfmbt2	4.90	8.88E-32	ENSMUSG00000061186	Scm-like with four mbt domains 2 [Source:MGI Symbol;Acc:MGI:2447794]	2	10370510	1	ENSMF00260000050568	SCM WITH FOUR MBT DOMAINS
Olr1	4.82	5.09E-10	ENSMUSG00000030162	oxidized low density lipoprotein (lectin-like) receptor 1 [Source:MGI Symbol;Acc:MGI:1261434]	6	129485246	-1	ENSMF00500000273171	OXIDIZED LOW DENSITY LIPOPROTEIN RECEPTOR 1 OX LDL RECEPTOR 1 LECTIN OXIDIZED LDL RECEPTOR 1 LOX 1 LECTIN OXLDL RECEPTOR 1 LECTIN TYPE OXIDIZED LDL RECEPTOR 1 [CONTAINS OXIDIZED LOW DENSITY LIPOPROTEIN RECEPTOR 1 SOLUBLE
Syna	4.81	4.37E-10	ENSMUSG00000085957	synaptobrevin 2 [Source:MGI Symbol;Acc:MGI:2684898]	5	134557254	-1	ENSMF00600000921957	ERV FRD PROVIRUS ANCESTRAL ENV POLYPROTEIN PRECURSOR ENVELOPE POLYPROTEIN SYNCTIN 2 [CONTAINS SURFACE SU ; TRANSMEMBRANE TM]
Ano1	4.78	1.07E-03	ENSMUSG00000031075	anoctamin 1, calcium activated chloride channel [Source:MGI Symbol;Acc:MGI:2142149]	7	144588549	-1	ENSMF00250000000240	ANOCTAMIN TRANSMEMBRANE
4932442L08 Rik	4.70	5.62E-06	ENSMUSG00000043549	RIKEN cDNA 4932442L08 gene [Source:MGI Symbol;Acc:MGI:1921682]	X	94355053	-1	ENSMF00500000287930	AMBIGUOUS
Alpl	4.65	4.45E-04	ENSMUSG00000028766	alkaline phosphatase, liver/bone/kidney [Source:MGI Symbol;Acc:MGI:87983]	4	137741733	-1	ENSMF00250000000564	ALKALINE PHOSPHATASE PRECURSOR EC_3.1.3.1
AU018091	4.64	2.45E-08	ENSMUSG00000054753	expressed sequence AU018091 [Source:MGI Symbol;Acc:MGI:2142124]	7	3154664	-1	ENSMF00250000000444	CATIONIC AMINO ACID TRANSPORTER SOLUTE CARRIER FAMILY 7 MEMBER

Phlda2	4.61	2.42E-03	ENSMUSG00000010760	pleckstrin homology-like domain, family A, member 2 [Source:MGI Symbol;Acc:MGI:1202307]	7	143501545	-1	ENSMF00500000282174	PLECKSTRIN HOMOLOGY DOMAIN FAMILY A MEMBER 2 IMPRINTED IN PLACENTA AND LIVER
Lipg	4.56	4.14E-02	ENSMUSG00000053846	lipase, endothelial [Source:MGI Symbol;Acc:MGI:1341803]	18	74939322	-1	ENSMF00400000131738	LIPASE PRECURSOR
Gpr56	4.52	6.95E-03	ENSMUSG00000031785	G protein-coupled receptor 56 [Source:MGI Symbol;Acc:MGI:1340051]	8	94977109	1	ENSMF00640001103085	G COUPLED RECEPTOR 56 GPR56 N TERMINAL FRAGMENT GPR56 NT GPR56 N GPR56 EXTRACELLULAR SUBUNIT GPR56 SUBUNIT ALPHA ; GPR56 C TERMINAL FRAGMENT GPR56 CT GPR56 C GPR56 SEVEN TRANSMEMBRANE SUBUNIT GPR56 7TM GPR56 SUBUNIT BETA]
Kcna1	4.43	5.13E-05	ENSMUSG00000047976	potassium voltage-gated channel, shaker-related subfamily, member 1 [Source:MGI Symbol;Acc:MGI:96654]	6	126636463	-1	ENSMF00290000065519	POTASSIUM VOLTAGE GATED CHANNEL SUBFAMILY A MEMBER VOLTAGE GATED POTASSIUM CHANNEL SUBUNIT KV1
Ace2	4.42	5.49E-03	ENSMUSG00000015405	angiotensin I converting enzyme (peptidyl-dipeptidase A) 2 [Source:MGI Symbol;Acc:MGI:1917258]	X	164139332	1	ENSMF00250000000787	ANGIOTENSIN CONVERTING ENZYME PRECURSOR ACE CARBOXYPEPTIDASE [CONTAINS ANGIOTENSIN CONVERTING ENZYME
Chi311	4.36	7.39E-03	ENSMUSG00000064246	chitinase 3-like 1 [Source:MGI Symbol;Acc:MGI:1340899]	1	134182176	1	ENSMF00250000000210	PRECURSOR
Ifit1	4.34	1.06E-03	ENSMUSG00000034459	interferon-induced protein with tetratricopeptide repeats 1 [Source:MGI Symbol;Acc:MGI:99450]	19	34640871	1	ENSMF00250000002441	INTERFERON INDUCED WITH TETRATRICOPEPTIDE REPEATS IFIT INTERFERON INDUCED KDA IFI
Kif26a	4.31	8.43E-04	ENSMUSG000000021294	kinesin family member 26A [Source:MGI Symbol;Acc:MGI:2447072]	12	112146208	1	ENSMF00250000001309	KINESIN
Gstm5	4.29	1.05E-04	ENSMUSG00000004032	glutathione S-transferase, mu 5 [Source:MGI Symbol;Acc:MGI:1309466]	3	107895821	1	ENSMF00500000269733	GLUTATHIONE S TRANSFERASE EC_2.5.1.18 GST CLASS MU
Gata2	4.29	9.13E-03	ENSMUSG00000015053	GATA binding protein 2 [Source:MGI Symbol;Acc:MGI:95662]	6	88193891	1	ENSMF00730001521743	TRANSCRIPTION FACTOR
Nos1	4.29	8.72E-04	ENSMUSG00000029361	nitric oxide synthase 1, neuronal [Source:MGI Symbol;Acc:MGI:97360]	5	117781032	1	ENSMF00470000251434	NITRIC OXIDE SYNTHASE EC_1.14.13.39 NOS NOS TYPE PEPTIDYL CYSTEINE S NITROSYLASE
Oprl1	4.28	2.68E-02	ENSMUSG000000027584	opioid receptor-like 1 [Source:MGI Symbol;Acc:MGI:97440]	2	181715016	1	ENSMF00730001521361	MU TYPE OPIOID RECEPTOR M OR 1 MOR 1
Oasl2	4.24	1.47E-21	ENSMUSG00000029561	2'-5' oligoadenylate synthetase-like 2 [Source:MGI Symbol;Acc:MGI:1344390]	5	114896936	1	ENSMF00570000851068	2' 5' OLIGOADENYLATE SYNTHASE 2 5' OLIGO A SYNTHASE 2 5A SYNTHASE EC_2.7.7.84
Tnk1	4.17	4.81E-02	ENSMUSG00000001583	tyrosine kinase, non-receptor, 1 [Source:MGI Symbol;Acc:MGI:1930958]	11	69851005	-1	ENSMF00270000056489	ACTIVATED CDC42 KINASE 1 ACK 1 EC_2.7.10.2 EC_2.7.11.- 1 TYROSINE KINASE NON RECEPTOR 2
Abcc9	4.16	1.46E-02	ENSMUSG00000030249	ATP-binding cassette, sub-family C (CFTR/MRP), member 9 [Source:MGI Symbol;Acc:MGI:1352630]	6	142587862	-1	ENSMF00730001521882	ATP BINDING CASSETTE SUB FAMILY C MEMBER SULFONYLUREA RECEPTOR
Fnd3c2	4.14	6.96E-05	ENSMUSG00000073012	fibronectin type III domain containing 3C2 [Source:MGI Symbol;Acc:MGI:2685621]	X	106235246	-1	ENSMF00250000001575	FIBRONECTIN TYPE III DOMAIN CONTAINING
Fhdc1	4.03	1.59E-04	ENSMUSG00000041842	FH2 domain containing 1 [Source:MGI Symbol;Acc:MGI:2684972]	3	84444035	-1	ENSMF00400000131932	FH2 DOMAIN CONTAINING 1
Tmem140	4.00	5.82E-05	ENSMUSG00000057137	transmembrane protein 140 [Source:MGI Symbol;Acc:MGI:1915737]	6	34863146	1	ENSMF00250000009024	TRANSMEMBRANE 140
Gata3	3.98	2.03E-13	ENSMUSG00000015619	GATA binding protein 3 [Source:MGI Symbol;Acc:MGI:95663]	2	9857078	-1	ENSMF00730001521743	TRANSCRIPTION FACTOR
Phf11d	3.97	3.03E-02	ENSMUSG00000068245	PHD finger protein 11D [Source:MGI Symbol;Acc:MGI:1277133]	14	59347407	-1	ENSMF00740001589319	PHD FINGER 11

Plaur	3.95	4.41E-02	ENSMUSG00000046223	plasminogen activator, urokinase receptor [Source:MGI Symbol;Acc:MGI:97612]	7	24462500	1	ENSMF00250000004086	UROKINASE PLASMINOGEN ACTIVATOR SURFACE RECEPTOR PRECURSOR U PAR UPAR CD87 ANTIGEN
Bcas1	3.90	4.97E-02	ENSMUSG00000013523	breast carcinoma amplified sequence 1 [Source:MGI Symbol;Acc:MGI:1924210]	2	170346991	-1	ENSMF00250000007762	BREAST CARCINOMA AMPLIFIED SEQUENCE 1 AMPLIFIED IN BREAST CANCER 1
Ankrd23	3.89	1.68E-02	ENSMUSG000000067653	ankyrin repeat domain 23 [Source:MGI Symbol;Acc:MGI:1925571]	1	36530534	-1	ENSMF00600000921345	ANKYRIN REPEAT DOMAIN CONTAINING ANKYRIN REPEAT
Hps4	3.85	3.82E-02	ENSMUSG000000042328	Hermansky-Pudlak syndrome 4 homolog (human) [Source:MGI Symbol;Acc:MGI:2177742]	5	112343083	1	ENSMF00250000005402	HERMANSKY PUDLAK SYNDROME 4 LIGHT EAR
Oas1c	3.85	4.45E-03	ENSMUSG000000001166	2'-5' oligoadenylate synthetase 1C [Source:MGI Symbol;Acc:MGI:2149633]	5	120800194	-1	ENSMF00570000851068	2' 5' OLIGOADENYLATE SYNTHASE 2 5' OLIGO A SYNTHASE 2 5A SYNTHASE EC_2.7.7.84
Pkhd1l1	3.85	5.02E-03	ENSMUSG00000038725	polycystic kidney and hepatic disease 1-like 1 [Source:MGI Symbol;Acc:MGI:2183153]	15	44457553	1	ENSMF00740001589282	FIBROCYSTIN L PRECURSOR POLYCYSTIC KIDNEY AND HEPATIC DISEASE 1 1 PKHD1 1
Zic3	3.83	5.85E-05	ENSMUSG000000067860	zinc finger protein of the cerebellum 3 [Source:MGI Symbol;Acc:MGI:106676]	X	58022700	1	ENSMF00400000131751	ZINC FINGER ZIC ZINC FINGER OF THE CEREBELLUM
Gm6325	3.83	1.16E-03	ENSMUSG000000081778	predicted gene 6325 [Source:MGI Symbol;Acc:MGI:3644961]	X	106360456	-1		
Als2cl	3.82	1.18E-02	ENSMUSG000000044037	ALS2 C-terminal like [Source:MGI Symbol;Acc:MGI:2447532]	9	110879870	1	ENSMF00250000002591	ALSIN AMYOTROPHIC LATERAL SCLEROSIS 2
Sico4a1	3.78	4.33E-02	ENSMUSG00000038963	solute carrier organic anion transporter family, member 4a1 [Source:MGI Symbol;Acc:MGI:1351866]	2	180456245	1	ENSMF00730001521392	SOLUTE CARRIER ORGANIC ANION TRANSPORTER FAMILY MEMBER ORGANIC ANION TRANSPORTING POLYPEPTIDE ORGANIC ANION SOLUTE CARRIER FAMILY 21 MEMBER
Samd9l	3.78	8.08E-09	ENSMUSG000000047735	sterile alpha motif domain containing 9-like [Source:MGI Symbol;Acc:MGI:1343184]	6	3372257	-1	ENSMF00250000003895	STERILE ALPHA MOTIF DOMAIN CONTAINING 9 SAM DOMAIN CONTAINING 9
Bglap3	3.75	3.24E-02	ENSMUSG000000074489	bone gamma-carboxyglutamate protein 3 [Source:MGI Symbol;Acc:MGI:88155]	3	88368616	-1	ENSMF00500000287206	OSTEOCALCIN RELATED PRECURSOR NEPHROCALCIN OC X
Isg15	3.74	1.23E-02	ENSMUSG000000035692	ISG15 ubiquitin-like modifier [Source:MGI Symbol;Acc:MGI:1855694]	4	156199424	-1	ENSMF00500000274879	UBIQUITIN ISG15 PRECURSOR INTERFERON INDUCED 15 KDA INTERFERON INDUCED 17 KDA IP17
Prom1	3.73	9.98E-03	ENSMUSG000000029086	prominin 1 [Source:MGI Symbol;Acc:MGI:1100886]	5	43993625	-1	ENSMF00250000001124	UBIQUITIN CROSS REACTIVE PROMININ 2 PRECURSOR PROM 2 PROMININ 2
Rnf144b	3.69	2.83E-02	ENSMUSG000000038068	ring finger protein 144B [Source:MGI Symbol;Acc:MGI:2384986]	13	47122720	1	ENSMF00250000002857	PROBABLE E3 UBIQUITIN LIGASE RNF144A EC_6.3.2.- RING FINGER 144A INTERLEUKIN 1 RECEPTOR TYPE 1 PRECURSOR IL 1R 1 IL 1RT 1 IL 1RT1 CD121 ANTIGEN FAMILY MEMBER A
Il1rl2	3.68	2.79E-02	ENSMUSG000000070942	interleukin 1 receptor-like 2 [Source:MGI Symbol;Acc:MGI:1913107]	1	40324627	1	ENSMF00500000270431	INTERLEUKIN 1 RECEPTOR ALPHA IL 1R ALPHA INTERLEUKIN 1 RECEPTOR TYPE I P80 CD121A ANTIGEN [CONTAINS INTERLEUKIN 1 RECEPTOR TYPE 1 MEMBRANE FORM MIL 1R1 MIL 1RI
9930012K11 Rik	3.67	3.97E-05	ENSMUSG000000044551	RIKEN cDNA 9930012K11 gene [Source:MGI Symbol;Acc:MGI:2145726]	14	70154405	-1	ENSMF00250000009596	UNCHARACTERIZED
Cdh5	3.65	1.18E-07	ENSMUSG000000031871	cadherin 5 [Source:MGI Symbol;Acc:MGI:105057]	8	104101625	1	ENSMF00260000050333	CADHERIN PRECURSOR
Sp100	3.64	3.09E-04	ENSMUSG000000026222	nuclear antigen Sp100 [Source:MGI Symbol;Acc:MGI:109561]	1	85649988	1	ENSMF00740001589402	NUCLEAR AUTOANTIGEN SP SPECKLED KDA

Hibch	3.55	2.28E-02	ENSMUSG00000041426	3-hydroxyisobutyryl-Coenzyme A hydrolase [Source:MGI Symbol;Acc:MGI:1923792]	1	52845013	1	ENSMF00250000003846	3 HYDROXYISOBUTYRYL COA HYDROLASE MITOCHONDRIAL PRECURSOR EC_3.1.2.4 3 HYDROXYISOBUTYRYL COENZYME A HYDROLASE HIB COA HYDROLASE HIBYL COA H
Ceacam1	3.55	2.09E-02	ENSMUSG00000074272	carcinoembryonic antigen-related cell adhesion molecule 1 [Source:MGI Symbol;Acc:MGI:1347245]	7	25461702	-1	ENSMF00670001235442	PREGNANCY SPECIFIC BETA 1 GLYCOPROTEIN PRECURSOR PS BETA G PSBG PREGNANCY SPECIFIC GLYCOPROTEIN
Tbx3	3.54	2.11E-06	ENSMUSG00000018604	T-box 3 [Source:MGI Symbol;Acc:MGI:98495]	5	119670669	1	ENSMF00730001521675	T BOX TRANSCRIPTION FACTOR T BOX
Nup62cl	3.52	1.16E-04	ENSMUSG00000072944	nucleoporin 62 C-terminal like [Source:MGI Symbol;Acc:MGI:2685565]	X	140006805	-1	ENSMF00500000270854	NUCLEAR PORE GLYCOPROTEIN P62.62 KDA NUCLEOPORIN NUCLEOPORIN NUP62
F2rl1	3.52	1.22E-02	ENSMUSG000000021678	coagulation factor II (thrombin) receptor- like 1 [Source:MGI Symbol;Acc:MGI:101910]	13	95511732	-1	ENSMF00670001235374	PROTEINASE ACTIVATED RECEPTOR PRECURSOR PAR COAGULATION FACTOR II RECEPTOR THROMBIN RECEPTOR PHOSPHOLIPASE B PRECURSOR EC_3.1.1.- LAMA LAMINA ANCESTOR HOMOLOG PHOSPHOLIPASE B DOMAIN CONTAINING
Plbd1	3.52	1.94E-05	ENSMUSG00000030214	phospholipase B domain containing 1 [Source:MGI Symbol;Acc:MGI:1914107]	6	136612070	-1	ENSMF00600000921313	EC_3.1.1.- LAMA LAMINA ANCESTOR HOMOLOG PHOSPHOLIPASE B DOMAIN CONTAINING
Anxa8	3.50	1.10E-02	ENSMUSG000000021950	annexin A8 [Source:MGI Symbol;Acc:MGI:1201374]	14	34085981	1	ENSMF00740001589071	ANNEXIN ANNEXIN ANNEXIN
Bcl11a	3.50	5.50E-04	ENSMUSG000000000861	B cell CLL/lymphoma 11A (zinc finger protein) [Source:MGI Symbol;Acc:MGI:106190]	11	24078056	1	ENSMF00600000921237	B CELL LYMPHOMA/LEUKEMIA 11A BCL 11A B CELL CLL/LYMPHOMA 11A COUP TF INTERACTING 1 ECOTROPIC VIRAL INTEGRATION SITE 9 EVI 9
Nxf7	3.49	7.35E-05	ENSMUSG000000031410	nuclear RNA export factor 7 [Source:MGI Symbol;Acc:MGI:2159343]	X	135579555	-1	ENSMF00250000001240	NUCLEAR RNA EXPORT FACTOR 1 TIP ASSOCIATED TIP ASSOCIATING EXPORT FACTOR TAP
Lgals3	3.48	1.37E-03	ENSMUSG000000050335	lectin, galactose binding, soluble 3 [Source:MGI Symbol;Acc:MGI:96778]	14	47367751	1	ENSMF00500000272251	GALECTIN 3 GAL 3.35 KDA LECTIN CARBOHYDRATE BINDING 35 CBP 35 GALACTOSE SPECIFIC LECTIN 3 IGE BINDING LAMININ BINDING LECTIN L 29 MAC 2 ANTIGEN
Nkain1	3.48	5.15E-04	ENSMUSG000000078532	Na ⁺ /K ⁺ transporting ATPase interacting 1 [Source:MGI Symbol;Acc:MGI:1914399]	4	130531602	-1	ENSMF00250000002642	SODIUM/POTASSIUM TRANSPORTING ATPASE SUBUNIT BETA 1 INTERACTING NA ⁺ /K ⁺ TRANSPORTING ATPASE SUBUNIT BETA 1 INTERACTING
Xist	3.46	4.65E-02	ENSMUSG000000086503	inactive X specific transcripts [Source:MGI Symbol;Acc:MGI:98974]	X	103460375	-1		
Gjb3	3.46	1.64E-02	ENSMUSG000000042367	gap junction protein, beta 3 [Source:MGI Symbol;Acc:MGI:95721]	4	127325235	-1	ENSMF00740001589183	GAP JUNCTION BETA CONNEXIN
Arhgap8	3.42	1.41E-02	ENSMUSG000000078954	Rho GTPase activating protein 8 [Source:MGI Symbol;Acc:MGI:1920417]	15	84720052	1	ENSMF00430000230144	RHO GTPASE ACTIVATING RHO TYPE GTPASE ACTIVATING
Trap1a	3.40	7.30E-04	ENSMUSG000000051257	tumor rejection antigen P1A [Source:MGI Symbol;Acc:MGI:98818]	X	139333683	1	ENSMF00250000032604	TUMOR REJECTION ANTIGEN P815A
Pik3cd	3.40	9.15E-04	ENSMUSG000000039936	phosphatidylinositol 3-kinase catalytic delta polypeptide [Source:MGI Symbol;Acc:MGI:1098211]	4	149649168	-1	ENSMF00730001521385	PHOSPHATIDYLINOSITOL 4 5 BISPHOSPHATE 3 KINASE CATALYTIC SUBUNIT PI3 KINASE SUBUNIT PI3K PTDINS 3 KINASE SUBUNIT EC_2.7.1.153 PHOSPHATIDYLINOSITOL 4 5 BISPHOSPHATE 3 KINASE 110 KDA CATALYTIC SUBUNIT PTDINS 3 KINASE SUBUNIT P110 PHOSPHOINOSITIDE 3 KINASE C

Mycbpap	3.40	1.09E-02	ENSMUSG00000039110	MYCBP associated protein [Source:MGI Symbol;Acc:MGI:2388726]	11	94501347	-1	ENSMF00250000007356	MYCBP ASSOCIATED AMAM 1 AMY 1 BINDING 1 AMAP 1
1600029D21 Rik	3.37	8.26E-03	ENSMUSG00000032068	RIKEN cDNA 1600029D21 gene [Source:MGI Symbol;Acc:MGI:1923759]	9	50494525	1	ENSMF00600000924919	PLACENTA EXPRESSED TRANSCRIPT 1 PRECURSOR
3110062M04Rik	3.35	2.12E-06	ENSMUSG00000046806	RIKEN cDNA 3110062M04 gene [Source:MGI Symbol;Acc:MGI:1925662]	6	34871771	-1	ENSMF00600000924309	MODULATOR OF RETROVIRUS INFECTION HOMOLOG
Coro2a	3.34	4.34E-03	ENSMUSG00000028337	coronin, actin binding protein 2A [Source:MGI Symbol;Acc:MGI:1345966]	4	46536937	-1	ENSMF00730001521970	CORONIN
Klk1b22	3.31	2.20E-02	ENSMUSG00000060177	kallikrein 1-related peptidase b22 [Source:MGI Symbol;Acc:MGI:95291]	7	44112673	1	ENSMF00730001522110	KALLIKREIN PRECURSOR EC_3.4.21.35 KALLIKREIN TISSUE KALLIKREIN
Stk11ip	3.29	1.01E-02	ENSMUSG00000026213	serine/threonine kinase 11 interacting protein [Source:MGI Symbol;Acc:MGI:1918978]	1	75521529	1	ENSMF00250000004028	SERINE/THREONINE KINASE 11 INTERACTING
St14	3.25	3.91E-02	ENSMUSG00000031995	suppression of tumorigenicity 14 (colon carcinoma) [Source:MGI Symbol;Acc:MGI:1338881]	9	31089402	-1	ENSMF00500000269776	TRANSMEMBRANE PROTEASE SERINE EC_3.4.21.- MATRIPTASE
Sfn	3.24	3.92E-05	ENSMUSG00000047281	stratifin [Source:MGI Symbol;Acc:MGI:1891831]	4	133600556	-1	ENSMF00730001521154	UNKNOWN
Eps8l2	3.22	2.92E-03	ENSMUSG00000025504	EPS8-like 2 [Source:MGI Symbol;Acc:MGI:2138828]	7	141338880	1	ENSMF00500000270023	EPIDERMAL GROWTH FACTOR RECEPTOR KINASE SUBSTRATE 8 EPS8 EPIDERMAL GROWTH FACTOR RECEPTOR PATHWAY SUBSTRATE 8 RELATED EPS8 RELATED
Kcna6	3.22	3.60E-03	ENSMUSG00000038077	potassium voltage-gated channel, shaker-related, subfamily, member 6 [Source:MGI Symbol;Acc:MGI:96663]	6	126708329	-1	ENSMF00290000065519	POTASSIUM VOLTAGE GATED CHANNEL SUBFAMILY A MEMBER VOLTAGE GATED POTASSIUM CHANNEL SUBUNIT KV1
Sept4	3.19	1.80E-07	ENSMUSG00000020486	septin 4 [Source:MGI Symbol;Acc:MGI:1270156]	11	87568903	1	ENSMF00730001521236	SEPTIN
Ctsq	3.19	4.94E-02	ENSMUSG00000021439	cathepsin Q [Source:MGI Symbol;Acc:MGI:2137385]	13	61035027	-1	ENSMF00250000000108	PRECURSOR
Prr15	3.17	3.49E-02	ENSMUSG00000045725	proline rich 15 [Source:MGI Symbol;Acc:MGI:1925254]	6	54327012	1	ENSMF00500000284993	PROLINE RICH 15
Grik3	3.15	8.41E-03	ENSMUSG00000001985	glutamate receptor, ionotropic, kainate 3 [Source:MGI Symbol;Acc:MGI:95816]	4	125490700	1	ENSMF00720001492013	GLUTAMATE RECEPTOR IONOTROPIC KAINATE PRECURSOR GLUTAMATE RECEPTOR
Cited2	3.14	2.18E-04	ENSMUSG00000039910	Cbp/p300-interacting transactivator, with Glu/Asp-rich carboxy-terminal domain, 2 [Source:MGI Symbol;Acc:MGI:1306784]	10	17723228	1	ENSMF00500000273263	CBP/P300 INTERACTING TRANSACTIVATOR 2
Usf1	3.13	1.22E-02	ENSMUSG00000026641	upstream transcription factor 1 [Source:MGI Symbol;Acc:MGI:99542]	1	171411313	1	ENSMF00250000001615	UPSTREAM STIMULATORY FACTOR MAJOR LATE TRANSCRIPTION FACTOR PROBABLE ATP DEPENDENT RNA
Ifih1	3.11	1.20E-04	ENSMUSG00000026896	interferon induced with helicase C domain 1 [Source:MGI Symbol;Acc:MGI:1918836]	2	62595798	-1	ENSMF00250000001740	HELICASE DDX58 EC_3.6.4.13 DEAD BOX 58 RIG I RECEPTOR 1 RLR 1 RETINOIC ACID INDUCIBLE GENE 1 RIG 1 RETINOIC ACID INDUCIBLE GENE I RIG I
Dock5	3.11	2.71E-09	ENSMUSG00000044447	dedicator of cytokinesis 5 [Source:MGI Symbol;Acc:MGI:2652871]	14	67751928	-1	ENSMF00250000000526	DEDICATOR OF CYTOKINESIS
Dusp9	3.11	6.73E-05	ENSMUSG00000031383	dual specificity phosphatase 9 [Source:MGI Symbol;Acc:MGI:2387107]	X	73639419	1	ENSMF00500000269961	DUAL SPECIFICITY PHOSPHATASE EC_3.1.3.16 EC_3.1.3.- 48 MITOGEN ACTIVATED KINASE PHOSPHATASE 3 MAP KINASE PHOSPHATASE 3 MKP 3
Ada	3.07	2.51E-04	ENSMUSG00000017697	adenosine deaminase [Source:MGI Symbol;Acc:MGI:87916]	2	163726584	-1	ENSMF00250000004973	ADENOSINE DEAMINASE EC_3.5.4.4 ADENOSINE AMINOHYDROLASE
Lonrf2	3.07	1.46E-02	ENSMUSG00000048814	LON peptidase N-terminal domain and ring finger 2 [Source:MGI Symbol;Acc:MGI:1920209]	1	38793669	-1	ENSMF00250000001913	LON PEPTIDASE N TERMINAL DOMAIN AND RING FINGER RING FINGER

Plekhh1	3.03	4.80E-04	ENSMUSG00000060716	pleckstrin homology domain containing, family H (with MyTH4 domain) member 1 [Source:MGI Symbol;Acc:MGI:2144989]	12	79029163	1	ENSMF00250000001866	PLECKSTRIN HOMOLOGY DOMAIN CONTAINING FAMILY H MEMBER 1 PH DOMAIN CONTAINING FAMILY H MEMBER 1
En1	3.01	1.24E-03	ENSMUSG00000058665	engrailed 1 [Source:MGI Symbol;Acc:MGI:95389]	1	120602418	1	ENSMF00670001235472	HOMEODOMAIN
Cubn	3.01	1.72E-06	ENSMUSG00000026726	cubilin (intrinsic factor-cobalamin receptor) [Source:MGI Symbol;Acc:MGI:1931256]	2	13276338	-1	ENSMF00740001589341	CUBILIN PRECURSOR 460 KDA RECEPTOR INTRINSIC FACTOR COBALAMIN RECEPTOR INTRINSIC FACTOR VITAMIN B12 RECEPTOR
Fblim1	2.99	5.52E-04	ENSMUSG00000006219	filamin binding LIM protein 1 [Source:MGI Symbol;Acc:MGI:1921452]	4	141576062	-1	ENSMF00500000271965	FILAMIN BINDING LIM 1 FBLP 1
Ass1	2.97	2.96E-02	ENSMUSG00000076441	argininosuccinate synthetase 1 [Source:MGI Symbol;Acc:MGI:88090]	2	31470207	1	ENSMF00250000002152	ARGININOSUCCINATE SYNTHASE EC_6.3.4.5 CITRULLINE ASPARTATE LIGASE
Irx3	2.97	7.84E-03	ENSMUSG00000031734	Iroquois related homeobox 3 (Drosophila) [Source:MGI Symbol;Acc:MGI:1197522]	8	91798511	-1	ENSMF00500000270435	IROQUOIS CLASS HOMEODOMAIN IRX IROQUOIS HOMEODOMAIN
Trim6	2.96	1.30E-06	ENSMUSG00000072244	tripartite motif-containing 6 [Source:MGI Symbol;Acc:MGI:2137352]	7	104218793	1	ENSMF00600000921153	TRIPARTITE MOTIF CONTAINING 5 EC_6.3.2.- TRIM5ALPHA
Sept5	2.96	4.08E-02	ENSMUSG00000072214	septin 5 [Source:MGI Symbol;Acc:MGI:1195461]	16	18621811	-1	ENSMF00730001521236	SEPTIN
Arhgef6	2.96	1.25E-14	ENSMUSG00000031133	Rac/Cdc42 guanine nucleotide exchange factor (GEF) 6 [Source:MGI Symbol;Acc:MGI:1920591]	X	57231485	-1	ENSMF00250000001135	RHO GUANINE NUCLEOTIDE EXCHANGE FACTOR 6 RAC/CDC42 GUANINE NUCLEOTIDE EXCHANGE FACTOR 6
Scel	2.95	1.09E-08	ENSMUSG00000022123	scieillin [Source:MGI Symbol;Acc:MGI:1891228]	14	103513341	1	ENSMF00250000007090	SCIEILLIN
Gbp3	2.94	1.42E-03	ENSMUSG00000028268	guanylate binding protein 3 [Source:MGI Symbol;Acc:MGI:1926263]	3	142560052	1	ENSMF00250000000852	GUANYLATE BINDING GTP BINDING GBP GUANINE NUCLEOTIDE BINDING
Lgals3bp	2.93	4.98E-04	ENSMUSG00000033880	lectin, galactoside-binding, soluble, 3 binding protein [Source:MGI Symbol;Acc:MGI:99554]	11	118392751	-1	ENSMF00440000236993	LECTIN GALACTOSIDE BINDING SOLUBLE 3 BINDING
Adamts4	2.87	2.20E-02	ENSMUSG00000006403	a disintegrin-like and metalloproteinase (reprolysin type) with thrombospondin type 1 motif, 4 [Source:MGI Symbol;Acc:MGI:1339949]	1	171250421	1	ENSMF00730001521602	A DISINTEGRIN AND METALLOPROTEINASE WITH THROMBOSPONDIN MOTIFS PRECURSOR ADAM TS ADAM ADAMTS
Klhl13	2.85	5.63E-14	ENSMUSG00000036782	kelch-like 13 [Source:MGI Symbol;Acc:MGI:1914705]	X	23219271	-1	ENSMF00270000056443	KELCH
Slco2a1	2.84	7.32E-03	ENSMUSG00000032548	solute carrier organic anion transporter family, member 2a1 [Source:MGI Symbol;Acc:MGI:1346021]	9	103008489	1	ENSMF00730001521765	SOLUTE CARRIER ORGANIC ANION TRANSPORTER FAMILY MEMBER ORGANIC ANION OATP ORGANIC ANION TRANSPORTER SOLUTE CARRIER FAMILY 21 MEMBER
Irf9	2.84	1.54E-06	ENSMUSG00000002325	interferon regulatory factor 9 [Source:MGI Symbol;Acc:MGI:107587]	14	55603571	1	ENSMF00500000269977	INTERFERON REGULATORY FACTOR 8 IRF 8 INTERFERON CONSENSUS SEQUENCE BINDING ICSBP
Ddx60	2.81	6.67E-03	ENSMUSG00000037921	DEAD (Asp-Glu-Ala-Asp) box polypeptide 60 [Source:MGI Symbol;Acc:MGI:2384570]	8	61928087	1	ENSMF00250000003484	PROBABLE ATP DEPENDENT RNA HELICASE DDX60 EC_3.6.4.13 DEAD BOX 60
Tmprss2	2.80	1.82E-02	ENSMUSG00000000385	transmembrane protease, serine 2 [Source:MGI Symbol;Acc:MGI:1354381]	16	97564684	-1	ENSMF00500000269719	TRANSMEMBRANE PROTEASE SERINE EC_3.4.21.-
Gpr116	2.79	7.51E-05	ENSMUSG00000056492	G protein-coupled receptor 116 [Source:MGI Symbol;Acc:MGI:2182928]	17	43389466	1	ENSMF00250000001341	PROBABLE G COUPLED RECEPTOR PRECURSOR G COUPLED RECEPTOR
Tdrp	2.79	3.73E-06	ENSMUSG00000050052	testis development related protein [Source:MGI Symbol;Acc:MGI:1919398]	8	13952009	-1	ENSMF00250000010007	TESTIS DEVELOPMENT RELATED
Pdlim2	2.77	7.99E-03	ENSMUSG00000022090	PDZ and LIM domain 2 [Source:MGI Symbol;Acc:MGI:2384850]	14	70164218	-1	ENSMF00500000272003	PDZ AND LIM DOMAIN 2

Serpinb9b	2.76	3.03E-03	ENSMUSG000000021403	serine (or cysteine) peptidase inhibitor, clade B, member 9b [Source:MGI Symbol;Acc:MGI:894668]	13	33027416	1	ENSMF00500000269596	SERPIN
Wnt5a	2.75	1.84E-07	ENSMUSG000000021994	wingless-related MMTV integration site 5A [Source:MGI Symbol;Acc:MGI:98958]	14	28504750	1	ENSMF00740001589193	WNT 5
Cited1	2.75	5.10E-04	ENSMUSG000000051159	Cbp/p300-interacting transactivator with Glu/Asp-rich carboxy-terminal domain 1 [Source:MGI Symbol;Acc:MGI:108023]	X	102247381	-1	ENSMF00440000236996	CBP/P300 INTERACTING TRANSACTIVATOR 1 MELANOCYTE SPECIFIC 1
Oas1b	2.73	4.93E-02	ENSMUSG000000029605	2'-5' oligoadenylate synthetase 1B [Source:MGI Symbol;Acc:MGI:97430]	5	120812635	1	ENSMF00570000851068	2' 5' OLIGOADENYLATE SYNTHASE 2 5' OLIGO A SYNTHASE 2 5A SYNTHASE EC_2.7.7.84
Helz2	2.73	3.86E-02	ENSMUSG000000027580	helicase with zinc finger 2, transcriptional coactivator [Source:MGI Symbol;Acc:MGI:2385169]	2	181227615	-1	ENSMF00740001589242	HELICASE WITH ZINC FINGER DOMAIN EC_3.6.4.-
Tril	2.71	1.91E-04	ENSMUSG000000043496	TLR4 interactor with leucine-rich repeats [Source:MGI Symbol;Acc:MGI:1914123]	6	53815471	-1	ENSMF00480000262869	TLR4 INTERACTOR WITH LEUCINE RICH REPEATS PRECURSOR LEUCINE RICH REPEAT CONTAINING
Ptx3	2.69	2.87E-03	ENSMUSG000000027832	pentraxin related gene [Source:MGI Symbol;Acc:MGI:104641]	3	66219910	1	ENSMF00400000132011	PENTRAXIN RELATED PTX3 PRECURSOR PENTAXIN RELATED PTX3 TUMOR NECROSIS FACTOR INDUCIBLE GENE 14 TSG 14
Lama1	2.68	1.46E-08	ENSMUSG000000032796	laminin, alpha 1 [Source:MGI Symbol;Acc:MGI:99892]	17	67697265	1	ENSMF00740001589230	LAMININ SUBUNIT ALPHA 2 PRECURSOR LAMININ M CHAIN LAMININ 12 SUBUNIT ALPHA LAMININ 2 SUBUNIT ALPHA LAMININ 4 SUBUNIT ALPHA MEROSIN
Stag3	2.68	1.03E-03	ENSMUSG000000036928	stromal antigen 3 [Source:MGI Symbol;Acc:MGI:1355311]	5	138280240	1	ENSMF00250000000734	HEAVY CHAIN COHESIN SUBUNIT SA SCC3 HOMOLOG
Prune2	2.67	1.86E-02	ENSMUSG000000039126	prune homolog 2 (Drosophila) [Source:MGI Symbol;Acc:MGI:1925004]	19	16956118	1	ENSMF00250000001236	STROMAL ANTIGEN
Rab3il1	2.66	4.59E-02	ENSMUSG000000024663	RAB3A interacting protein (rabin3)-like 1 [Source:MGI Symbol;Acc:MGI:1922010]	19	10001669	1	ENSMF00250000001842	AMBIGUOUS
Kcnh6	2.66	2.61E-03	ENSMUSG000000001901	potassium voltage-gated channel, subfamily H (eag-related), member 6 [Source:MGI Symbol;Acc:MGI:2684139]	11	106008124	1	ENSMF00730001521633	GUANINE NUCLEOTIDE EXCHANGE FACTOR RAB 3A RAB 3A INTERACTING 1 RAB3A INTERACTING 1 RABIN3 1
Cdh1	2.66	3.80E-10	ENSMUSG000000000303	cadherin 1 [Source:MGI Symbol;Acc:MGI:88354]	8	106603351	1	ENSMF00730001521172	POTASSIUM VOLTAGE GATED CHANNEL SUBFAMILY H MEMBER 2 ETHER A GO GO RELATED GENE POTASSIUM CHANNEL 1 ERG 1 EAG RELATED 1 ETHER A GO GO RELATED 1 VOLTAGE GATED POTASSIUM CHANNEL SUBUNIT KV11 1
Pygl	2.64	1.73E-02	ENSMUSG000000021069	liver glycogen phosphorylase [Source:MGI Symbol;Acc:MGI:97829]	12	70190811	-1	ENSMF00250000001172	CADHERIN PRECURSOR CADHERIN CADHERIN
Tspan8	2.62	1.96E-02	ENSMUSG000000034127	tetraspanin 8 [Source:MGI Symbol;Acc:MGI:2384918]	10	115817284	1	ENSMF00500000272455	GLYCOGEN PHOSPHORYLASE FORM EC_2.4.1.1
Krt18	2.60	1.63E-06	ENSMUSG000000023043	keratin 18 [Source:MGI Symbol;Acc:MGI:96692]	15	102028216	1	ENSMF00560000771030	TETRASPANIN 8 TSPAN 8
Sin3b	2.59	5.60E-08	ENSMUSG000000031622	transcriptional regulator, SIN3B (yeast) [Source:MGI Symbol;Acc:MGI:107158]	8	72723288	1	ENSMF00570000851098	KERATIN TYPE I CYTOSKELETAL 18 CYTOKERATIN 18 CK 18 KERATIN 18 K18
Chrnbl	2.59	4.98E-02	ENSMUSG000000041189	cholinergic receptor, nicotinic, beta polypeptide 1 (muscle) [Source:MGI Symbol;Acc:MGI:87890]	11	69784036	-1	ENSMF00730001521468	PAIRED AMPHIPATHIC HELIX HISTONE DEACETYLASE COMPLEX SUBUNIT TRANSCRIPTIONAL COREPRESSOR
									ACETYLCHOLINE RECEPTOR SUBUNIT PRECURSOR

Ralgds	2.56	2.83E-05	ENSMUSG00000026821	ral guanine nucleotide dissociation stimulator [Source:MGI Symbol;Acc:MGI:107485]	2	28513125	1	ENSMF00690001356594	RAL GUANINE NUCLEOTIDE DISSOCIATION STIMULATOR RALGDS
Lgals9	2.56	4.49E-06	ENSMUSG00000001123	lectin, galactose binding, soluble 9 [Source:MGI Symbol;Acc:MGI:109496]	11	78962974	-1	ENSMF00740001589285	GALECTIN GAL
Tubb4a	2.55	3.44E-04	ENSMUSG000000062591	tubulin, beta 4A class IVA [Source:MGI Symbol;Acc:MGI:107848]	17	57080066	-1	ENSMF00250000000193	TUBULIN BETA CHAIN
Ldhb	2.54	1.07E-04	ENSMUSG00000030246	lactate dehydrogenase B [Source:MGI Symbol;Acc:MGI:96763]	6	142490249	-1	ENSMF00250000000475	L LACTATE DEHYDROGENASE CHAIN LDH EC_1.1.1.27
Stat1	2.53	3.11E-06	ENSMUSG000000026104	signal transducer and activator of transcription 1 [Source:MGI Symbol;Acc:MGI:103063]	1	52119438	1	ENSMF00500000269705	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION
Sulf1	2.53	6.43E-10	ENSMUSG00000016918	sulfatase 1 [Source:MGI Symbol;Acc:MGI:2138563]	1	12692430	1	ENSMF00570000851069	EXTRACELLULAR SULFATASE SULF PRECURSOR EC_3.1.6.-
Serpina3n	2.52	3.61E-02	ENSMUSG000000021091	serine (or cysteine) peptidase inhibitor, clade A, member 3N [Source:MGI Symbol;Acc:MGI:105045]	12	104406729	1	ENSMF00250000000235	PRECURSOR
Sbsn	2.50	1.24E-03	ENSMUSG00000046056	suprabasin [Source:MGI Symbol;Acc:MGI:2446326]	7	30734739	1	ENSMF00740001589670	SUPRABASIN PRECURSOR
Akap5	2.50	3.09E-04	ENSMUSG000000021057	A kinase (PRKA) anchor protein 5 [Source:MGI Symbol;Acc:MGI:2685104]	12	76324891	1	ENSMF00250000007751	A KINASE ANCHOR 5 AKAP 5 A KINASE ANCHOR KDA AKAP CAMP DEPENDENT KINASE REGULATORY SUBUNIT II HIGH AFFINITY BINDING
Bcl11b	2.49	2.02E-02	ENSMUSG00000048251	B cell leukemia/lymphoma 11B [Source:MGI Symbol;Acc:MGI:1929913]	12	107910403	-1	ENSMF00600000921237	B CELL LYMPHOMA/LEUKEMIA 11A BCL 11A B CELL CLL/LYMPHOMA 11A COUP TF INTERACTING 1 ECOTROPIC VIRAL INTEGRATION SITE 9 EVI 9
Gm12913	2.48	9.07E-04	ENSMUSG000000082697	predicted gene 12913 [Source:MGI Symbol;Acc:MGI:3650682]	4	78773677	-1		
Pvrl4	2.47	4.79E-04	ENSMUSG000000006411	poliovirus receptor-related 4 [Source:MGI Symbol;Acc:MGI:1918990]	1	171370099	1	ENSMF00360000110027	POLIOVIRUS RECEPTOR RELATED 4 PRECURSOR IG SUPERFAMILY RECEPTOR LNIR NECTIN 4
Gbp2b	2.47	2.83E-02	ENSMUSG000000028269	guanylate binding protein 2b [Source:MGI Symbol;Acc:MGI:95666]	3	142594847	1	ENSMF002500000000852	GUANYLATE BINDING GTP BINDING GBP
Vash2	2.47	5.00E-02	ENSMUSG000000037568	vasohibin 2 [Source:MGI Symbol;Acc:MGI:2444826]	1	190947648	-1	ENSMF00250000003896	GUANINE NUCLEOTIDE BINDING VASOHIBIN
Gm20696	2.46	4.39E-02	ENSMUSG000000030068	predicted gene 20696 [Source:MGI Symbol;Acc:MGI:5313143]	6	99257484	-1	ENSMF00660001179915	UNKNOWN
Fmo1	2.45	1.65E-02	ENSMUSG000000040181	flavin containing monooxygenase 1 [Source:MGI Symbol;Acc:MGI:1310002]	1	162829561	-1	ENSMF002500000000577	DIMETHYLANILINE MONOOXYGENASE [N OXIDE FORMING] EC_1.14.13.8 DIMETHYLANILINE OXIDASE FLAVIN CONTAINING MONOOXYGENASE FMO
Phf16	2.43	4.65E-08	ENSMUSG000000037315	PHD finger protein 16 [Source:MGI Symbol;Acc:MGI:2148019]	X	20425688	1	ENSMF00480000262767	PHD FINGER
Mitd1	2.42	4.29E-05	ENSMUSG000000026088	MIT, microtubule interacting and transport, domain containing 1 [Source:MGI Symbol;Acc:MGI:1916278]	1	37874801	-1	ENSMF00250000004794	MIT DOMAIN CONTAINING 1
Sfi1	2.42	3.49E-04	ENSMUSG000000023764	Sfi1 homolog, spindle assembly associated (yeast) [Source:MGI Symbol;Acc:MGI:1926137]	11	3131850	-1	ENSMF00250000004966	SFI1 HOMOLOG

Tfb2m	2.41	1.18E-02	ENSMUSG00000026492	transcription factor B2, mitochondrial [Source:MGI Symbol;Acc:MGI:107937]	1	179528055	-1	ENSMF00250000007288	DIMETHYLADENOSINE TRANSFERASE 2 MITOCHONDRIAL PRECURSOR EC_2.1.1.- MITOCHONDRIAL 12S RRNA DIMETHYLASE 2 MITOCHONDRIAL TRANSCRIPTION FACTOR B2 MTTFB2 S ADENOSYLMETHIONINE 6' N' N' ADENOSYL RRNA DIMETHYLTRANSFERASE 2
Mbd1	2.40	3.70E-02	ENSMUSG00000024561	methyl-CpG binding domain protein 1 [Source:MGI Symbol;Acc:MGI:1333811]	18	74268272	1	ENSMF00250000003325	METHYL CPG BINDING DOMAIN 1 METHYL CPG BINDING MBD1
Stat2	2.40	1.42E-03	ENSMUSG00000040033	signal transducer and activator of transcription 2 [Source:MGI Symbol;Acc:MGI:103039]	10	128270576	1	ENSMF00500000269705	SIGNAL TRANSDUCER AND ACTIVATOR OF TRANSCRIPTION
Prmt3	2.39	2.83E-02	ENSMUSG00000030505	protein arginine N-methyltransferase 3 [Source:MGI Symbol;Acc:MGI:1919224]	7	49778346	1	ENSMF00730001522058	ARGININE N METHYLTRANSFERASE 3 EC_2.1.1.- HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN
Gm5424	2.38	3.73E-02	ENSMUSG00000046687	predicted gene 5424 [Source:MGI Symbol;Acc:MGI:3643173]	10	62071015	1	ENSMF00250000002152	METHYLTRANSFERASE 3 ARGININOSUCCINATE SYNTHASE EC_6.3.4.5 CITRULLINE ASPARTATE LIGASE
Serpind1	2.38	1.31E-02	ENSMUSG00000022766	serine (or cysteine) peptidase inhibitor, clade D, member 1 [Source:MGI Symbol;Acc:MGI:96051]	16	17331371	1	ENSMF00440000236979	HEPARIN COFACTOR 2 PRECURSOR HEPARIN COFACTOR II HC II PROTEASE INHIBITOR LEUSERPIN 2 SERPIN D1
Hic2	2.37	6.68E-03	ENSMUSG00000050240	hypermethylated in cancer 2 [Source:MGI Symbol;Acc:MGI:1929869]	16	17233572	1	ENSMF00600000921379	HYPERMETHYLATED IN CANCER
Hdac4	2.36	4.33E-02	ENSMUSG00000026313	histone deacetylase 4 [Source:MGI Symbol;Acc:MGI:3036234]	1	91932757	-1	ENSMF00730001521398	HISTONE DEACETYLASE EC_3.5.1.98
Tes	2.35	6.52E-04	ENSMUSG00000029552	testis derived transcript [Source:MGI Symbol;Acc:MGI:105081]	6	17065149	1	ENSMF00730001522088	TESTIN
Rnf128	2.34	7.24E-03	ENSMUSG00000031438	ring finger protein 128 [Source:MGI Symbol;Acc:MGI:1914139]	X	139563316	1	ENSMF00600000921169	E3 UBIQUITIN LIGASE EC_6.3.2.- RING FINGER
Flnb	2.33	3.38E-10	ENSMUSG00000025278	filamin, beta [Source:MGI Symbol;Acc:MGI:2446089]	14	7817957	1	ENSMF00740001589123	FILAMIN FLN ABP 280 ACTIN BINDING FILAMIN
Trp53i11	2.33	6.53E-03	ENSMUSG00000068735	transformation related protein 53 inducible protein 11 [Source:MGI Symbol;Acc:MGI:2670995]	2	93187548	1	ENSMF00500000272770	TUMOR P53 INDUCIBLE 11 P53 INDUCED GENE 11
H19	2.32	2.30E-09	ENSMUSG00000000031	H19 fetal liver mRNA [Source:MGI Symbol;Acc:MGI:95891]	7	142575529	-1		
Pmaip1	2.31	4.82E-03	ENSMUSG00000024521	phorbol-12-myristate-13-acetate-induced protein 1 [Source:MGI Symbol;Acc:MGI:1930146]	18	66458604	1	ENSMF00670001246165	PHORBOL 12 MYRISTATE 13 ACETATE INDUCED 1 NOXA
Ing5	2.30	3.53E-03	ENSMUSG00000026283	inhibitor of growth family, member 5 [Source:MGI Symbol;Acc:MGI:1922816]	1	93803965	1	ENSMF00500000270342	INHIBITOR OF GROWTH
Klhdc10	2.30	9.69E-08	ENSMUSG00000029775	kelch domain containing 10 [Source:MGI Symbol;Acc:MGI:1924038]	6	30401868	1	ENSMF00250000003847	KELCH DOMAIN CONTAINING 10
Sorbs3	2.29	9.73E-04	ENSMUSG00000022091	sorbin and SH3 domain containing 3 [Source:MGI Symbol;Acc:MGI:700013]	14	70180468	-1	ENSMF00670001235644	SORBIN AND SH3 DOMAIN CONTAINING 1 PONSIN SH3 DOMAIN 5 S C CBL ASSOCIATED CAP
Tor1aip1	2.29	2.49E-05	ENSMUSG00000026466	torsin A interacting protein 1 [Source:MGI Symbol;Acc:MGI:3582693]	1	156004599	-1	ENSMF00250000003441	TORSIN 1A INTERACTING 1 ASSOCIATED 1B LAP1B
Gm8113	2.29	2.02E-06	ENSMUSG00000089901	predicted gene 8113 [Source:MGI Symbol;Acc:MGI:3648791]	14	43925390	1	ENSMF00600000927082	ENVELOPE GLYCOPROTEIN
Dysf	2.27	2.59E-02	ENSMUSG00000033788	dysferlin [Source:MGI Symbol;Acc:MGI:1349385]	6	84008590	1	ENSMF00730001521574	FER 1
Bex1	2.27	3.41E-08	ENSMUSG00000050071	brain expressed gene 1 [Source:MGI Symbol;Acc:MGI:1328321]	X	136213972	-1	ENSMF00600000921661	BRAIN EXPRESSED X LINKED

Slc39a14	2.26	1.25E-03	ENSMUSG00000022094	solute carrier family 39 (zinc transporter), member 14 [Source:MGI Symbol;Acc:MGI:2384851]	14	70303469	-1	ENSMF00500000270245	ZINC TRANSPORTER ZIP14 PRECURSOR SOLUTE CARRIER FAMILY 39 MEMBER 14 ZRT AND IRT 14 ZIP 14
Flt1	2.25	3.03E-05	ENSMUSG00000029648	FMS-like tyrosine kinase 1 [Source:MGI Symbol;Acc:MGI:95558]	5	147561604	-1	ENSMF00440000236870	VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR PRECURSOR VEGFR EC_2.7.10.1 FMS TYROSINE KINASE FLT TYROSINE KINASE RECEPTOR
Pex5	2.24	8.22E-03	ENSMUSG00000005069	peroxisomal biogenesis factor 5 [Source:MGI Symbol;Acc:MGI:1098808]	6	124396816	-1	ENSMF00250000001819	PEROXISOMAL TARGETING SIGNAL 1 RECEPTOR PTS1 RECEPTOR PTS1R PTS1 BP PEROXIN 5 PEROXISOMAL C TERMINAL TARGETING SIGNAL IMPORT RECEPTOR PEROXISOME RECEPTOR 1
Bin3	2.22	1.24E-02	ENSMUSG00000022089	bridging integrator 3 [Source:MGI Symbol;Acc:MGI:1929883]	14	70100145	1	ENSMF00460000244978	BRIDGING INTEGRATOR 3
Grb10	2.22	2.43E-10	ENSMUSG00000020176	growth factor receptor bound protein 10 [Source:MGI Symbol;Acc:MGI:103232]	11	11930508	-1	ENSMF00250000001938	GROWTH FACTOR RECEPTOR BOUND ADAPTER
Sugp2	2.22	1.74E-02	ENSMUSG00000036054	SURP and G patch domain containing 2 [Source:MGI Symbol;Acc:MGI:2678085]	8	70234226	1	ENSMF00250000005667	SURP AND G PATCH DOMAIN CONTAINING 2 ARGININE/SERINE RICH SPLICING FACTOR 14 SPLICING FACTOR ARGININE/SERINE RICH 14
Clu	2.21	4.83E-06	ENSMUSG00000022037	clusterin [Source:MGI Symbol;Acc:MGI:88423]	14	65968483	1	ENSMF00250000003194	CLUSTERIN PRECURSOR [CONTAINS CLUSTERIN BETA CHAIN; CLUSTERIN ALPHA CHAIN]
Usp21	2.20	7.39E-04	ENSMUSG000000053483	ubiquitin specific peptidase 21 [Source:MGI Symbol;Acc:MGI:1353665]	1	171281945	-1	ENSMF00730001521805	UBIQUITIN CARBOXYL TERMINAL HYDROLASE 2 EC_3.4.19.12.41 KDA UBIQUITIN SPECIFIC PROTEASE DEUBIQUITINATING ENZYME 2 UBIQUITIN THIOESTERASE 2 UBIQUITIN SPECIFIC PROCESSING PROTEASE 2
Fbxo28	2.20	2.29E-03	ENSMUSG000000047539	F-box protein 28 [Source:MGI Symbol;Acc:MGI:1261890]	1	182313102	-1	ENSMF00250000005021	F BOX ONLY 28
Col5a2	2.20	2.01E-08	ENSMUSG00000026042	collagen, type V, alpha 2 [Source:MGI Symbol;Acc:MGI:88458]	1	45374321	-1	ENSMF00250000000184	COLLAGEN ALPHA 1 CHAIN PRECURSOR ALPHA TYPE I COLLAGEN
Fam213a	2.19	1.13E-05	ENSMUSG00000021792	family with sequence similarity 213, member A [Source:MGI Symbol;Acc:MGI:1917814]	14	40993740	-1	ENSMF00250000005616	REDOX REGULATORY FAM213A PEROXIREDOXIN 2 ACTIVATED IN M CSF STIMULATED MONOCYTES PAMM
Rbm47	2.19	1.26E-02	ENSMUSG00000070780	RNA binding motif protein 47 [Source:MGI Symbol;Acc:MGI:2384294]	5	66016549	-1	ENSMF00730001521837	RNA BINDING RNA BINDING MOTIF
Gba2	2.18	1.97E-02	ENSMUSG00000028467	glucosidase beta 2 [Source:MGI Symbol;Acc:MGI:2654325]	4	43566928	-1	ENSMF00250000004179	NON LYSOSOMAL GLUCOSYLKERAMIDASE NLGASE EC_3.2.1.45 BETA GLUCOCEREBROSIDASE 2 BETA GLUCOSIDASE 2 GLUCOSYLKERAMIDASE 2
Phlpp1	2.17	4.89E-02	ENSMUSG000000044340	PH domain and leucine rich repeat protein phosphatase 1 [Source:MGI Symbol;Acc:MGI:2138327]	1	106171752	1	ENSMF00250000001904	PH DOMAIN LEUCINE RICH REPEAT PHOSPHATASE 1 EC_3.1.3.16 PLECKSTRIN HOMOMLOGY DOMAIN CONTAINING FAMILY E MEMBER 1 PH DOMAIN CONTAINING FAMILY E MEMBER 1 SUPRACHIASMATIC NUCLEUS CIRCADIAN OSCILLATORY
Dsg2	2.16	2.04E-03	ENSMUSG000000044393	desmoglein 2 [Source:MGI Symbol;Acc:MGI:1196466]	18	20558074	1	ENSMF00730001521591	DESMOGLEIN PRECURSOR
Spint1	2.16	3.85E-03	ENSMUSG00000027315	serine protease inhibitor, Kunitz type 1 [Source:MGI Symbol;Acc:MGI:1338033]	2	119237362	1	ENSMF00500000271220	KUNITZ TYPE PROTEASE INHIBITOR 1 PRECURSOR HEPATOCYTE GROWTH FACTOR ACTIVATOR INHIBITOR TYPE 1 HAI 1

Slc7a5	2.15	3.40E-02	ENSMUSG00000040010	solute carrier family 7 (cationic amino acid transporter, y+ system), member 5 [Source:MGI Symbol;Acc:MGI:1298205]	8	121881150	-1	ENSMF00250000000331	AMINO ACID TRANSPORTER SOLUTE CARRIER FAMILY 7 MEMBER
Pard3b	2.15	5.55E-03	ENSMUSG000000052062	par-3 partitioning defective 3 homolog B (C. elegans) [Source:MGI Symbol;Acc:MGI:1919301]	1	61638824	1	ENSMF00610000952891	PARTITIONING DEFECTIVE 3 HOMOLOG B AMYOTROPHIC LATERAL SCLEROSIS 2 CHROMOSOMAL REGION CANDIDATE GENE 19 PAR3 BETA PARTITIONING DEFECTIVE 3 PAR3 L
Esrp1	2.15	4.92E-04	ENSMUSG000000040728	epithelial splicing regulatory protein 1 [Source:MGI Symbol;Acc:MGI:1917326]	4	11331933	-1	ENSMF002500000001984	EPITHELIAL SPLICING REGULATORY 1 RNA BINDING MOTIF 35A RNA BINDING 35A
Tnfrsf21	2.14	2.22E-02	ENSMUSG000000023915	tumor necrosis factor receptor superfamily, member 21 [Source:MGI Symbol;Acc:MGI:2151075]	17	43016555	1	ENSMF00440000236917	TUMOR NECROSIS FACTOR RECEPTOR SUPERFAMILY MEMBER 21 PRECURSOR DEATH RECEPTOR 6 CD358 ANTIGEN MITOFERRIN MITOCHONDRIAL IRON TRANSPORTER SOLUTE CARRIER FAMILY 25 MEMBER
Slc25a37	2.14	1.22E-02	ENSMUSG000000034248	solute carrier family 25, member 37 [Source:MGI Symbol;Acc:MGI:1914962]	14	69241848	-1	ENSMF002500000002181	LIM DOMAIN KINASE LIMK EC_2.7.11.1
Limk2	2.13	1.22E-05	ENSMUSG000000020451	LIM motif-containing protein kinase 2 [Source:MGI Symbol;Acc:MGI:1197517]	11	3344256	-1	ENSMF00730001521981	G COUPLED RECEPTOR PRECURSOR
Gpr126	2.10	3.11E-02	ENSMUSG000000039116	G protein-coupled receptor 126 [Source:MGI Symbol;Acc:MGI:1916151]	10	14402585	-1	ENSMF005000000269836	MKI67 FHA DOMAIN INTERACTING NUCLEOLAR PHOSPHOPROTEIN NUCLEOLAR INTERACTING WITH THE FHA DOMAIN OF PKI 67
Mki67ip	2.09	2.45E-03	ENSMUSG000000026377	Mki67 (FHA domain) interacting nucleolar phosphoprotein [Source:MGI Symbol;Acc:MGI:1915199]	1	118321839	1	ENSMF005000000271318	HIGH MOBILITY GROUP NUCLEOSOME BINDING DOMAIN CONTAINING 5 NUCLEOSOME BINDING 1
Hmgn5	2.09	3.15E-09	ENSMUSG000000031245	high-mobility group nucleosome binding domain 5 [Source:MGI Symbol;Acc:MGI:1355295]	X	109004534	-1	ENSMF006000000925254	CATENIN BETA BETA CATENIN
Jup	2.09	3.84E-03	ENSMUSG000000001552	junction plakoglobin [Source:MGI Symbol;Acc:MGI:96650]	11	100368958	-1	ENSMF002500000001012	SPONDIN 1 PRECURSOR F SPONDIN
Spon1	2.08	3.18E-02	ENSMUSG000000038156	spodin 1, (f-spondin) extracellular matrix protein [Source:MGI Symbol;Acc:MGI:2385287]	7	113765998	1	ENSMF00700001390220	AMBIGUOUS
BC065397	2.08	1.20E-02	ENSMUSG000000072960	cDNA sequence BC065397 [Source:MGI Symbol;Acc:MGI:3584520]	X	136741858	1	ENSMF00390000127317	PEROXISOME ASSEMBLY 26 PEROXIN 26
Gm11914	2.08	3.03E-03	ENSMUSG000000082674	predicted gene 11914 [Source:MGI Symbol;Acc:MGI:3649889]	4	27867149	-1	ENSMF002500000007719	PLECKSTRIN HOMOLOGY DOMAIN CONTAINING FAMILY A MEMBER 8 PH DOMAIN CONTAINING FAMILY A MEMBER 8 PHOSPHATIDYLINOSITOL FOUR PHOSPHATE ADAPTER 2 FAPP 2 PHOSPHOINOSITOL 4 PHOSPHATE ADAPTER 2
Pex26	2.07	1.71E-03	ENSMUSG000000067825	peroxisomal biogenesis factor 26 [Source:MGI Symbol;Acc:MGI:1921293]	6	121183667	1	ENSMF005000000270443	TETRASPANIN 9 TSPAN 9
Plekha8	2.07	1.22E-02	ENSMUSG000000005225	pleckstrin homology domain containing, family A (phosphoinositide binding specific) member 8 [Source:MGI Symbol;Acc:MGI:2681164]	6	54595111	1	ENSMF006000000921226	SECRETED FRIZZLED RELATED PRECURSOR SFRP
Tspan9	2.07	4.96E-02	ENSMUSG000000030352	tetraspanin 9 [Source:MGI Symbol;Acc:MGI:1924558]	6	127961396	-1	ENSMF005000000270542	BTG1 B CELL TRANSLOCATION GENE 1
Sfrp2	2.05	1.90E-04	ENSMUSG000000027996	secreted frizzled-related protein 2 [Source:MGI Symbol;Acc:MGI:108078]	3	83766321	1	ENSMF002500000009106	APOLIPOPROTEIN B RECEPTOR APOLIPOPROTEIN B 100 RECEPTOR APOLIPOPROTEIN B48 RECEPTOR APOB 48R
Btg2	2.03	2.05E-02	ENSMUSG000000020423	B cell translocation gene 2, anti-proliferative [Source:MGI Symbol;Acc:MGI:108384]	1	134075170	-1		
Apobr	2.03	4.08E-02	ENSMUSG000000042759	apolipoprotein B receptor [Source:MGI Symbol;Acc:MGI:2176230]	7	126584942	1		

Iqgap2	2.01	7.24E-03	ENSMUSG00000021676	IQ motif containing GTPase activating protein 2 [Source:MGI Symbol;Acc:MGI:2449975]	13	95627177	-1	ENSMF00250000000952	RAS GTPASE ACTIVATING
Daam2	2.00	4.02E-03	ENSMUSG00000040260	dishevelled associated activator of morphogenesis 2 [Source:MGI Symbol;Acc:MGI:1923691]	17	49456022	-1	ENSMF00350000105429	DISHEVELED ASSOCIATED ACTIVATOR OF MORPHOGENESIS
1700025G04 Rik	1.99	1.56E-03	ENSMUSG00000032666	RIKEN cDNA 1700025G04 gene [Source:MGI Symbol;Acc:MGI:1916649]	1	151884524	-1	ENSMF00500000274384	UNCHARACTERIZED
Gm2058	1.99	1.03E-02	ENSMUSG00000074903	predicted gene 2058 [Source:MGI Symbol;Acc:MGI:3805010]	7	39588931	1	ENSMF00670001235468	UBIQUITIN CONJUGATING ENZYME E2 H EC_6.3.2.19 UBCH2 UBIQUITIN CARRIER H UBIQUITIN CONJUGATING ENZYME E2 20K UBIQUITIN LIGASE H
Fbxl19	1.98	3.11E-02	ENSMUSG00000030811	F-box and leucine-rich repeat protein 19 [Source:MGI Symbol;Acc:MGI:3039600]	7	127746775	1	ENSMF00730001521651	LYSINE SPECIFIC DEMETHYLASE EC_1.14.11.27 F BOX AND LEUCINE RICH REPEAT F BOX/LRR REPEAT JMJC DOMAIN CONTAINING HISTONE DEMETHYLATION [HISTONE H3] LYSINE 36 DEMETHYLASE
Mical3	1.98	2.00E-02	ENSMUSG00000051586	microtubule associated monooxygenase, calponin and LIM domain containing 3 [Source:MGI Symbol;Acc:MGI:2442733]	6	120931707	-1	ENSMF00250000000908	METHIONINE SULFOXIDE OXIDASE EC_1.14.13.- MOLECULE INTERACTING WITH CASL MICAL
Anxa4	1.98	2.84E-04	ENSMUSG00000029994	annexin A4 [Source:MGI Symbol;Acc:MGI:88030]	6	86736840	-1	ENSMF00740001589071	ANNEXIN ANNEXIN ANNEXIN
Tatdn2	1.97	3.69E-03	ENSMUSG00000056952	TatD DNase domain containing 2 [Source:MGI Symbol;Acc:MGI:3576210]	6	113697050	1	ENSMF00250000008209	DEOXYRIBONUCLEASE TATDN2 EC_3.1.21.-
Atp11a	1.96	1.82E-06	ENSMUSG00000031441	ATPase, class VI, type 11A [Source:MGI Symbol;Acc:MGI:1354735]	8	12757014	1	ENSMF00730001521628	PROBABLE PHOSPHOLIPID TRANSPORTING ATPASE EC_3.6.3.1 ATPASE CLASS VI TYPE
Lrp8	1.95	1.68E-02	ENSMUSG00000028613	low density lipoprotein receptor-related protein 8, apolipoprotein e receptor [Source:MGI Symbol;Acc:MGI:1340044]	4	107802261	1	ENSMF00740001589117	LOW DENSITY LIPOPROTEIN RECEPTOR RECEPTOR
Limch1	1.95	3.62E-03	ENSMUSG00000037736	LIM and calponin homology domains 1 [Source:MGI Symbol;Acc:MGI:1924819]	5	66745835	1	ENSMF00250000003304	LIM AND CALPONIN HOMOLOGY DOMAINS CONTAINING 1
Tns1	1.95	1.00E-02	ENSMUSG00000055322	tensin 1 [Source:MGI Symbol;Acc:MGI:104552]	1	73910231	-1	ENSMF00250000000591	TENSIN
Hmox1	1.95	2.94E-02	ENSMUSG00000005413	heme oxygenase (decycling) 1 [Source:MGI Symbol;Acc:MGI:96163]	8	75093591	1	ENSMF00250000002797	HEME OXYGENASE HO EC_1.14.99.3
Rb1	1.94	3.84E-02	ENSMUSG00000022105	retinoblastoma 1 [Source:MGI Symbol;Acc:MGI:97874]	14	73183673	-1	ENSMF00250000004695	RETINOBLASTOMA ASSOCIATED PRB RB
Rnf44	1.93	4.16E-03	ENSMUSG00000034928	ring finger protein 44 [Source:MGI Symbol;Acc:MGI:2145310]	13	54679399	-1	ENSMF00250000001948	RING FINGER
Tor1aip2	1.92	1.68E-03	ENSMUSG00000050565	torsin A interacting protein 2 [Source:MGI Symbol;Acc:MGI:3582695]	1	156035403	1	ENSMF00250000003441	TORSIN 1A INTERACTING 1 ASSOCIATED 1B LAP1B
Dlg5	1.92	3.57E-04	ENSMUSG00000021782	discs, large homolog 5 (Drosophila) [Source:MGI Symbol;Acc:MGI:1918478]	14	24133953	-1	ENSMF00360000109935	DISKS LARGE HOMOLOG 5 DISCS LARGE P DLG PLACENTA AND PROSTATE DLG INTERLEUKIN 1 RECEPTOR TYPE 1 PRECURSOR IL 1R 1 IL 1RT 1 IL 1RT1 CD121 ANTIGEN FAMILY MEMBER A INTERLEUKIN 1 RECEPTOR ALPHA IL 1R ALPHA INTERLEUKIN 1 RECEPTOR TYPE I P80 CD121A ANTIGEN [CONTAINS INTERLEUKIN 1 RECEPTOR TYPE 1 MEMBRANE FORM MIL 1R1 MIL 1R1
Il1r1	1.92	1.77E-02	ENSMUSG00000026072	interleukin 1 receptor, type I [Source:MGI Symbol;Acc:MGI:96545]	1	40225080	1	ENSMF00500000270431	
Fam126b	1.92	2.79E-02	ENSMUSG00000038174	family with sequence similarity 126, member B [Source:MGI Symbol;Acc:MGI:1098784]	1	58522806	-1	ENSMF00250000003532	HYCCIN DOWN REGULATED BY CTNNB1 A FAM126A

Nuak1	1.91	1.51E-02	ENSMUSG00000020032	NUAK family, SNF1-like kinase, 1 [Source:MGI Symbol;Acc:MGI:1925226]	10	84370905	-1	ENSM00730001522048	NUAK FAMILY SNF1 KINASE EC_2.7.11.1
Cgnl1	1.91	1.89E-03	ENSMUSG00000032232	cingulin-like 1 [Source:MGI Symbol;Acc:MGI:1915428]	9	71626509	-1	ENSM00740001589340	CINGULIN
Nabp1	1.90	1.01E-02	ENSMUSG00000026107	nucleic acid binding protein 1 [Source:MGI Symbol;Acc:MGI:1923258]	1	51469498	-1	ENSM00250000004294	SOSS COMPLEX SUBUNIT B1 NUCLEIC ACID BINDING 2 OLIGONUCLEOTIDE/OLIGOSACCHARIDE BINDING FOLD CONTAINING 2B SENSOR OF SINGLE STRAND DNA COMPLEX SUBUNIT B1 SENSOR OF SSDNA SUBUNIT B1 SOSS B1 SINGLE STRANDED DNA BINDING 1
Ndrp1	1.90	3.31E-02	ENSMUSG00000005125	N-myc downstream regulated gene 1 [Source:MGI Symbol;Acc:MGI:1341799]	15	66929321	-1	ENSM00250000000535	N MYC DOWNSTREAM REGULATED GENE
Pdcl3	1.89	3.14E-03	ENSMUSG00000026078	phosducin-like 3 [Source:MGI Symbol;Acc:MGI:1916083]	1	38987814	1	ENSM00250000003658	PHOSDUCIN
Ccrn4l	1.88	1.39E-03	ENSMUSG00000023087	CCR4 carbon catabolite repression 4-like (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:109382]	3	51224447	1	ENSM00250000004355	NOCTURNIN CCR4 HOMOLOG
Pdia4	1.88	1.85E-04	ENSMUSG00000025823	protein disulfide isomerase associated 4 [Source:MGI Symbol;Acc:MGI:104864]	6	47796142	-1	ENSM00740001589147	DISULFIDE ISOMERASE PRECURSOR EC_5.3.4.1 ENDOPLASMIC RETICULUM RESIDENT ER ENDOPLASMIC RETICULUM RESIDENT ER
Gm10800	1.87	5.11E-05	ENSMUSG00000075014	predicted gene 10800 [Source:MGI Symbol;Acc:MGI:3641657]	2	98666547	-1	ENSM00360000113264	AMBIGUOUS
Swt1	1.86	2.11E-02	ENSMUSG00000052748	SWT1 RNA endoribonuclease homolog (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1914125]	1	151367699	-1	ENSM00250000006172	TRANSCRIPTIONAL SWT1
Map4k4	1.86	4.52E-05	ENSMUSG00000026074	mitogen-activated protein kinase kinase kinase kinase 4 [Source:MGI Symbol;Acc:MGI:1349394]	1	39900913	1	ENSM00260000050335	KINASE EC_2.7.11.1 KINASE MAPK/ERK KINASE KINASE KINASE MEK KINASE KINASE MEKKK KINASE
Cdc73	1.85	5.55E-05	ENSMUSG00000026361	cell division cycle 73, Paf1/RNA polymerase II complex component [Source:MGI Symbol;Acc:MGI:2384876]	1	143598797	-1	ENSM00250000003369	PARAFIBROMIN CELL DIVISION CYCLE 73 HOMOLOG HYPERPARATHYROIDISM 2
Ino80d	1.85	8.82E-04	ENSMUSG00000040865	INO80 complex subunit D [Source:MGI Symbol;Acc:MGI:3027003]	1	62958418	-1	ENSM00250000008301	INO80 COMPLEX SUBUNIT D
Hsd17b7	1.85	2.79E-02	ENSMUSG00000026675	hydroxysteroid (17-beta) dehydrogenase 7 [Source:MGI Symbol;Acc:MGI:1330808]	1	169949535	-1	ENSM00250000003070	3 KETO STEROID REDUCTASE EC_1.1.1.270 17 BETA HYDROXYSTEROID DEHYDROGENASE 7 17 BETA HSD 7 ESTRADIOL 17 BETA DEHYDROGENASE 7 EC_1.1.1.- 62
A830080D01Rik	1.85	1.79E-02	ENSMUSG00000044150	RIKEN cDNA A830080D01 gene [Source:MGI Symbol;Acc:MGI:2685992]	X	159526688	1	ENSM00250000008659	UNCHARACTERIZED CXORF23
Ahcyl2	1.84	7.23E-03	ENSMUSG00000029772	S-adenosylhomocysteine hydrolase-like 2 [Source:MGI Symbol;Acc:MGI:1921590]	6	29768011	1	ENSM00740001589092	ADENOSYLHOMOCYSTEINASE ADOHCYASE EC_3.3.1.1 S ADENOSYL L HOMOCYSTEINE HYDROLASE 2 PEPTIDE N 4 N ACETYL BETA GLUCOSAMINYL ASPARAGINE AMIDASE PNGASE EC_3.5.1.52 N GLYCANASE 1 PEPTIDE:N GLYCANASE
Ngly1	1.84	2.42E-02	ENSMUSG00000021785	N-glycanase 1 [Source:MGI Symbol;Acc:MGI:1913276]	14	16249280	1	ENSM00250000003697	RIBOSOMAL S6 KINASE ALPHA S6K ALPHA EC_2.7.11.1.90 KDA RIBOSOMAL S6 KINASE P90 RSK MAP KINASE ACTIVATED KINASE MAPK ACTIVATED KINASE MAPKAP KINASE MAPKAPK RIBOSOMAL S6 KINASE RSK
Rps6ka6	1.84	1.19E-02	ENSMUSG00000025665	ribosomal protein S6 kinase polypeptide 6 [Source:MGI Symbol;Acc:MGI:1914321]	X	111388192	-1	ENSM00570000851006	

Fkbp14	1.84	1.26E-03	ENSMUSG00000038074	FK506 binding protein 14 [Source:MGI Symbol;Acc:MGI:2387639]	6	54577604	-1	ENSMF00670001235676	PEPTIDYL PROLYL CIS TRANS ISOMERASE PRECURSOR PPIASE EC_5.2.1.8 KDA FK506 BINDING KDA FKBP FKBP FK506 BINDING FKBP ROTAMASE
Cflar	1.84	1.74E-03	ENSMUSG00000026031	CASP8 and FADD-like apoptosis regulator [Source:MGI Symbol;Acc:MGI:1336166]	1	58711508	1	ENSMF00250000004126	CASP8 AND FADD APOPTOSIS REGULATOR PRECURSOR CASPASE HOMOLOG CASH CASPASE EIGHT RELATED CASPER CASPASE APOPTOSIS REGULATORY CLARP CELLULAR FLICE INHIBITORY C FLIP FADD ANTIAPOPTOTIC MOLECULE 1 FLAME 1 INHIBITOR OF FLICE I FLICE MACH RELATED INDUCER OF
Vangl2	1.83	4.16E-02	ENSMUSG00000026556	vang-like 2 (van gogh, Drosophila) [Source:MGI Symbol;Acc:MGI:2135272]	1	172000960	-1	ENSMF00250000002390	VANG 2 VAN GOGH
Sfrp1	1.83	2.53E-05	ENSMUSG00000031548	secreted frizzled-related protein 1 [Source:MGI Symbol;Acc:MGI:892014]	8	23411502	1	ENSMF00600000921226	SECRETED FRIZZLED RELATED PRECURSOR SFRP
Bgn	1.83	5.56E-04	ENSMUSG00000031375	biglycan [Source:MGI Symbol;Acc:MGI:88158]	X	73483602	1	ENSMF00370000118599	DECORIN PRECURSOR BONE PROTEOGLYCAN II PG S2
Wdpy1	1.82	1.89E-02	ENSMUSG00000073643	WD repeat and FYVE domain containing 1 [Source:MGI Symbol;Acc:MGI:1916618]	1	79702262	-1	ENSMF00250000002558	WD REPEAT AND FYVE DOMAIN CONTAINING WD40 AND FYVE DOMAIN CONTAINING
Pex19	1.82	9.55E-03	ENSMUSG00000003464	peroxisomal biogenesis factor 19 [Source:MGI Symbol;Acc:MGI:1334458]	1	172126755	1	ENSMF00500000271341	PEROXISOMAL BIOGENESIS FACTOR 19 PRECURSOR PEROXIN 19 PEROXISOMAL FARNESYLATED
Cspp1	1.82	4.63E-04	ENSMUSG00000056763	centrosome and spindle pole associated protein 1 [Source:MGI Symbol;Acc:MGI:2681832]	1	10038218	1	ENSMF00400000131873	CENTROSOME AND SPINDLE POLE ASSOCIATED 1
Cd9	1.82	4.96E-02	ENSMUSG00000030342	CD9 antigen [Source:MGI Symbol;Acc:MGI:88348]	6	125460266	-1	ENSMF00670001235424	ANTIGEN ANTIGEN
Zyx	1.80	2.03E-02	ENSMUSG00000029860	zyxin [Source:MGI Symbol;Acc:MGI:103072]	6	42349828	1	ENSMF00730001521785	ZYXIN
Arl4c	1.80	1.68E-03	ENSMUSG00000049866	ADP-ribosylation factor-like 4C [Source:MGI Symbol;Acc:MGI:2445172]	1	88673125	-1	ENSMF00500000270123	ADP RIBOSYLATION FACTOR ADP RIBOSYLATION FACTOR DEUBIQUITINATING VCIP135
Vcpip1	1.80	3.89E-03	ENSMUSG00000045210	valosin containing protein (p97)/p47 complex interacting protein 1 [Source:MGI Symbol;Acc:MGI:1917925]	1	9718622	-1	ENSMF00250000008023	EC_3.4.19.12 VALOSIN CONTAINING P97/P47 COMPLEX INTERACTING 1 VALOSIN CONTAINING P97/P47 COMPLEX INTERACTING P135
Kif26b	1.79	1.92E-02	ENSMUSG00000026494	kinesin family member 26B [Source:MGI Symbol;Acc:MGI:2447076]	1	178529125	1	ENSMF00250000001309	KINESIN
Cyp1b1	1.79	1.03E-02	ENSMUSG00000024087	cytochrome P450, family 1, subfamily b, polypeptide 1 [Source:MGI Symbol;Acc:MGI:88590]	17	79706953	-1	ENSMF00730001522008	CYTOCHROME P450 1B1 EC_1.14.14.1 CYP1B1
Arid3a	1.79	2.34E-02	ENSMUSG00000019564	AT rich interactive domain 3A (BRIGHT-like) [Source:MGI Symbol;Acc:MGI:1328360]	10	79927043	1	ENSMF00250000002182	AT RICH INTERACTIVE DOMAIN CONTAINING ARID DOMAIN CONTAINING BRIGHT DEAD RINGER
Irs1	1.78	2.20E-02	ENSMUSG00000055980	insulin receptor substrate 1 [Source:MGI Symbol;Acc:MGI:99454]	1	82233101	-1	ENSMF00250000001358	INSULIN RECEPTOR SUBSTRATE
Zbtb10	1.78	1.11E-03	ENSMUSG00000069114	zinc finger and BTB domain containing 10 [Source:MGI Symbol;Acc:MGI:2139883]	3	9250602	1	ENSMF00500000272085	ZINC FINGER AND BTB DOMAIN CONTAINING 10 ZINC FINGER RIN ZF N LYSINE METHYLTRANSFERASE SMYD2
Smyd2	1.77	2.83E-02	ENSMUSG00000026603	SET and MYND domain containing 2 [Source:MGI Symbol;Acc:MGI:1915889]	1	189880492	-1	ENSMF00500000271113	EC_2.1.1.- HISTONE METHYLTRANSFERASE SMYD2 EC_2.1.1.43 SET AND MYND DOMAIN CONTAINING

Obsl1	1.77	3.44E-02	ENSMUSG00000026211	obscurin-like 1 [Source:MGI Symbol;Acc:MGI:2138628]	1	75479310	-1	ENSMF00740001589077	EC_2.7.11.1
Ralb	1.77	4.66E-02	ENSMUSG00000004451	v-ral simian leukemia viral oncogene homolog B (ras related) [Source:MGI Symbol;Acc:MGI:1927244]	1	119470305	-1	ENSMF00500000270233	RAS RELATED PRECURSOR
Nav1	1.77	2.62E-03	ENSMUSG00000009418	neuron navigator 1 [Source:MGI Symbol;Acc:MGI:2183683]	1	135434580	-1	ENSMF00250000000514	NEURON NAVIGATOR PORE MEMBRANE AND/OR FILAMENT INTERACTING 1
Sec24c	1.77	2.29E-03	ENSMUSG00000039367	Sec24 related gene family, member C (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1919746]	14	20674321	1	ENSMF00730001521537	SEC24 RELATED
Klhl22	1.77	2.03E-03	ENSMUSG00000022750	kelch-like 22 [Source:MGI Symbol;Acc:MGI:1337995]	16	17759618	1	ENSMF00270000056443	KELCH
Mest	1.76	3.17E-04	ENSMUSG00000051855	mesoderm specific transcript [Source:MGI Symbol;Acc:MGI:96968]	6	30723547	1	ENSMF00250000004943	MESODERM SPECIFIC TRANSCRIPT EC 3
Elf1	1.76	1.32E-02	ENSMUSG00000036461	E74-like factor 1 [Source:MGI Symbol;Acc:MGI:107180]	14	79481194	1	ENSMF00250000000562	PATERNALLY EXPRESSED GENE 1 ETS RELATED TRANSCRIPTION FACTOR ELF E74 FACTOR
Cxcl12	1.76	2.84E-04	ENSMUSG00000061353	chemokine (C-X-C motif) ligand 12 [Source:MGI Symbol;Acc:MGI:103556]	6	117168535	1	ENSMF00670001236588	STROMAL CELL DERIVED FACTOR 1 PRECURSOR SDF 1 1 C X C MOTIF CHEMOKINE 12 PRE B CELL GROWTH STIMULATING FACTOR PBSF
Hspe1	1.76	1.27E-03	ENSMUSG00000073676	heat shock protein 1 (chaperonin 10) [Source:MGI Symbol;Acc:MGI:104680]	1	55088132	1	ENSMF00670001235755	10 KDA HEAT SHOCK PROTEIN MITOCHONDRIAL HSP10.10 KDA CHAPERONIN CHAPERONIN 10 CPN10
Nvl	1.76	1.50E-02	ENSMUSG00000026516	nuclear VCP-like [Source:MGI Symbol;Acc:MGI:1914709]	1	181093423	-1	ENSMF00570000851171	NUCLEAR VALOSIN CONTAINING NVLP NUCLEAR VCP
Col27a1	1.76	2.92E-02	ENSMUSG000000045672	collagen, type XXVII, alpha 1 [Source:MGI Symbol;Acc:MGI:2672118]	4	63214004	1	ENSMF00740001589328	COLLAGEN ALPHA 1 CHAIN PRECURSOR
Trip12	1.75	4.94E-05	ENSMUSG00000026219	thyroid hormone receptor interactor 12 [Source:MGI Symbol;Acc:MGI:1309481]	1	84721189	-1	ENSMF00740001589164	E3 UBIQUITIN LIGASE TRIP12 EC_6.3.2.- THYROID RECEPTOR INTERACTING 12 TR INTERACTING 12 TRIP 12
Hspb1	1.75	2.28E-02	ENSMUSG000000004951	heat shock protein 1 [Source:MGI Symbol;Acc:MGI:96240]	5	135887919	1	ENSMF00500000270924	HEAT SHOCK BETA 1 HSPB1 HEAT SHOCK 27 KDA HSP 27
Cog3	1.74	3.79E-02	ENSMUSG00000034893	component of oligomeric golgi complex 3 [Source:MGI Symbol;Acc:MGI:2450151]	14	75702351	-1	ENSMF00600000921310	CONSERVED OLIGOMERIC GOLGI COMPLEX SUBUNIT 3 COG COMPLEX SUBUNIT 3 COMPONENT OF OLIGOMERIC GOLGI COMPLEX 3
Gabrp	1.74	1.01E-02	ENSMUSG00000020159	gamma-aminobutyric acid (GABA) A receptor, pi [Source:MGI Symbol;Acc:MGI:2387597]	11	33550781	-1	ENSMF00400000131718	GAMMA AMINOBUTYRIC ACID RECEPTOR SUBUNIT PRECURSOR GABA A RECEPTOR SUBUNIT
Kdm5a	1.74	2.71E-04	ENSMUSG00000030180	lysine (K)-specific demethylase 5A [Source:MGI Symbol;Acc:MGI:2136980]	6	120364099	1	ENSMF00250000000658	LYSINE SPECIFIC DEMETHYLASE EC_1.14.11.- HISTONE DEMETHYLASE JUMONJI/ARID DOMAIN CONTAINING
Agrn	1.74	1.29E-02	ENSMUSG000000041936	agrin [Source:MGI Symbol;Acc:MGI:87961]	4	156165290	-1	ENSMF00740001589225	AGRIN N TERMINAL 110 KDA SUBUNIT; AGRIN C TERMINAL 110 KDA SUBUNIT; AGRIN C TERMINAL 90 KDA FRAGMENT C90 ; AGRIN C TERMINAL 22 KDA FRAGMENT C22]
R3hcc1	1.74	1.11E-02	ENSMUSG00000034194	R3H domain and coiled-coil containing 1 [Source:MGI Symbol;Acc:MGI:1919093]	14	69697307	-1	ENSMF00720001492059	CHARGED MULTIVESICULAR BODY 7 CHROMATIN MODIFYING 7
Kcnj13	1.73	1.74E-02	ENSMUSG00000079436	potassium inwardly-rectifying channel, subfamily J, member 13 [Source:MGI Symbol;Acc:MGI:3781032]	1	87386363	-1	ENSMF00730001521400	INWARD RECTIFIER POTASSIUM CHANNEL INWARD RECTIFIER K + CHANNEL POTASSIUM CHANNEL INWARDLY RECTIFYING SUBFAMILY J MEMBER
Zfp451	1.73	2.43E-03	ENSMUSG000000042197	zinc finger protein 451 [Source:MGI Symbol;Acc:MGI:2137896]	1	33760472	-1	ENSMF00250000005875	ZINC FINGER 451

Cd55	1.73	6.15E-03	ENSMUSG00000026399	CD55 antigen [Source:MGI Symbol;Acc:MGI:104850]	1	130439027	-1	ENSMF00320000100135	COMPLEMENT DECAY ACCELERATING FACTOR PRECURSOR CD55 ANTIGEN
Mbnl2	1.72	6.84E-03	ENSMUSG00000022139	muscleblind-like 2 [Source:MGI Symbol;Acc:MGI:2145597]	14	120275669	1	ENSMF00250000000919	MUSCLEBLIND
Ptpn14	1.72	1.07E-03	ENSMUSG00000026604	protein tyrosine phosphatase, non-receptor type 14 [Source:MGI Symbol;Acc:MGI:102467]	1	189728268	1	ENSMF00250000001986	TYROSINE PHOSPHATASE NON RECEPTOR TYPE EC_3.1.3.48 TYROSINE PHOSPHATASE
Arhgef5	1.72	2.42E-02	ENSMUSG00000033542	Rho guanine nucleotide exchange factor (GEF) 5 [Source:MGI Symbol;Acc:MGI:1858952]	6	43265582	1	ENSMF00740001589196	EPHEXIN 1 EPH INTERACTING EXCHANGE NEURONAL GUANINE NUCLEOTIDE EXCHANGE FACTOR
Trim2	1.72	1.29E-02	ENSMUSG00000027993	tripartite motif-containing 2 [Source:MGI Symbol;Acc:MGI:1933163]	3	84160439	-1	ENSMF00750001632380	TRIPARTITE MOTIF CONTAINING 2 EC_6.3.2.- E3 UBIQUITIN LIGASE TRIM2
Zcchc2	1.71	3.04E-02	ENSMUSG00000038866	zinc finger, CCHC domain containing 2 [Source:MGI Symbol;Acc:MGI:2444114]	1	105990406	1	ENSMF00250000008649	ZINC FINGER CCHC DOMAIN CONTAINING 2
Csrp1	1.70	1.60E-02	ENSMUSG00000026421	cysteine and glycine-rich protein 1 [Source:MGI Symbol;Acc:MGI:88549]	1	135720061	1	ENSMF00740001589223	CYSTEINE AND GLYCINE RICH CYSTEINE RICH
Ncoa2	1.70	3.33E-03	ENSMUSG00000005886	nuclear receptor coactivator 2 [Source:MGI Symbol;Acc:MGI:1276533]	1	13139105	-1	ENSMF00250000000875	NUCLEAR RECEPTOR COACTIVATOR 2 NCOA 2 TRANSCRIPTIONAL INTERMEDIARY FACTOR 2
Eps8	1.70	1.76E-02	ENSMUSG00000015766	epidermal growth factor receptor pathway substrate 8 [Source:MGI Symbol;Acc:MGI:104684]	6	137477245	-1	ENSMF00500000270023	EPIDERMAL GROWTH FACTOR RECEPTOR KINASE SUBSTRATE 8 EPS8 EPIDERMAL GROWTH FACTOR RECEPTOR PATHWAY SUBSTRATE 8 RELATED EPS8 RELATED
Lsr	1.70	1.37E-02	ENSMUSG00000001247	lipolysis stimulated lipoprotein receptor [Source:MGI Symbol;Acc:MGI:1927471]	7	30957775	-1	ENSMF00740001589531	LIPOLYSIS STIMULATED LIPOPROTEIN RECEPTOR PRECURSOR LIPOLYSIS STIMULATED RECEPTOR
Copa	1.69	2.97E-04	ENSMUSG00000026553	coatomer protein complex subunit alpha [Source:MGI Symbol;Acc:MGI:1334462]	1	172082529	1	ENSMF00260000050647	COATOMER SUBUNIT ALPHA ALPHA COAT ALPHA COP HEP COP HEPCOP [CONTAINS XENIN XENOPSIN RELATED PEPTIDE ; PROXENIN]
Hspe1-ps2	1.69	9.95E-03	ENSMUSG000000049246	heat shock protein 1 (chaperonin 10), pseudogene 2 [Source:MGI Symbol;Acc:MGI:1935162]	12	81399812	1		
Pikfyve	1.69	2.62E-02	ENSMUSG00000025949	phosphoinositide kinase, FYVE finger containing [Source:MGI Symbol;Acc:MGI:1335106]	1	65186750	1	ENSMF00750001632433	1 PHOSPHATIDYLINOSITOL 3 PHOSPHATE 5 KINASE PHOSPHATIDYLINOSITOL 3 PHOSPHATE 5 KINASE EC_2.7.1.150 FYVE FINGER CONTAINING PHOSPHOINOSITIDE KINASE PIKFYVE PHOSPHATIDYLINOSITOL 3 PHOSPHATE 5 KINASE TYPE III PIPKIN III TYPE III PIP KINASE
Fam115a	1.68	2.96E-03	ENSMUSG00000036667	family with sequence similarity 115, member A [Source:MGI Symbol;Acc:MGI:1914665]	6	42668002	-1	ENSMF00250000002714	UNKNOWN
Cald1	1.68	2.85E-04	ENSMUSG00000029761	caldesmon 1 [Source:MGI Symbol;Acc:MGI:88250]	6	34598500	1	ENSMF00250000002835	CALDESMON CDM
Prdx6	1.67	4.31E-02	ENSMUSG00000026701	peroxiredoxin 6 [Source:MGI Symbol;Acc:MGI:894320]	1	161240112	-1	ENSMF00730001522010	PEROXIREDOXIN 6 EC_1.11.1.15 1 CYS PEROXIREDOXIN 1 CYS PRX ACIDIC CALCIUM INDEPENDENT PHOSPHOLIPASE A2 AIPLA2 EC_3.1.1.- ANTIOXIDANT 2 NON SELENIUM GLUTATHIONE PEROXIDASE NSGPX EC_1.11.-.- 1 9

Degs1	1.67	1.89E-02	ENSMUSG00000038633	degenerative spermatocyte homolog 1 (Drosophila) [Source:MGI Symbol;Acc:MGI:1097711]	1	182275772	-1	ENSMF00250000002237	SPHINGOLIPID DELTA 4 DESATURASE DES1 EC_1.14.-.- DEGENERATIVE SPERMATOCYTE HOMOLOG 1
Cica1	1.67	3.92E-02	ENSMUSG00000056025	chloride channel calcium activated 1 [Source:MGI Symbol;Acc:MGI:1316732]	3	144729677	-1	ENSMF00250000001395	CALCIUM ACTIVATED CHLORIDE CHANNEL REGULATOR PRECURSOR CALCIUM ACTIVATED CHLORIDE CHANNEL FAMILY MEMBER
Orc2	1.67	2.83E-02	ENSMUSG00000026037	origin recognition complex, subunit 2 [Source:MGI Symbol;Acc:MGI:1328306]	1	58462771	-1	ENSMF00500000271072	ORIGIN RECOGNITION COMPLEX SUBUNIT 2
Ildr2	1.67	1.41E-02	ENSMUSG00000040612	immunoglobulin-like domain containing receptor 2 [Source:MGI Symbol;Acc:MGI:1196370]	1	166254139	1	ENSMF00740001589513	IMMUNOGLOBULIN DOMAIN CONTAINING RECEPTOR 2
Lima1	1.67	8.95E-04	ENSMUSG00000023022	LIM domain and actin binding 1 [Source:MGI Symbol;Acc:MGI:1920992]	15	99778470	-1	ENSMF00500000271499	LIM DOMAIN AND ACTIN BINDING 1 EPITHELIAL LOST IN NEOPLASM
Mycbp2	1.67	6.75E-04	ENSMUSG00000033004	MYC binding protein 2 [Source:MGI Symbol;Acc:MGI:2179432]	14	103113411	-1	ENSMF00250000001622	PROBABLE E3 UBIQUITIN LIGASE MYCBP2 EC_6.3.2.- MYC BINDING 2
Rhou	1.67	4.73E-02	ENSMUSG00000039960	ras homolog gene family, member U [Source:MGI Symbol;Acc:MGI:1916831]	8	123653929	1	ENSMF00730001521953	PAM/HIGHWIRE/RPM 1 PROTEIN ASSOCIATED WITH MYC RHO RELATED GTP BINDING RHO GTPASE WNT 1 RESPONSIVE CDC42 HOMOLOG
Gabarapl1	1.66	3.77E-03	ENSMUSG00000030161	gamma-aminobutyric acid (GABA) A receptor-associated protein-like 1 [Source:MGI Symbol;Acc:MGI:1914980]	6	129533200	1	ENSMF00500000270406	WRCH GAMMA AMINOBUTYRIC ACID RECEPTOR ASSOCIATED 1 PRECURSOR GABA A RECEPTOR ASSOCIATED 1
Gigyf2	1.66	9.14E-04	ENSMUSG00000048000	GRB10 interacting GYF protein 2 [Source:MGI Symbol;Acc:MGI:2138584]	1	87326998	1	ENSMF00740001589295	PERQ AMINO ACID RICH WITH GYF DOMAIN CONTAINING 2 TRINUCLEOTIDE REPEAT CONTAINING GENE 15
Srgap3	1.66	8.79E-03	ENSMUSG00000030257	SLIT-ROBO Rho GTPase activating protein 3 [Source:MGI Symbol;Acc:MGI:2152938]	6	112717971	-1	ENSMF00250000000639	SLIT ROBO RHO GTPASE ACTIVATING RHO GTPASE ACTIVATING
Col4a1	1.65	2.28E-02	ENSMUSG00000031502	collagen, type IV, alpha 1 [Source:MGI Symbol;Acc:MGI:88454]	8	11198423	-1	ENSMF00740001589085	COLLAGEN ALPHA IV CHAIN
Slc38a6	1.65	1.74E-02	ENSMUSG00000044712	solute carrier family 38, member 6 [Source:MGI Symbol;Acc:MGI:3648156]	12	73286779	1	ENSMF00250000000644	SODIUM COUPLED NEUTRAL AMINO ACID TRANSPORTER AMINO ACID TRANSPORTER SOLUTE CARRIER FAMILY 38 MEMBER SYSTEM A AMINO ACID TRANSPORTER 1 SYSTEM N AMINO ACID TRANSPORTER
Rnf213	1.65	8.93E-03	ENSMUSG00000070327	ring finger protein 213 [Source:MGI Symbol;Acc:MGI:1289196]	11	119393100	1	ENSMF00730001522194	E3 UBIQUITIN LIGASE RNF213 EC_6.3.2.-
Sri	1.65	9.95E-03	ENSMUSG00000003161	sorcin [Source:MGI Symbol;Acc:MGI:98419]	5	8046078	1	ENSMF00500000270522	SORCIN
Myo1b	1.65	1.02E-02	ENSMUSG00000018417	myosin IB [Source:MGI Symbol;Acc:MGI:107752]	1	51749765	-1	ENSMF00730001521251	UNCONVENTIONAL MYOSIN
Elk4	1.64	1.24E-02	ENSMUSG00000026436	ELK4, member of ETS oncogene family [Source:MGI Symbol;Acc:MGI:102853]	1	132007607	1	ENSMF00600000921286	ETS DOMAIN CONTAINING ELK 4 SERUM RESPONSE FACTOR ACCESSORY 1 SAP 1 SRF ACCESSORY 1
Trim25	1.64	6.06E-03	ENSMUSG00000000275	tripartite motif-containing 25 [Source:MGI Symbol;Acc:MGI:102749]	11	88999376	1	ENSMF00390000126422	E3 UBIQUITIN/ISG15 LIGASE TRIM25 EC_6.3.2.19 EC_6.3.2.- N3 ESTROGEN RESPONSIVE FINGER TRIPARTITE MOTIF CONTAINING 25 UBIQUITIN/ISG15 CONJUGATING ENZYME TRIM25 ZINC FINGER 147
Fam21	1.64	3.24E-02	ENSMUSG00000024104	family with sequence similarity 21 [Source:MGI Symbol;Acc:MGI:106463]	6	116208033	1	ENSMF00250000002377	WASH COMPLEX SUBUNIT FAM21
Zc3h11a	1.63	1.35E-02	ENSMUSG00000026464	zinc finger CCCH type containing 11A [Source:MGI Symbol;Acc:MGI:1917829]	1	133619871	-1	ENSMF00250000004239	ZINC FINGER CCCH DOMAIN CONTAINING 11A

Dst	1.63	1.31E-03	ENSMUSG00000026131	dystonin [Source:MGI Symbol;Acc:MGI:104627]	1	33908225	1	ENSMF00740001589112	MICROTUBULE ACTIN CROSS LINKING FACTOR 1 ACTIN CROSS LINKING FAMILY 7
Pogk	1.62	4.08E-02	ENSMUSG00000040596	pogo transposable element with KRAB domain [Source:MGI Symbol;Acc:MGI:1918842]	1	166384622	-1	ENSMF00350000105484	POGO TRANSPOSABLE ELEMENT WITH KRAB DOMAIN
Tle3	1.62	2.09E-02	ENSMUSG00000032280	transducin-like enhancer of split 3, homolog of Drosophila E(spl) [Source:MGI Symbol;Acc:MGI:104634]	9	61372366	1	ENSMF00250000000505	TRANSDUCIN ENHANCER
Idh1	1.62	3.78E-02	ENSMUSG00000025950	isocitrate dehydrogenase 1 (NADP+), soluble [Source:MGI Symbol;Acc:MGI:96413]	1	65158616	-1	ENSMF00610000952871	ISOCITRATE DEHYDROGENASE [NADP] IDH EC_1.1.1.42 IDP NADP + SPECIFIC ICDH OXALOSUCCINATE DECARBOXYLASE
Rb1cc1	1.62	5.11E-03	ENSMUSG00000025907	RB1-inducible coiled-coil 1 [Source:MGI Symbol;Acc:MGI:1341850]	1	6206197	1	ENSMF00250000002936	RB1 INDUCIBLE COILED COIL 1 FAK FAMILY KINASE INTERACTING OF 200 KDA FIP200
Fermt2	1.62	1.32E-02	ENSMUSG00000037712	fermitin family homolog 2 (Drosophila) [Source:MGI Symbol;Acc:MGI:2385001]	14	45458792	-1	ENSMF00250000001652	FERMITIN FAMILY HOMOLOG KINDLIN UNC 112 RELATED
Efnb2	1.62	2.43E-02	ENSMUSG00000001300	ephrin B2 [Source:MGI Symbol;Acc:MGI:105097]	8	8617434	-1	ENSMF00250000002014	EPHRIN B1 PRECURSOR ELK LIGAND ELK L EPH RELATED RECEPTOR TYROSINE KINASE LIGAND 2 LERK 2
Dlg3	1.62	3.45E-02	ENSMUSG00000000881	discs, large homolog 3 (Drosophila) [Source:MGI Symbol;Acc:MGI:1888986]	X	100767722	1	ENSMF00250000000275	DISKS LARGE HOMOLOG SYNAPSE ASSOCIATED SAP
Phldb2	1.61	7.19E-03	ENSMUSG00000033149	pleckstrin homology-like domain, family B, member 2 [Source:MGI Symbol;Acc:MGI:2444981]	16	45746243	-1	ENSMF00600000921202	PLECKSTRIN HOMOLOGY DOMAIN FAMILY B MEMBER
Dbi	1.61	1.02E-02	ENSMUSG00000026385	diazepam binding inhibitor [Source:MGI Symbol;Acc:MGI:94865]	1	120113280	-1	ENSMF00670001239746	ACYL COA BINDING ACBP DIAZEPAM BINDING INHIBITOR DBI ENDOZEPINE EP
Clk1	1.61	2.43E-03	ENSMUSG00000026034	CDC-like kinase 1 [Source:MGI Symbol;Acc:MGI:107403]	1	58410189	-1	ENSMF00310000089012	DUAL SPECIFICITY KINASE EC_2.7.12.1 CDC KINASE
Synpo	1.61	4.76E-03	ENSMUSG00000043079	synaptopodin [Source:MGI Symbol;Acc:MGI:1099446]	18	60593973	-1	ENSMF00250000008348	SYNAPTOPODIN
Marc2	1.60	5.00E-03	ENSMUSG00000073481	mitochondrial amidoxime reducing component 2 [Source:MGI Symbol;Acc:MGI:1914497]	1	184813068	-1	ENSMF00500000270661	MOSC DOMAIN CONTAINING 2 MITOCHONDRIAL PRECURSOR EC 1 MITOCHONDRIAL AMIDOXIME REDUCING COMPONENT 2 MOCO SULFURASE C
Enah	1.60	1.02E-02	ENSMUSG00000022995	enabled homolog (Drosophila) [Source:MGI Symbol;Acc:MGI:108360]	1	181904445	-1	ENSMF00740001589204	TERMINAL DOMAIN CONTAINING 2 ENA/VASP ENA/VASODILATOR STIMULATED PHOSPHOPROTEIN
Phactr2	1.60	3.44E-02	ENSMUSG00000062866	phosphatase and actin regulator 2 [Source:MGI Symbol;Acc:MGI:2446138]	10	13207717	-1	ENSMF00740001589138	PHOSPHATASE AND ACTIN REGULATOR
Eif4e2	1.60	3.66E-02	ENSMUSG00000026254	eukaryotic translation initiation factor 4E member 2 [Source:MGI Symbol;Acc:MGI:1914440]	1	87213914	1	ENSMF00500000270263	EUKARYOTIC TRANSLATION INITIATION FACTOR 4E TYPE 2 EIF 4E TYPE 2 EIF4E TYPE 2 EUKARYOTIC TRANSLATION INITIATION FACTOR 4E 3 EIF4E 4E LP
Ppp1r7	1.59	2.06E-02	ENSMUSG00000026275	protein phosphatase 1, regulatory (inhibitor) subunit 7 [Source:MGI Symbol;Acc:MGI:1913635]	1	93342854	1	ENSMF00260000050762	PHOSPHATASE 1 REGULATORY SUBUNIT 7 PHOSPHATASE 1 REGULATORY SUBUNIT 22
Smardc1	1.59	1.97E-02	ENSMUSG00000029920	SWI/SNF-related, matrix-associated actin-dependent regulator of chromatin, subfamily a, containing DEAD/H box 1 [Source:MGI Symbol;Acc:MGI:95453]	6	65042667	1	ENSMF00410000138550	SWI/SNF RELATED MATRIX ASSOCIATED ACTIN DEPENDENT REGULATOR OF CHROMATIN SUBFAMILY A CONTAINING DEAD/H BOX EC_3.6.4.12

Ube2h	1.58	7.41E-03	ENSMUSG00000039159	ubiquitin-conjugating enzyme E2H [Source:MGI Symbol;Acc:MGI:104632]	6	30211289	-1	ENSMF00670001235468	UBIQUITIN CONJUGATING ENZYME E2 H EC_6.3.2.19 UBCH2 UBIQUITIN CARRIER H UBIQUITIN CONJUGATING ENZYME E2 20K UBIQUITIN LIGASE H
Fgfr2	1.57	8.48E-03	ENSMUSG00000030849	fibroblast growth factor receptor 2 [Source:MGI Symbol;Acc:MGI:95523]	7	130162451	-1	ENSMF00250000000093	FIBROBLAST GROWTH FACTOR RECEPTOR PRECURSOR FGFR EC_2.7.10.1
Kdm4a	1.57	3.77E-02	ENSMUSG00000033326	lysine (K)-specific demethylase 4A [Source:MGI Symbol;Acc:MGI:2446210]	4	118136957	-1	ENSMF002500000000893	LYSINE SPECIFIC DEMETHYLASE EC_1.14.11.- JMJC DOMAIN CONTAINING HISTONE DEMETHYLATION JUMONJI DOMAIN CONTAINING
Zim1	1.56	9.55E-03	ENSMUSG00000002266	zinc finger, imprinted 1 [Source:MGI Symbol;Acc:MGI:1341879]	7	6675443	-1	ENSMF002500000000002	ZINC FINGER
Mdm4	1.56	2.81E-02	ENSMUSG00000054387	transformed mouse 3T3 cell double minute 4 [Source:MGI Symbol;Acc:MGI:107934]	1	132989845	-1	ENSMF00500000270633	MDM4 DOUBLE MINUTE 4 MDM2 P53 BINDING MDMX P53 BINDING MDM4
Hdlbp	1.56	3.94E-03	ENSMUSG00000034088	high density lipoprotein (HDL) binding protein [Source:MGI Symbol;Acc:MGI:99256]	1	93405940	-1	ENSMF00740001589253	VIGILIN HIGH DENSITY LIPOPROTEIN BINDING HDL BINDING
Trim35	1.56	1.81E-02	ENSMUSG00000022043	tripartite motif-containing 35 [Source:MGI Symbol;Acc:MGI:1914104]	14	66297031	1	ENSMF00400000131770	TRIPARTITE MOTIF CONTAINING 35 HEMOPOIETIC LINEAGE SWITCH 5
Tfrc	1.55	1.32E-02	ENSMUSG00000022797	transferrin receptor [Source:MGI Symbol;Acc:MGI:98822]	16	32608920	1	ENSMF00500000270210	TRANSFERRIN RECEPTOR 1 TR TFR TFR1 TRFR CD71 ANTIGEN
Glul	1.55	2.38E-02	ENSMUSG00000026473	glutamate-ammonia ligase (glutamine synthetase) [Source:MGI Symbol;Acc:MGI:95739]	1	153899944	1	ENSMF00750001632335	GLUTAMINE SYNTHETASE GS EC_6.3.1.2 GLUTAMATE DECARBOXYLASE EC_4.1.1.- 15 GLUTAMATE AMMONIA LIGASE
Col12a1	1.55	1.22E-02	ENSMUSG00000032332	collagen, type XII, alpha 1 [Source:MGI Symbol;Acc:MGI:88448]	9	79598991	-1	ENSMF00740001589200	COLLAGEN ALPHA 1 CHAIN
Pip5k1a	1.54	4.72E-02	ENSMUSG00000028126	phosphatidylinositol-4-phosphate 5-kinase, type 1 alpha [Source:MGI Symbol;Acc:MGI:107929]	3	95058530	-1	ENSMF00730001521611	PHOSPHATIDYLINOSITOL 4 PHOSPHATE 5 KINASE TYPE 1 BETA PI BETA PTDINS 4 P 5 KINASE 1 BETA EC_2.7.1.68 PHOSPHATIDYLINOSITOL 4 PHOSPHATE 5 KINASE TYPE I PHOSPHATIDYLINOSITOL 4 PHOSPHATE 5 KINASE BETA
Arfgef1	1.54	1.92E-02	ENSMUSG000000067851	ADP-ribosylation factor guanine nucleotide- exchange factor 1(brefeldin A-inhibited) [Source:MGI Symbol;Acc:MGI:2442988]	1	10137571	-1	ENSMF00250000001560	BREFELDIN A INHIBITED GUANINE NUCLEOTIDE EXCHANGE 1 BREFELDIN A INHIBITED GEP 1 ADP RIBOSYLATION FACTOR GUANINE NUCLEOTIDE EXCHANGE FACTOR 1
Col11a1	1.53	1.92E-02	ENSMUSG000000027966	collagen, type XI, alpha 1 [Source:MGI Symbol;Acc:MGI:88446]	3	114030540	1	ENSMF002500000000231	COLLAGEN ALPHA CHAIN PRECURSOR
Nid2	1.53	1.30E-02	ENSMUSG00000021806	nidogen 2 [Source:MGI Symbol;Acc:MGI:1298229]	14	19751257	1	ENSMF006000000921282	NIDOGEN NID
Tpt1	1.53	5.58E-03	ENSMUSG000000060126	tumor protein, translationally-controlled 1 [Source:MGI Symbol;Acc:MGI:104890]	14	75845093	1	ENSMF00500000270782	TRANSLATIONALLY CONTROLLED TUMOR TCTP
Cops5	1.53	4.42E-02	ENSMUSG00000025917	COP9 (constitutive photomorphogenic) homolog, subunit 5 (Arabidopsis thaliana) [Source:MGI Symbol;Acc:MGI:1349415]	1	10024602	-1	ENSMF00250000004521	COP9 SIGNALOSOME COMPLEX SUBUNIT 5 EC_3.4.-.-
Sf3b1	1.53	7.73E-03	ENSMUSG00000025982	splicing factor 3b, subunit 1 [Source:MGI Symbol;Acc:MGI:1932339]	1	54985169	-1	ENSMF00250000003034	SPLICING FACTOR 3B SUBUNIT PRE SPLICING FACTOR SF3B 155 KDA SUBUNIT S SPLICEOSOME ASSOCIATED 155 SAP 155
Chd8	1.52	3.33E-02	ENSMUSG00000053754	chromodomain helicase DNA binding protein 8 [Source:MGI Symbol;Acc:MGI:1915022]	14	52198151	-1	ENSMF00730001521485	CHROMODOMAIN HELICASE DNA BINDING CHD EC_3.6.4.12 ATP DEPENDENT HELICASE

Bmpr2	1.50	3.36E-02	ENSMUSG000000067336	bone morphogenetic protein receptor, type II (serine/threonine kinase) [Source:MGI Symbol;Acc:MGI:1095407]	1	59764279	1	ENSM00730001522171	ANTI MUELLERIAN HORMONE TYPE 2 RECEPTOR PRECURSOR EC_2.7.11.30
Kdm5b	1.50	2.68E-02	ENSMUSG000000042207	lysine (K)-specific demethylase 5B [Source:MGI Symbol;Acc:MGI:1922855]	1	134560171	1	ENSM002500000000658	ANTI MUELLERIAN HORMONE TYPE II RECEPTOR AMH TYPE II RECEPTOR MIS TYPE II RECEPTOR MISRII MRII LYSINE SPECIFIC DEMETHYLASE EC_1.14.11.- HISTONE DEMETHYLASE JUMONJI/ARID DOMAIN CONTAINING

Table_S2

d0_decrease									
Gene Name	foldChange	padj	Ensembl Gene ID	Description	Chromosome Name	Gene Start (bp)	Strand	Ensembl Protein Family ID(s)	Ensembl Family Description
Postn	-Inf	1.48E-02	ENSMUSG000000027750	periostin, osteoblast specific factor [Source:MGI Symbol;Acc:MGI:1926321]	3	54361109	1	ENSMF00250000001947	TRANSFORMING GROWTH FACTOR BETA INDUCED IG H3 PRECURSOR BETA IG H3 KERATO EPITHELIN RGD CONTAINING COLLAGEN ASSOCIATED RGD CAP
Rybp	-154.00	1.17E-12	ENSMUSG000000072872	RING1 and YY1 binding protein [Source:MGI Symbol;Acc:MGI:1929059]	6	100228566	-1	ENSMF006000000921629	RING1 AND YY1 BINDING DEATH EFFECTOR DOMAIN ASSOCIATED FACTOR DED ASSOCIATED FACTOR
Gm6910	-114.66667	2.19E-10	ENSMUSG000000055763	predicted gene 6910 [Source:MGI Symbol;Acc:MGI:3648043]	13	66007672	1		
Trim36	-70.00	8.41E-03	ENSMUSG000000033949	tripartite motif-containing 36 [Source:MGI Symbol;Acc:MGI:106264]	18	46165302	-1	ENSMF004000000131833	TRIPARTITE MOTIF CONTAINING 46 GENE Y GENEY TRIPARTITE FIBRONECTIN TYPE III AND C TERMINAL SPRY MOTIF
Gm24895	-36.00	1.37E-02	ENSMUSG000000084691	predicted gene, 24895 [Source:MGI Symbol;Acc:MGI:5454672]	12	109646129	1		
Gstm2	-22.00	3.14E-02	ENSMUSG000000040562	glutathione S-transferase, mu 2 [Source:MGI Symbol;Acc:MGI:95861]	3	107981702	-1	ENSMF005000000269733	GLUTATHIONE S TRANSFERASE EC_2.5.1.18 GST CLASS MU
Pax6	-16.73	9.76E-06	ENSMUSG000000027168	paired box gene 6 [Source:MGI Symbol;Acc:MGI:97490]	2	105668900	1	ENSMF004400000236845	PAIRED BOX PAX
Spink3	-15.43	5.42E-04	ENSMUSG000000024503	serine peptidase inhibitor, Kazal type 3 [Source:MGI Symbol;Acc:MGI:106202]	18	43728069	-1	ENSMF005000000301544	SERINE PROTEASE INHIBITOR KAZAL TYPE 3 PRECURSOR P12 PROSTATIC SECRETORY GLYCOPROTEIN
Meg3	-14.51	2.30E-10	ENSMUSG000000021268	maternally expressed 3 [Source:MGI Symbol;Acc:MGI:1202886]	12	109541001	1		
Plagl1	-13.86	2.38E-05	ENSMUSG000000019817	pleiomorphic adenoma gene-like 1 [Source:MGI Symbol;Acc:MGI:1100874]	10	13090691	1	ENSMF00730001522033	ZINC FINGER PLEIOMORPHIC ADENOMA
Sfmbt2	-11.66	2.84E-10	ENSMUSG000000061186	Scm-like with four mbt domains 2 [Source:MGI Symbol;Acc:MGI:2447794]	2	10370510	1	ENSMF002600000050568	SCM WITH FOUR MBT DOMAINS
Clca4	-10.00	1.86E-03	ENSMUSG000000037033	chloride channel calcium activated 4 [Source:MGI Symbol;Acc:MGI:2181989]	3	144822623	-1	ENSMF002500000001395	CALCIUM ACTIVATED CHLORIDE CHANNEL REGULATOR PRECURSOR CALCIUM ACTIVATED CHLORIDE CHANNEL FAMILY MEMBER
Aim2	-9.84	9.76E-06	ENSMUSG000000037860	absent in melanoma 2 [Source:MGI Symbol;Acc:MGI:2686159]	1	173350879	1	ENSMF005000000276089	INTERFERON INDUCIBLE AIM2
Thbs1	-9.29	2.17E-02	ENSMUSG000000040152	thrombospondin 1 [Source:MGI Symbol;Acc:MGI:98737]	2	118111876	1	ENSMF002500000000689	PRECURSOR
Wt1	-7.67	1.74E-02	ENSMUSG000000016458	Wilms tumor 1 homolog [Source:MGI Symbol;Acc:MGI:98968]	2	105126529	1	ENSMF002500000002802	WILMS TUMOR HOMOLOG
Fgfr2	-7.63	9.76E-06	ENSMUSG000000030849	fibroblast growth factor receptor 2 [Source:MGI Symbol;Acc:MGI:95523]	7	130162451	-1	ENSMF002500000000093	FIBROBLAST GROWTH FACTOR RECEPTOR PRECURSOR FGFR EC_2.7.10.1
Ifitm1	-7.20	2.12E-03	ENSMUSG000000025491	interferon induced transmembrane protein 1 [Source:MGI Symbol;Acc:MGI:1915963]	7	140967221	1	ENSMF00670001240004	INTERFERON INDUCED TRANSMEMBRANE 1 DISPANIN SUBFAMILY A MEMBER 2A DSPA2A FRAGILIS 2 MOUSE IFITM 2 MIL 2
Klhl13	-7.11	3.20E-07	ENSMUSG000000036782	kelch-like 13 [Source:MGI Symbol;Acc:MGI:1914705]	X	23219271	-1	ENSMF002700000056443	KELCH
Uty	-6.98	1.64E-02	ENSMUSG000000068457	ubiquitously transcribed tetratricopeptide repeat gene, Y chromosome [Source:MGI Symbol;Acc:MGI:894810]	Y	1096861	-1	ENSMF002500000000912	HISTONE DEMETHYLASE UTY EC_1.14.11.- UBIQUITOUSLY TRANSCRIBED TPR ON THE Y CHROMOSOME UBIQUITOUSLY TRANSCRIBED Y CHROMOSOME TETRATRICOPEPTIDE REPEAT
Grhl2	-6.73	1.82E-02	ENSMUSG000000022286	grainyhead-like 2 (Drosophila) [Source:MGI Symbol;Acc:MGI:2182543]	15	37233036	1	ENSMF002500000001044	GRAINYHEAD HOMOLOG TRANSCRIPTION FACTOR CP2
Ptch1	-6.34	1.43E-05	ENSMUSG000000021466	patched homolog 1 [Source:MGI Symbol;Acc:MGI:105373]	13	63511533	-1	ENSMF002500000001574	PATCHED HOMOLOG
Ddx3y	-6.27	1.74E-02	ENSMUSG000000069045	DEAD (Asp-Glu-Ala-Asp) box polypeptide 3, Y-linked [Source:MGI Symbol;Acc:MGI:1349406]	Y	1260715	-1	ENSMF00730001521315	ATP DEPENDENT RNA HELICASE EC_3.6.4.13
Esrp1	-6.00	2.37E-03	ENSMUSG000000040728	epithelial splicing regulatory protein 1 [Source:MGI Symbol;Acc:MGI:1917326]	4	11331933	-1	ENSMF002500000001984	EPITHELIAL SPLICING REGULATORY 1 RNA BINDING MOTIF 35A RNA BINDING 35A

Enpp3	-5.54	6.93E-03	ENSMUSG00000019989	ectonucleotide pyrophosphatase/phosphodiesterase 3 [Source:MGI Symbol;Acc:MGI:2143702]	10	24773814	-1	ENSMF00730001521683	ECTONUCLEOTIDE PYROPHOSPHATASE/PHOSPHODIESTERASE FAMILY MEMBER 3 E NPP 3 PHOSPHODIESTERASE I BETA PD IBETA PHOSPHODIESTERASE I/NUCLEOTIDE PYROPHOSPHATASE 3 CD203C ANTIGEN [INCLUDES ALKALINE PHOSPHODIESTERASE I EC_3.1.4.1 ; NUCLEOTIDE PYROPHOSPHATASE NPPAS
Ina	-5.525	0.0167641	ENSMUSG00000034336	internexin neuronal intermediate filament protein, alpha [Source:MGI Symbol;Acc:MGI:96568]	19	47014698	1	ENSMF00730001521354	NEUROFILAMENT POLYPEPTIDE NF KDA NEUROFILAMENT NEUROFILAMENT TRIPLET
Dnmt3l	-4.6173633	0.0040775	ENSMUSG00000000730	DNA (cytosine-5-)-methyltransferase 3-like [Source:MGI Symbol;Acc:MGI:1859287]	10	78041947	1	ENSMF00250000001090	DNA CYTOSINE 5 METHYLTRANSFERASE EC_2.1.1.37 DNA METHYLTRANSFERASE DNA MTASE M
Lrp2	-4.3602484	0.0313787	ENSMUSG00000027070	low density lipoprotein receptor-related protein 2 [Source:MGI Symbol;Acc:MGI:95794]	2	69424340	-1	ENSMF00740001589098	DENSITY LIPOPROTEIN RECEPTOR RELATED PRECURSOR LRP
C77370	-4.3513043	0.0024014	ENSMUSG00000046449	expressed sequence C77370 [Source:MGI Symbol;Acc:MGI:2148050]	X	104077434	-1	ENSMF00250000008212	UNCHARACTERIZED
Tpm1	-3.1902627	0.0275946	ENSMUSG00000032366	tropomyosin 1, alpha [Source:MGI Symbol;Acc:MGI:98809]	9	67022590	-1	ENSMF00250000000220	TROPOMYOSIN CHAIN TROPOMYOSIN TROPOMYOSIN
d8 decrease									
Gene Name	foldChange	padj	Ensembl Gene ID	Description	Chromosome Name	Gene Start (bp)	Strand	Ensembl Protein Family ID(s)	Ensembl Family Description
Ccl3	-Inf	1.76E-02	ENSMUSG00000000982	chemokine (C-C motif) ligand 3 [Source:MGI Symbol;Acc:MGI:98260]	11	83647844	-1	ENSMF00670001239909	C C MOTIF CHEMOKINE 3 PRECURSOR MACROPHAGE INFLAMMATORY 1 ALPHA MIP 1 ALPHA SMALL INDUCIBLE CYTOKINE A3
Cybb	-Inf	8.75E-04	ENSMUSG00000015340	cytochrome b-245, beta polypeptide [Source:MGI Symbol;Acc:MGI:88574]	X	9435252	-1	ENSMF00730001521605	EC 1 SUBUNIT 1
Pyy	-Inf	1.32E-02	ENSMUSG00000017311	peptide YY [Source:MGI Symbol;Acc:MGI:99924]	11	102106676	-1	ENSMF00670001241094	PEPTIDE YY PRECURSOR PYY PEPTIDE TYROSINE TYROSINE
Myf7	-Inf	6.16E-13	ENSMUSG00000020469	myosin, light polypeptide 7, regulatory [Source:MGI Symbol;Acc:MGI:107495]	11	5896637	-1	ENSMF00730001521620	MYOSIN REGULATORY LIGHT CHAIN 2
Gpr65	-Inf	4.32E-02	ENSMUSG00000021886	G-protein coupled receptor 65 [Source:MGI Symbol;Acc:MGI:108031]	12	98268635	1	ENSMF00320000100112	G COUPLED RECEPTOR
Fgf12	-Inf	7.28E-03	ENSMUSG00000022523	fibroblast growth factor 12 [Source:MGI Symbol;Acc:MGI:109183]	16	28160120	-1	ENSMF00500000269773	FIBROBLAST GROWTH FACTOR FGF FIBROBLAST GROWTH FACTOR HOMOLOGOUS FACTOR FHF CELL SURFACE GLYCOPROTEIN CD200 RECEPTOR PRECURSOR CD200 CELL SURFACE GLYCOPROTEIN RECEPTOR CD200 RECEPTOR CD200 CELL SURFACE GLYCOPROTEIN RECEPTOR CELL SURFACE GLYCOPROTEIN OX2 RECEPTOR
Cd200r1	-Inf	5.38E-03	ENSMUSG00000022667	CD200 receptor 1 [Source:MGI Symbol;Acc:MGI:1889024]	16	44765736	1	ENSMF00500000271208	RECEPTOR CD200 RECEPTOR CD200 CELL SURFACE GLYCOPROTEIN RECEPTOR CELL SURFACE GLYCOPROTEIN OX2 RECEPTOR
Aif1	-Inf	4.31E-02	ENSMUSG00000024397	allograft inflammatory factor 1 [Source:MGI Symbol;Acc:MGI:1343098]	17	35170991	-1	ENSMF00670001235659	ALLOGRAFT INFLAMMATORY FACTOR 1 IONIZED CALCIUM BINDING ADAPTER MOLECULE
Cd226	-Inf	2.11E-03	ENSMUSG00000034028	CD226 antigen [Source:MGI Symbol;Acc:MGI:3039602]	18	89197431	1	ENSMF00250000007425	CD226 ANTIGEN PRECURSOR PLATELET AND T CELL ACTIVATION ANTIGEN 1 CD226 ANTIGEN
Ifit1	-Inf	2.13E-03	ENSMUSG00000034459	interferon-induced protein with tetratricopeptide repeats 1 [Source:MGI Symbol;Acc:MGI:99450]	19	34640871	1	ENSMF00250000002441	INTERFERON INDUCED WITH TETRATRICOPEPTIDE REPEATS IFIT INTERFERON INDUCED KDA IFI
Themis2	-Inf	4.43E-02	ENSMUSG00000037731	thymocyte selection associated family member 2 [Source:MGI Symbol;Acc:MGI:2446213]	4	132781843	-1	ENSMF00660001157244	THYMOCYTE EXPRESSED MOLECULE INVOLVED IN SELECTION
Bank1	-Inf	3.19E-02	ENSMUSG00000037922	B cell scaffold protein with ankyrin repeats 1 [Source:MGI Symbol;Acc:MGI:2442120]	3	136053363	-1	ENSMF00250000006766	B CELL SCAFFOLD WITH ANKYRIN REPEATS
Isg20	-Inf	4.30E-02	ENSMUSG00000039236	interferon-stimulated protein [Source:MGI Symbol;Acc:MGI:1928895]	7	78913424	1	ENSMF00500000274591	INTERFERON STIMULATED GENE 20 KDA EC_3.1.13.1 PROMYELOCYTIC LEUKEMIA NUCLEAR BODY ASSOCIATED ISG20

Milr1	-Inf	7.28E-03	ENSMUSG00000040528	mast cell immunoglobulin like receptor 1 [Source:MGI Symbol;Acc:MGI:2685731]	11	106751226	1	ENSMF00500000283091	ALLERGIN 1 PRECURSOR ALLERGY INHIBITORY RECEPTOR 1 MAST CELL ANTIGEN 32 MCA 32 MAST CELL AG 32 MAST CELL IMMUNOGLOBULIN RECEPTOR 1
MyI3	-Inf	1.31E-08	ENSMUSG00000059741	myosin, light polypeptide 3 [Source:MGI Symbol;Acc:MGI:97268]	9	110763646	1	ENSMF00250000000438	MYOSIN LIGHT CHAIN MYOSIN LIGHT CHAIN MYOSIN LIGHT CHAIN
ErbB4	-Inf	1.15E-05	ENSMUSG00000062209	v-erb-a erythroblastic leukemia viral oncogene homolog 4 (avian) [Source:MGI Symbol;Acc:MGI:104771]	1	68032186	-1	ENSMF00410000138465	RECEPTOR TYROSINE KINASE ERBB PRECURSOR EC_2.7.10.1 PROTO ONCOGENE C ERBB
Gm25224	-Inf	2.15E-03	ENSMUSG00000088820	predicted gene, 25224 [Source:MGI Symbol;Acc:MGI:5455001]	12	109689477	1		
Gm6910	-159.89	8.21E-16	ENSMUSG00000055763	predicted gene 6910 [Source:MGI Symbol;Acc:MGI:3648043]	13	66007672	1		
Myh6	-147.58	3.00E-55	ENSMUSG00000040752	myosin, heavy polypeptide 6, cardiac muscle, alpha [Source:MGI Symbol;Acc:MGI:97255]	14	54941921	-1	ENSMF00250000000024	MYOSIN MYOSIN HEAVY CHAIN MYOSIN HEAVY CHAIN MUSCLE
Myh7	-119.20	1.36E-43	ENSMUSG00000053093	myosin, heavy polypeptide 7, cardiac muscle, beta [Source:MGI Symbol;Acc:MGI:2155600]	14	54970688	-1	ENSMF00250000000024	MYOSIN MYOSIN HEAVY CHAIN MYOSIN HEAVY CHAIN MUSCLE
Rybp	-105.75	4.32E-23	ENSMUSG00000072872	RING1 and YY1 binding protein [Source:MGI Symbol;Acc:MGI:1929059]	6	100228566	-1	ENSMF00600000921629	RING1 AND YY1 BINDING DEATH EFFECTOR DOMAIN ASSOCIATED FACTOR DED ASSOCIATED FACTOR
Actc1	-89.33	4.44E-66	ENSMUSG00000068614	actin, alpha, cardiac muscle 1 [Source:MGI Symbol;Acc:MGI:87905]	2	114047282	-1	ENSMF00730001521060	ACTIN
Afp	-79.52	7.50E-07	ENSMUSG00000054932	alpha fetoprotein [Source:MGI Symbol;Acc:MGI:87951]	5	90490714	1	ENSMF00250000001052	PRECURSOR
Plagl1	-76.79	3.44E-77	ENSMUSG00000019817	pleiomorphic adenoma gene-like 1 [Source:MGI Symbol;Acc:MGI:1100874]	10	13090691	1	ENSMF00730001522033	ZINC FINGER PLEIOMORPHIC ADENOMA
Cd180	-61.03	6.31E-11	ENSMUSG00000021624	CD180 antigen [Source:MGI Symbol;Acc:MGI:1194924]	13	102693558	1	ENSMF00730001522636	CD180 ANTIGEN PRECURSOR LYMPHOCYTE ANTIGEN RADIOPROTECTIVE 105 KDA CD180 ANTIGEN
Pik3cg	-55.57	7.65E-05	ENSMUSG00000020573	phosphoinositide-3-kinase, catalytic, gamma polypeptide [Source:MGI Symbol;Acc:MGI:1353576]	12	32173473	-1	ENSMF00730001521385	PHOSPHATIDYLINOSITOL 4 5 BISPHOSPHATE 3 KINASE CATALYTIC SUBUNIT P13 KINASE SUBUNIT P13K PTDINS 3 KINASE SUBUNIT EC_2.7.1.153 PHOSPHATIDYLINOSITOL 4 5 BISPHOSPHATE 3 KINASE 110 KDA CATALYTIC SUBUNIT PTDINS 3 KINASE SUBUNIT P110 PHOSPHOINOSITIDE 3 KINASE C
Gm13938	-49.75	2.94E-04	ENSMUSG00000086354	predicted gene 13938 [Source:MGI Symbol;Acc:MGI:3651046]	2	76722776	1		
Cx3cr1	-43.21	1.02E-09	ENSMUSG00000052336	chemokine (C-X3-C) receptor 1 [Source:MGI Symbol;Acc:MGI:1333815]	9	119901616	-1	ENSMF00250000000182	C C CHEMOKINE RECEPTOR TYPE 5 C C CKR 5 CC CKR 5 CCR 5 CCR5 CD195 ANTIGEN
Ttn	-42.59	1.00E-70	ENSMUSG00000051747	titin [Source:MGI Symbol;Acc:MGI:98864]	2	76703980	-1	ENSMF00740001589077	EC_2.7.11.1
Shh	-42.33	1.71E-04	ENSMUSG00000002633	sonic hedgehog [Source:MGI Symbol;Acc:MGI:98297]	5	28456815	-1	ENSMF00250000000992	HEDGEHOG HEDGEHOG N PRODUCT; HEDGEHOG C PRODUCT]
Btk	-42.26	6.43E-07	ENSMUSG00000031264	Bruton agammaglobulinemia tyrosine kinase [Source:MGI Symbol;Acc:MGI:88216]	X	134542336	-1	ENSMF00280000058686	TYROSINE KINASE EC_2.7.10.2
Xirp1	-39.91	1.52E-03	ENSMUSG00000079243	xin actin-binding repeat containing 1 [Source:MGI Symbol;Acc:MGI:1333878]	9	120013755	-1	ENSMF00250000001847	XIN ACTIN BINDING REPEAT CONTAINING 2 BETA XIN CARDIOMYOPATHY ASSOCIATED 3
Coro1a	-38.87	6.54E-04	ENSMUSG00000030707	coronin, actin binding protein 1A [Source:MGI Symbol;Acc:MGI:1345961]	7	126699773	-1	ENSMF00730001521292	CORONIN
Ebf4	-37.59	3.38E-03	ENSMUSG00000053552	early B cell factor 4 [Source:MGI Symbol;Acc:MGI:2385972]	2	130295169	1	ENSMF00250000000890	TRANSCRIPTION FACTOR EARLY B CELL FACTOR
Hpgd	-37.32	1.83E-08	ENSMUSG00000031613	hydroxyprostaglandin dehydrogenase 15 (NAD) [Source:MGI Symbol;Acc:MGI:108085]	8	56294552	1	ENSMF00500000270795	15 HYDROXYPROSTAGLANDIN DEHYDROGENASE [NAD +] 15 PGDH EC_1.1.1.141 PROSTAGLANDIN DEHYDROGENASE 1
Lilrb4	-36.17	2.25E-06	ENSMUSG00000062593	leukocyte immunoglobulin-like receptor, subfamily B, member 4 [Source:MGI Symbol;Acc:MGI:102701]	10	51480640	1	ENSMF00740001589102	LEUKOCYTE IMMUNOGLOBULIN RECEPTOR SUBFAMILY MEMBER PRECURSOR CD85 ANTIGEN FAMILY MEMBER IMMUNOGLOBULIN TRANSCRIPT ILT RECEPTOR ANTIGEN

Gm16152	-31.78	1.23E-02	ENSMUSG00000087131	predicted gene 16152 [Source:MGI Symbol;Acc:MGI:3802058]	1	38384949	1		
Trim55	-31.20	3.38E-03	ENSMUSG00000060913	tripartite motif-containing 55 [Source:MGI Symbol;Acc:MGI:3036269]	3	19644460	1	ENSM00250000001642	TRIPARTITE MOTIF CONTAINING MUSCLE SPECIFIC RING FINGER MURF RING FINGER
MyI2	-31.07	3.04E-10	ENSMUSG00000013936	myosin, light polypeptide 2, regulatory, cardiac, slow [Source:MGI Symbol;Acc:MGI:97272]	5	122100951	1	ENSM00730001521620	MYOSIN REGULATORY LIGHT CHAIN 2
Hdac9	-30.40	9.29E-09	ENSMUSG00000004698	histone deacetylase 9 [Source:MGI Symbol;Acc:MGI:1931221]	12	34371503	-1	ENSM00730001521398	HISTONE DEACETYLASE EC_3.5.1.98
Apoa1	-30.26	2.47E-08	ENSMUSG00000032083	apolipoprotein A-I [Source:MGI Symbol;Acc:MGI:88049]	9	46228580	1	ENSM00470000251509	APOLIPOPROTEIN A I PRECURSOR APO A1 APOA I APOLIPOPROTEIN A1 [CONTAINS TRUNCATED APOLIPOPROTEIN A I]
Pax1	-29.52	7.83E-05	ENSMUSG00000037034	paired box gene 1 [Source:MGI Symbol;Acc:MGI:97485]	2	147361925	1	ENSM00730001521783	PAIRED BOX PAX
Rgl2	-28.95	2.09E-02	ENSMUSG000000041354	ral guanine nucleotide dissociation stimulator like 2 [Source:MGI Symbol;Acc:MGI:107483]	17	33929543	1	ENSM00690001356594	RAL GUANINE NUCLEOTIDE DISSOCIATION STIMULATOR RALGDS
Mybpc3	-25.92	3.77E-08	ENSMUSG000000002100	myosin binding protein C, cardiac [Source:MGI Symbol;Acc:MGI:102844]	2	91118144	1	ENSM00740001589136	MYOSIN BINDING C TYPE MYBP C C PROTEIN MUSCLE
Ncf1	-23.12	4.31E-05	ENSMUSG00000015950	neutrophil cytosolic factor 1 [Source:MGI Symbol;Acc:MGI:97283]	5	134220053	-1	ENSM00500000270980	NEUTROPHIL CYTOSOL FACTOR 1 NCF 1.47 KDA NEUTROPHIL OXIDASE FACTOR NCF 47K NEUTROPHIL NADPH OXIDASE FACTOR 1 P47 PHOX
Tyrobp	-22.61	2.62E-13	ENSMUSG00000030579	TYRO protein tyrosine kinase binding protein [Source:MGI Symbol;Acc:MGI:1277211]	7	30413788	1	ENSM00720001492117	TYRO TYROSINE KINASE BINDING PRECURSOR DNAX ACTIVATION 12
Ldb3	-21.99	1.01E-03	ENSMUSG000000021798	LIM domain binding 3 [Source:MGI Symbol;Acc:MGI:1344412]	14	34526699	-1	ENSM00740001589114	PDZ AND LIM DOMAIN
Smyd1	-19.66	2.96E-26	ENSMUSG000000055027	SET and MYND domain containing 1 [Source:MGI Symbol;Acc:MGI:104790]	6	71213940	-1	ENSM00500000270699	HISTONE LYSINE N METHYLTRANSFERASE SMYD1 EC_2.1.1.43 SET AND MYND DOMAIN CONTAINING 1
Myo1f	-19.62	4.79E-03	ENSMUSG000000024300	myosin IF [Source:MGI Symbol;Acc:MGI:107711]	17	33555719	1	ENSM00730001521590	MYOSIN CLASS I UNCONVENTIONAL MYOSIN TYPE I MYOSIN
Gpr98	-19.08	1.66E-03	ENSMUSG000000069170	G protein-coupled receptor 98 [Source:MGI Symbol;Acc:MGI:1274784]	13	81095068	-1	ENSM00250000002503	G COUPLED RECEPTOR 98 PRECURSOR MONOGENIC AUDIOGENIC SEIZURE SUSCEPTIBILITY 1 VERY LARGE G COUPLED RECEPTOR 1
Stac	-17.55	1.24E-02	ENSMUSG00000032502	src homology three (SH3) and cysteine rich domain [Source:MGI Symbol;Acc:MGI:1201400]	9	111561437	-1	ENSM00670001235579	SH3 AND CYSTEINE RICH DOMAIN CONTAINING SRC HOMOLOGY 3 AND CYSTEINE RICH DOMAIN CONTAINING
Alpk2	-17.03	1.73E-05	ENSMUSG00000032845	alpha-kinase 2 [Source:MGI Symbol;Acc:MGI:2449492]	18	65265529	-1	ENSM00570000851237	ALPHA KINASE 2 EC_2.7.11.- HEART ALPHA KINASE
Gp49a	-16.73	2.46E-05	ENSMUSG000000089672	glycoprotein 49 A [Source:MGI Symbol;Acc:MGI:102702]	10	51480632	1	ENSM00740001589102	LEUKOCYTE IMMUNOGLOBULIN RECEPTOR SUBFAMILY MEMBER PRECURSOR CD85 ANTIGEN FAMILY MEMBER IMMUNOGLOBULIN TRANSCRIPT ILT RECEPTOR ANTIGEN
Gm4070	-16.39	2.03E-02	ENSMUSG000000078606	predicted gene 4070 [Source:MGI Symbol;Acc:MGI:3782245]	7	105895139	-1	ENSM00250000001084	UP REGULATOR OF CELL PROLIFERATION HBV X UP REGULATED GENE 4 HOMOLOG HBXAG UP REGULATED GENE 4 HOMOLOG
Gm24895	-15.69	1.06E-10	ENSMUSG000000084691	predicted gene, 24895 [Source:MGI Symbol;Acc:MGI:5454672]	12	109646129	1		
Ccl6	-15.39	1.74E-05	ENSMUSG00000018927	chemokine (C-C motif) ligand 6 [Source:MGI Symbol;Acc:MGI:98263]	11	83587882	-1	ENSM00670001248036	C C MOTIF CHEMOKINE 6 PRECURSOR SMALL INDUCIBLE CYTOKINE A6
Nebi	-15.03	1.66E-29	ENSMUSG000000053702	nebulette [Source:MGI Symbol;Acc:MGI:1921353]	2	17343909	-1	ENSM00740001589165	NEBULIN RELATED ANCHORING N RAP
Lair1	-14.89	4.16E-02	ENSMUSG000000055541	leukocyte-associated Ig-like receptor 1 [Source:MGI Symbol;Acc:MGI:105492]	7	4007073	-1	ENSM00500000277257	LEUKOCYTE ASSOCIATED IMMUNOGLOBULIN RECEPTOR 1 PRECURSOR LAIR 1 CD305 ANTIGEN

Ccl9	-14.81	1.54E-04	ENSMUSG00000019122	chemokine (C-C motif) ligand 9 [Source:MGI Symbol;Acc:MGI:104533]	11	83572919	-1	ENSMF005000000283516	C C MOTIF CHEMOKINE 9 PRECURSOR CCF18 MACROPHAGE INFLAMMATORY 1 GAMMA MIP 1 GAMMA MACROPHAGE INFLAMMATORY RELATED 2 MRP 2 SMALL INDUCIBLE CYTOKINE A9 [CONTAINS CCL9 29 101 ; CCL9 30 101 ; CCL9 31 101]
F13a1	-13.98	1.61E-03	ENSMUSG000000039109	coagulation factor XIII, A1 subunit [Source:MGI Symbol;Acc:MGI:1921395]	13	36867178	-1	ENSMF00730001521466	GLUTAMINE GAMMA GLUTAMYLTRANSFERASE EC_2.3.2.13 TRANSGLUTAMINASE TG TGASE TRANSGLUTAMINASE TGASE
Gm23474	-13.61	1.02E-09	ENSMUSG000000089509	predicted gene, 23474 [Source:MGI Symbol;Acc:MGI:5453251]	12	109633768	1		
Meg3	-12.74	2.33E-52	ENSMUSG000000021268	maternally expressed 3 [Source:MGI Symbol;Acc:MGI:1202886]	12	109541001	1		
Gm22205	-12.66	5.79E-03	ENSMUSG000000084604	predicted gene, 22205 [Source:MGI Symbol;Acc:MGI:5451982]	12	109688055	1		
Rbm24	-11.96	8.64E-16	ENSMUSG000000038132	RNA binding motif protein 24 [Source:MGI Symbol;Acc:MGI:3610364]	13	46418300	1	ENSMF00250000001992	RNA BINDING RNA BINDING MOTIF
AF357355	-11.80	6.10E-04	ENSMUSG000000064621	snoRNA AF357355 [Source:MGI Symbol;Acc:MGI:3843217]	12	109654627	1		
Ptafr	-11.31	7.79E-03	ENSMUSG000000056529	platelet-activating factor receptor [Source:MGI Symbol;Acc:MGI:106066]	4	132564067	1	ENSMF005000000271988	PLATELET ACTIVATING FACTOR RECEPTOR PAF R PAFR
MyI4	-11.14	1.30E-12	ENSMUSG000000061086	myosin, light polypeptide 4 [Source:MGI Symbol;Acc:MGI:97267]	11	104550663	1	ENSMF00250000000438	MYOSIN LIGHT CHAIN MYOSIN LIGHT CHAIN MYOSIN LIGHT CHAIN
DQ267100	-10.86	5.97E-04	ENSMUSG000000084549	snoRNA DQ267100 [Source:MGI Symbol;Acc:MGI:5439865]	12	109649617	1		
Thbs4	-10.78	5.05E-03	ENSMUSG000000021702	thrombospondin 4 [Source:MGI Symbol;Acc:MGI:1101779]	13	92751590	-1	ENSMF00250000000689	PRECURSOR
Tnnt2	-10.68	3.82E-37	ENSMUSG000000026414	troponin T2, cardiac [Source:MGI Symbol;Acc:MGI:104597]	1	135836386	1	ENSMF006000000921149	TROPONIN T MUSCLE MUSCLE TROPONIN T
Gm24598	-10.23	1.73E-03	ENSMUSG000000084459	predicted gene, 24598 [Source:MGI Symbol;Acc:MGI:5454375]	X	64496584	1		
Ptprc	-10.18	1.52E-04	ENSMUSG000000026395	protein tyrosine phosphatase, receptor type, C [Source:MGI Symbol;Acc:MGI:97810]	1	138062861	-1	ENSMF00740001589127	RECEPTOR TYPE TYROSINE PHOSPHATASE PRECURSOR TYROSINE PHOSPHATASE R PTP EC_3.1.3.48
Arhgap30	-10.18	4.58E-12	ENSMUSG000000048865	Rho GTPase activating protein 30 [Source:MGI Symbol;Acc:MGI:2684948]	1	171388954	1	ENSMF00250000001205	RHO GTPASE ACTIVATING RHO TYPE GTPASE ACTIVATING GTPASE ACTIVATING
Ddx3y	-9.77	4.30E-12	ENSMUSG000000069045	DEAD (Asp-Glu-Ala-Asp) box polypeptide 3, Y-linked [Source:MGI Symbol;Acc:MGI:1349406]	Y	1260715	-1	ENSMF00730001521315	ATP DEPENDENT RNA HELICASE EC_3.6.4.13
Csf1r	-9.71	1.46E-04	ENSMUSG000000024621	colony stimulating factor 1 receptor [Source:MGI Symbol;Acc:MGI:1339758]	18	61105572	1	ENSMF00730001521364	MAST/STEM CELL GROWTH FACTOR RECEPTOR KIT PRECURSOR SCFR EC_2.7.10.1 PROTO ONCOGENE C KIT TYROSINE KINASE KIT
Gvin1	-9.18	8.31E-03	ENSMUSG000000045868	GTPase, very large interferon inducible 1 [Source:MGI Symbol;Acc:MGI:1921808]	7	106156556	-1	ENSMF00250000001084	UP REGULATOR OF CELL PROLIFERATION HBV X UP REGULATED GENE 4 HOMOLOG HBXAG UP REGULATED GENE 4 HOMOLOG
Slc24a2	-9.03	1.01E-07	ENSMUSG000000037996	solute carrier family 24 (sodium/potassium/calcium exchanger), member 2 [Source:MGI Symbol;Acc:MGI:1923626]	4	86983124	-1	ENSMF00730001521845	SODIUM/POTASSIUM/CALCIUM EXCHANGER 1 NA + /K + /CA 2+ EXCHANGE 1 RETINAL ROD NA CA+K EXCHANGER SOLUTE CARRIER FAMILY 24 MEMBER 1
Gipc2	-9.00	3.55E-02	ENSMUSG000000039131	GIPC PDZ domain containing family, member 2 [Source:MGI Symbol;Acc:MGI:1889209]	3	152093533	-1	ENSMF00250000002325	PDZ DOMAIN CONTAINING
Slc8a1	-8.65	1.68E-21	ENSMUSG000000054640	solute carrier family 8 (sodium/calcium exchanger), member 1 [Source:MGI Symbol;Acc:MGI:107956]	17	81388691	-1	ENSMF00710001441664	SODIUM/CALCIUM EXCHANGER 1 PRECURSOR NA + /CA 2+ EXCHANGE 1 SOLUTE CARRIER FAMILY 8 MEMBER 1
Gria1	-8.62	2.98E-02	ENSMUSG000000020524	glutamate receptor, ionotropic, AMPA1 (alpha 1) [Source:MGI Symbol;Acc:MGI:95808]	11	57011387	1	ENSMF00720001492020	GLUTAMATE RECEPTOR PRECURSOR GLUR AMPA SELECTIVE GLUTAMATE RECEPTOR GLUR GLUTAMATE RECEPTOR IONOTROPIC AMPA
Nepn	-8.58	1.95E-07	ENSMUSG000000038624	nephrocan [Source:MGI Symbol;Acc:MGI:1913900]	10	52388972	1	ENSMF005000000276824	AMBIGUOUS
Hrc	-8.47	1.37E-11	ENSMUSG000000038239	histidine rich calcium binding protein [Source:MGI Symbol;Acc:MGI:96226]	7	45335290	1	ENSMF00250000007393	SARCOPLASMIC RETICULUM HISTIDINE RICH CALCIUM BINDING PRECURSOR

Oasl2	-8.38	1.37E-06	ENSMUSG00000029561	2'-5' oligoadenylate synthetase-like 2 [Source:MGI Symbol;Acc:MGI:1344390]	5	114896936	1	ENSMF00570000851068	2' 5' OLIGOADENYLATE SYNTHASE 2 5' OLIGO A SYNTHASE 2 5A SYNTHASE EC_2.7.7.84
Col2a1	-8.22	3.98E-15	ENSMUSG00000022483	collagen, type II, alpha 1 [Source:MGI Symbol;Acc:MGI:88452]	15	97975602	-1	ENSMF00250000000184	COLLAGEN ALPHA I CHAIN PRECURSOR ALPHA TYPE I COLLAGEN
Jakmip2	-8.08	2.54E-03	ENSMUSG00000024502	janus kinase and microtubule interacting protein 2 [Source:MGI Symbol;Acc:MGI:1923467]	18	43531408	-1	ENSMF00250000001480	JANUS KINASE AND MICROTUBULE INTERACTING 1 MULTIPLE ALPHA HELICES AND RNA LINKER 1 MARLIN 1
Prdm9	-7.96	6.15E-03	ENSMUSG000000051977	PR domain containing 9 [Source:MGI Symbol;Acc:MGI:2384854]	17	15543079	-1	ENSMF00730001521582	HISTONE LYSINE N METHYLTRANSFERASE EC_2.1.1.43 PR DOMAIN ZINC FINGER PR DOMAIN CONTAINING
Ppargc1a	-7.69	6.77E-04	ENSMUSG00000029167	peroxisome proliferative activated receptor, gamma, coactivator 1 alpha [Source:MGI Symbol;Acc:MGI:1342774]	5	51454249	-1	ENSMF00250000006958	PEROXISOME PROLIFERATOR ACTIVATED RECEPTOR GAMMA COACTIVATOR 1 ALPHA PGC 1 ALPHA PPAR GAMMA COACTIVATOR 1 ALPHA PPARGC 1 ALPHA
A830082K1 2Rik	-7.64	1.20E-03	ENSMUSG000000087143	RIKEN cDNA A830082K12 gene [Source:MGI Symbol;Acc:MGI:2443527]	13	78198017	1		
Uty	-7.62	5.29E-09	ENSMUSG00000068457	ubiquitously transcribed tetratricopeptide repeat gene, Y chromosome [Source:MGI Symbol;Acc:MGI:894810]	Y	1096861	-1	ENSMF00250000000912	HISTONE DEMETHYLASE UTY EC_1.14.11.- UBIQUITOUSLY TRANSCRIBED TPR ON THE Y CHROMOSOME UBIQUITOUSLY TRANSCRIBED Y CHROMOSOME TETRATRICOPEPTIDE REPEAT
Tnni2	-7.60	1.99E-02	ENSMUSG00000031097	troponin I, skeletal, fast 2 [Source:MGI Symbol;Acc:MGI:105070]	7	142441808	1	ENSMF00670001235399	TROPONIN I MUSCLE TROPONIN I
Igsf5	-7.49	1.67E-09	ENSMUSG000000000159	immunoglobulin superfamily, member 5 [Source:MGI Symbol;Acc:MGI:1919308]	16	96361668	1	ENSMF00500000273376	IMMUNOGLOBULIN SUPERFAMILY MEMBER 5 IGSF5 JUNCTIONAL ADHESION MOLECULE 4 JAM 4
Sh3bgr	-7.47	2.04E-07	ENSMUSG00000040666	SH3-binding domain glutamic acid-rich protein [Source:MGI Symbol;Acc:MGI:1354740]	16	96200470	1	ENSMF00670001236050	SH3 DOMAIN BINDING GLUTAMIC ACID RICH SH3BGR
AF357425	-7.38	9.89E-03	ENSMUSG00000088294	snoRNA AF357425 [Source:MGI Symbol;Acc:MGI:3053434]	12	109636012	1		
Hlf	-7.35	3.56E-09	ENSMUSG00000003949	hepatic leukemia factor [Source:MGI Symbol;Acc:MGI:96108]	11	90336536	-1	ENSMF00250000001169	THYROTROPH EMBRYONIC FACTOR
Sirpa	-7.32	6.43E-07	ENSMUSG00000037902	signal-regulatory protein alpha [Source:MGI Symbol;Acc:MGI:108563]	2	129592835	1	ENSMF00500000269963	TYROSINE PHOSPHATASE NON RECEPTOR TYPE SUBSTRATE 1 PRECURSOR SHP SUBSTRATE 1 SHPS 1 BRAIN IG MOLECULE WITH TYROSINE BASED ACTIVATION MOTIFS BIT CD172 ANTIGEN FAMILY MEMBER A INHIBITORY RECEPTOR SHPS 1 SIGNAL REGULATORY ALPHA 1 SIRP ALPHA 1 CD172A ANTIGE
Slco2b1	-7.19	3.46E-02	ENSMUSG00000030737	solute carrier organic anion transporter family, member 2b1 [Source:MGI Symbol;Acc:MGI:1351872]	7	99657804	-1	ENSMF00730001521765	SOLUTE CARRIER ORGANIC ANION OATP ORGANIC ANION TRANSPORTER SOLUTE CARRIER FAMILY 21 MEMBER
Fyb	-7.00	5.10E-06	ENSMUSG00000022148	FYN binding protein [Source:MGI Symbol;Acc:MGI:1346327]	15	6579871	1	ENSMF00250000005863	FYN BINDING ADHESION AND DEGRANULATION PROMOTING ADAPTOR ADAP FYB 120/130 P120/P130 FYN T BINDING SLAP 130 SLP 76 ASSOCIATED PHOSPHOPROTEIN
Pcp4	-6.97	1.31E-07	ENSMUSG000000090223	Purkinje cell protein 4 [Source:MGI Symbol;Acc:MGI:97509]	16	96467606	1	ENSMF00560000777821	UNKNOWN
Epha3	-6.90	6.43E-07	ENSMUSG000000052504	Eph receptor A3 [Source:MGI Symbol;Acc:MGI:99612]	16	63543538	-1	ENSMF00730001521142	EPHRIN TYPE A RECEPTOR PRECURSOR EC_2.7.10.1 KINASE
F630028O1 0Rik	-6.75	6.81E-04	ENSMUSG000000078122	RIKEN cDNA F630028O10 gene [Source:MGI Symbol;Acc:MGI:3641813]	X	96239942	1		
C3ar1	-6.71	2.64E-11	ENSMUSG00000040552	complement component 3a receptor 1 [Source:MGI Symbol;Acc:MGI:1097680]	6	122847138	-1	ENSMF00500000273608	C3A ANAPHYLATOXIN CHEMOTACTIC RECEPTOR C3AR C3A R
Slc46a3	-6.60	1.46E-02	ENSMUSG00000029650	solute carrier family 46, member 3 [Source:MGI Symbol;Acc:MGI:1918956]	5	147878437	-1	ENSMF00480000262809	SOLUTE CARRIER FAMILY 46 MEMBER 3 PRECURSOR
Camk1d	-6.54	1.87E-02	ENSMUSG00000039145	calcium/calmodulin-dependent protein kinase ID [Source:MGI Symbol;Acc:MGI:2442190]	2	5293457	-1	ENSMF00400000131731	CALCIUM/CALMODULIN DEPENDENT KINASE TYPE EC_2.7.11.17 CAM KINASE I CAM KINASE CAMKI
Unc45b	-6.11	1.09E-03	ENSMUSG00000018845	unc-45 homolog B (C. elegans) [Source:MGI Symbol;Acc:MGI:2443377]	11	82910550	1	ENSMF00250000002279	UNC 45 HOMOLOG A UNC 45A ASSOCIATED 1 SMAP 1

Gm23600	-6.08	3.59E-03	ENSMUSG00000087885	predicted gene, 23600 [Source:MGI Symbol;Acc:MGI:5453377]	12	109643748	1		
Sept1	-6.01	2.15E-02	ENSMUSG00000000486	septin 1 [Source:MGI Symbol;Acc:MGI:1858916]	7	127214447	-1	ENSMF00730001521236	SEPTIN
Pf4	-5.99	6.43E-05	ENSMUSG00000029373	platelet factor 4 [Source:MGI Symbol;Acc:MGI:1888711]	5	90772435	1	ENSMF00670001243526	PLATELET FACTOR 4 PRECURSOR PF 4 C X C MOTIF CHEMOKINE 4
Apbb1ip	-5.92	4.08E-04	ENSMUSG00000026786	amyloid beta (A4) precursor protein-binding, family B, member 1 interacting protein [Source:MGI Symbol;Acc:MGI:1861354]	2	22774094	1	ENSMF00250000001459	AMYLOID BETA A4 PRECURSOR BINDING FAMILY B MEMBER 1 INTERACTING APBB1 INTERACTING 1
Nkx3-1	-5.89	1.55E-02	ENSMUSG00000022061	NK-3 transcription factor, locus 1 (Drosophila) [Source:MGI Symbol;Acc:MGI:97352]	14	69190638	1	ENSMF00500000273274	HOMEODOMAIN NKX 3 1 HOMEODOMAIN NK 3 HOMOLOG A
Slitrk4	-5.77	7.88E-06	ENSMUSG00000046699	SLIT and NTRK-like family, member 4 [Source:MGI Symbol;Acc:MGI:2442509]	X	64264885	-1	ENSMF00250000001398	SLIT AND NTRK PRECURSOR
Sorbs2	-5.56	1.60E-13	ENSMUSG000000031626	sorbin and SH3 domain containing 2 [Source:MGI Symbol;Acc:MGI:1924574]	8	45507788	1	ENSMF00550000743175	SORBIN AND SH3 DOMAIN CONTAINING 2 ARG/ABL INTERACTING 2 ARGBP2
Ctnna3	-5.56	4.55E-02	ENSMUSG000000060843	catenin (cadherin associated protein), alpha 3 [Source:MGI Symbol;Acc:MGI:2661445]	10	63430098	1	ENSMF00250000001018	CATENIN ALPHA 2 ALPHA N CATENIN
Cdo1	-5.54	1.49E-06	ENSMUSG000000033022	cysteine dioxygenase 1, cytosolic [Source:MGI Symbol;Acc:MGI:105925]	18	46713205	-1	ENSMF00500000271351	CYSTEINE DIOXYGENASE TYPE 1 EC_1.13.11.20 CYSTEINE DIOXYGENASE TYPE I CDO CDO I
Actn2	-5.43	3.26E-04	ENSMUSG000000052374	actinin alpha 2 [Source:MGI Symbol;Acc:MGI:109192]	13	12269426	-1	ENSMF00440000236866	ALPHA ACTININ F ACTIN CROSS LINKING NON MUSCLE ALPHA ACTININ
Arhgap20	-5.40	1.82E-02	ENSMUSG000000053199	Rho GTPase activating protein 20 [Source:MGI Symbol;Acc:MGI:2445175]	9	51765337	1	ENSMF00500000270859	RHO GTPASE ACTIVATING 20 RA AND RHOGAP DOMAIN CONTAINING RARHOGAP RHO TYPE GTPASE ACTIVATING 20
Ryr2	-5.35	7.70E-12	ENSMUSG000000021313	ryanodine receptor 2, cardiac [Source:MGI Symbol;Acc:MGI:99685]	13	11553103	-1	ENSMF00250000000332	RYANODINE RECEPTOR RYR MUSCLE CALCIUM RELEASE CHANNEL MUSCLE TYPE RYANODINE RECEPTOR TYPE RYANODINE RECEPTOR
Sphkap	-5.29	6.41E-05	ENSMUSG000000026163	SPHK1 interactor, AKAP domain containing [Source:MGI Symbol;Acc:MGI:1924879]	1	83254139	-1	ENSMF00250000003911	A KINASE ANCHOR SPHKAP SPHK1 INTERACTOR AND AKAP DOMAIN CONTAINING SPHINGOSINE KINASE TYPE 1 INTERACTING
Ppbp	-5.29	1.59E-02	ENSMUSG000000029372	pro-platelet basic protein [Source:MGI Symbol;Acc:MGI:1888712]	5	90768518	1	ENSMF00500000303403	UNKNOWN
Lyve1	-5.15	4.12E-02	ENSMUSG000000030787	lymphatic vessel endothelial hyaluronan receptor 1 [Source:MGI Symbol;Acc:MGI:2136348]	7	110850607	-1	ENSMF00250000008298	LYMPHATIC VESSEL ENDOTHELIAL HYALURONIC ACID RECEPTOR 1 PRECURSOR LYVE 1 CELL SURFACE RETENTION SEQUENCE BINDING 1 CRSBP 1 EXTRACELLULAR LINK DOMAIN CONTAINING 1
Diras2	-5.12	1.51E-02	ENSMUSG000000047842	DIRAS family, GTP-binding RAS-like 2 [Source:MGI Symbol;Acc:MGI:1915453]	13	52504375	-1	ENSMF00500000270725	GTP BINDING DI PRECURSOR DISTINCT SUBGROUP OF THE RAS FAMILY MEMBER
Zfhx4	-5.00	4.61E-13	ENSMUSG000000025255	zinc finger homeodomain 4 [Source:MGI Symbol;Acc:MGI:2137668]	3	5218526	1	ENSMF00740001589135	ZINC FINGER HOMEODOMAIN ZINC FINGER HOMEODOMAIN ZFH
Fsd2	-4.96	3.47E-02	ENSMUSG000000038663	fibronectin type III and SPRY domain containing 2 [Source:MGI Symbol;Acc:MGI:2444310]	7	81533308	-1	ENSMF00500000272996	FIBRONECTIN TYPE III AND SPRY DOMAIN CONTAINING 2 SPRY DOMAIN CONTAINING 1
Jph2	-4.87	1.23E-06	ENSMUSG000000017817	junctophilin 2 [Source:MGI Symbol;Acc:MGI:1891496]	2	163336242	-1	ENSMF00250000001356	JUNCTOPHILIN JP JUNCTOPHILIN
Apobec1	-4.76	4.14E-05	ENSMUSG000000040613	apolipoprotein B mRNA editing enzyme, catalytic polypeptide 1 [Source:MGI Symbol;Acc:MGI:103298]	6	122577792	-1	ENSMF00500000272650	C >U EDITING ENZYME APOBEC 1 EC_3.5.4.- APOLIPOPROTEIN B EDITING ENZYME 1
Slc24a3	-4.70	6.41E-04	ENSMUSG000000063873	solute carrier family 24 (sodium/potassium/calcium exchanger), member 3 [Source:MGI Symbol;Acc:MGI:2137513]	2	145167754	1	ENSMF00730001521994	SODIUM/POTASSIUM/CALCIUM EXCHANGER 3 PRECURSOR NA + /K + /CA 2+ EXCHANGE 3 SOLUTE CARRIER FAMILY 24 MEMBER 3
Irs4	-4.67	1.30E-02	ENSMUSG000000054667	insulin receptor substrate 4 [Source:MGI Symbol;Acc:MGI:1338009]	X	141710998	-1	ENSMF00250000001358	INSULIN RECEPTOR SUBSTRATE
Trib3	-4.66	2.50E-02	ENSMUSG000000032715	tribbles homolog 3 (Drosophila) [Source:MGI Symbol;Acc:MGI:1345675]	2	152337422	-1	ENSMF00250000001980	TRIBBLES HOMOLOG TRB
Evi2a	-4.59	2.54E-03	ENSMUSG000000078771	ecotropic viral integration site 2a [Source:MGI Symbol;Acc:MGI:95458]	11	79526560	-1	ENSMF00250000009974	EVI2A PRECURSOR ECOTROPIC VIRAL INTEGRATION SITE 2A EVI 2A

Cul9	-4.59	1.56E-02	ENSMUSG00000040327	cullin 9 [Source:MGI Symbol;Acc:MGI:1925559]	17	46500572	-1	ENSMF00250000002710	CULLIN CUL
Pls1	-4.47	1.22E-02	ENSMUSG00000049493	plastin 1 (I-isoform) [Source:MGI Symbol;Acc:MGI:104809]	9	95752642	-1	ENSMF00250000001554	PLASTIN
Nckap1l	-4.46	1.35E-02	ENSMUSG000000022488	NCK associated protein 1 like [Source:MGI Symbol;Acc:MGI:1926063]	15	103453825	1	ENSMF002500000001880	NCK ASSOCIATED 1 1 MEMBRANE ASSOCIATED HEM
Hcls1	-4.43	4.46E-02	ENSMUSG000000022831	hematopoietic cell specific Lyn substrate 1 [Source:MGI Symbol;Acc:MGI:104568]	16	36934983	1	ENSMF006000000921221	HEMATOPOIETIC LINEAGE CELL SPECIFIC HEMATOPOIETIC CELL SPECIFIC LYN SUBSTRATE 1 LCKBP1
Rcan2	-4.39	3.59E-03	ENSMUSG000000039601	regulator of calcineurin 2 [Source:MGI Symbol;Acc:MGI:1858219]	17	43801851	1	ENSMF002500000001903	CALCIPRESSIN DOWN SYNDROME REGION 1 REGULATOR OF CALCINEURIN
Pcdhb17	-4.37	2.85E-02	ENSMUSG000000046387	protocadherin beta 17 [Source:MGI Symbol;Acc:MGI:2136754]	18	37485021	1	ENSMF00730001521419	PROTOCOLADHERIN BETA PRECURSOR PCDH BETA
Mutyh	-4.34	4.92E-02	ENSMUSG000000028687	mutY homolog (E. coli) [Source:MGI Symbol;Acc:MGI:1917853]	4	116807723	1	ENSMF002500000006429	A/G SPECIFIC ADENINE DNA GLYCOSYLASE EC_3.2.2.- MUTY HOMOLOG
Itgb2	-4.29	3.65E-02	ENSMUSG000000000290	integrin beta 2 [Source:MGI Symbol;Acc:MGI:96611]	10	77530252	1	ENSMF00730001521210	INTEGRIN BETA PRECURSOR SUBUNIT BETA SUBUNIT BETA ANTIGEN
Serping1	-4.29	7.13E-04	ENSMUSG000000023224	serine (or cysteine) peptidase inhibitor, clade G, member 1 [Source:MGI Symbol;Acc:MGI:894696]	2	84765387	-1	ENSMF002600000051123	PLASMA PROTEASE C1 INHIBITOR PRECURSOR C1 INH C1INH C1 ESTERASE INHIBITOR C1 INHIBITING FACTOR SERPIN G1
Myocd	-4.26	4.02E-05	ENSMUSG000000020542	myocardin [Source:MGI Symbol;Acc:MGI:2137495]	11	65176561	-1	ENSMF00630001050598	MKL/MYOCARDIN MYOCARDIN RELATED TRANSCRIPTION FACTOR MRTF
Actg2	-4.14	2.68E-06	ENSMUSG000000059430	actin, gamma 2, smooth muscle, enteric [Source:MGI Symbol;Acc:MGI:104589]	6	83512905	-1	ENSMF00730001521060	ACTIN
Josd2	-4.07	1.99E-02	ENSMUSG000000038695	Josephin domain containing 2 [Source:MGI Symbol;Acc:MGI:1913374]	7	44467980	1	ENSMF006000000921376	JOSEPHIN 1 EC_3.4.19.12 JOSEPHIN DOMAIN CONTAINING 1
Atp10a	-4.02	2.99E-02	ENSMUSG000000025324	ATPase, class V, type 10A [Source:MGI Symbol;Acc:MGI:1330809]	7	58658202	1	ENSMF005000000269897	PROBABLE PHOSPHOLIPID TRANSPORTING ATPASE EC_3.6.3.1 ATPASE CLASS V TYPE
Rbp4	-3.98	9.44E-11	ENSMUSG000000024990	retinol binding protein 4, plasma [Source:MGI Symbol;Acc:MGI:97879]	19	38116620	-1	ENSMF002500000003212	RETINOL BINDING 4 PLASMA RETINOL BINDING PRBP
Mfap2	-3.84	6.04E-03	ENSMUSG000000060572	microfibrillar-associated protein 2 [Source:MGI Symbol;Acc:MGI:99559]	4	141010418	1	ENSMF005000000274137	MICROFIBRILLAR ASSOCIATED 2 PRECURSOR MFAP 2 MICROFIBRIL ASSOCIATED GLYCOPROTEIN 1 MAGP MAGP 1
Lgals9	-3.81	2.33E-02	ENSMUSG000000001123	lectin, galactose binding, soluble 9 [Source:MGI Symbol;Acc:MGI:109496]	11	78962974	-1	ENSMF00740001589285	GALECTIN GAL
Myom1	-3.78	9.33E-07	ENSMUSG000000024049	myomesin 1 [Source:MGI Symbol;Acc:MGI:1341430]	17	71019521	1	ENSMF002600000050477	MYOMESIN MYOMESIN FAMILY MEMBER
Cacnb2	-3.78	3.39E-03	ENSMUSG000000057914	calcium channel, voltage-dependent, beta 2 subunit [Source:MGI Symbol;Acc:MGI:894644]	2	14604306	1	ENSMF002500000000524	VOLTAGE DEPENDENT L TYPE CALCIUM CHANNEL SUBUNIT BETA CALCIUM CHANNEL VOLTAGE DEPENDENT SUBUNIT BETA
Nell1	-3.76	9.53E-05	ENSMUSG000000055409	NEL-like 1 [Source:MGI Symbol;Acc:MGI:2443902]	7	49974864	1	ENSMF002500000001932	KINASE C BINDING NELL2 PRECURSOR NEL 2
Lcp2	-3.73	2.08E-03	ENSMUSG000000002699	lymphocyte cytosolic protein 2 [Source:MGI Symbol;Acc:MGI:1321402]	11	34046920	1	ENSMF002500000006667	LYMPHOCYTE CYTOSOLIC 2 SH2 DOMAIN CONTAINING LEUKOCYTE OF 76 KDA SLP 76 TYROSINE PHOSPHOPROTEIN SLP76
Mpnd	-3.71	1.21E-03	ENSMUSG000000003199	MPN domain containing [Source:MGI Symbol;Acc:MGI:1915297]	17	56005711	1	ENSMF002500000005074	MPN DOMAIN CONTAINING EC_3.4.-.-
Rgs2	-3.63	1.09E-03	ENSMUSG000000026360	regulator of G-protein signaling 2 [Source:MGI Symbol;Acc:MGI:1098271]	1	143999338	-1	ENSMF00510000502821	REGULATOR OF G SIGNALING 2 RGS2
Tenm2	-3.55	6.08E-03	ENSMUSG000000049336	teneurin transmembrane protein 2 [Source:MGI Symbol;Acc:MGI:1345184]	11	36006656	-1	ENSMF002500000000375	TENEURIN TEN ODD OZ/TEN M HOMOLOG TENASCIN TEN TENEURIN TRANSMEMBRANE [CONTAINS TEN INTRACELLULAR DOMAIN TEN ICD]
Tdgf1	-3.51	3.39E-03	ENSMUSG000000032494	teratocarcinoma-derived growth factor 1 [Source:MGI Symbol;Acc:MGI:98658]	9	110939610	-1	ENSMF005000000273423	TERATOCARCINOMA DERIVED GROWTH FACTOR CRIPTO GROWTH FACTOR EPIDERMAL GROWTH FACTOR CRIPTO
Tnni1	-3.50	3.72E-03	ENSMUSG000000026418	troponin I, skeletal, slow 1 [Source:MGI Symbol;Acc:MGI:105073]	1	135783065	1	ENSMF00670001235399	TROPONIN I MUSCLE TROPONIN I
Rtl1	-3.47	4.85E-05	ENSMUSG000000085925	retrotransposon-like 1 [Source:MGI Symbol;Acc:MGI:2656842]	12	109589194	-1	ENSMF005000000275807	RETROTRANSPOSON 1 MAMMALIAN RETROTRANSPOSON DERIVED 1 PATERNALLY EXPRESSED GENE 11 RETROTRANSPOSON DERIVED PEG11

Sema3a	-3.46	7.74E-04	ENSMUSG00000028883	sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3A [Source:MGI Symbol;Acc:MGI:107558]	5	13396784	1	ENSMF00480000262738	SEMAPHORIN PRECURSOR
Laptm5	-3.44	1.24E-02	ENSMUSG00000028581	lysosomal-associated protein transmembrane 5 [Source:MGI Symbol;Acc:MGI:108046]	4	130913125	1	ENSMF00250000008983	LYSOSOMAL ASSOCIATED TRANSMEMBRANE 5 LYSOSOMAL ASSOCIATED MULTITRANSMEMBRANE 5 RETINOIC ACID INDUCIBLE E3
Axl	-3.43	2.63E-06	ENSMUSG00000002602	AXL receptor tyrosine kinase [Source:MGI Symbol;Acc:MGI:1347244]	7	25757273	-1	ENSMF00730001521921	TYROSINE KINASE PRECURSOR EC_2.7.10.1
6330403K07Rik	-3.41	1.31E-04	ENSMUSG000000018451	RIKEN cDNA 6330403K07 gene [Source:MGI Symbol;Acc:MGI:1918001]	11	71031941	-1		
Vwf	-3.32	4.17E-02	ENSMUSG000000001930	Von Willebrand factor homolog [Source:MGI Symbol;Acc:MGI:98941]	6	125546774	1	ENSMF00740001589089	MUCIN PRECURSOR MUC MUCIN
Ypel2	-3.29	3.46E-03	ENSMUSG000000018427	yippee-like 2 (Drosophila) [Source:MGI Symbol;Acc:MGI:1925114]	11	86936425	-1	ENSMF005000000270081	YIPPEE
2810408A11Rik	-3.25	3.59E-03	ENSMUSG000000018570	RIKEN cDNA 2810408A11 gene [Source:MGI Symbol;Acc:MGI:1917669]	11	69897352	-1	ENSMF00250000010019	UNCHARACTERIZED
Mical2	-3.24	2.44E-03	ENSMUSG000000038244	microtubule associated monoxygenase, calponin and LIM domain containing 2 [Source:MGI Symbol;Acc:MGI:2444947]	7	112225856	1	ENSMF00250000000908	METHIONINE SULFOXIDE OXIDASE EC_1.14.13.- MOLECULE INTERACTING WITH CASL MICAL
Camk2a	-3.23	1.46E-04	ENSMUSG000000024617	calcium/calmodulin-dependent protein kinase II alpha [Source:MGI Symbol;Acc:MGI:88256]	18	60925618	1	ENSMF00250000000111	CALCIUM/CALMODULIN DEPENDENT KINASE TYPE II SUBUNIT CAM KINASE II SUBUNIT CAMK II SUBUNIT EC_2.7.11.17
Atp1b2	-3.23	3.79E-07	ENSMUSG000000041329	ATPase, Na+/K+ transporting, beta 2 polypeptide [Source:MGI Symbol;Acc:MGI:88109]	11	69599736	-1	ENSMF00670001235362	SODIUM/POTASSIUM TRANSPORTING ATPASE SUBUNIT BETA SODIUM/POTASSIUM DEPENDENT ATPASE SUBUNIT BETA
Eno3	-3.22	6.47E-03	ENSMUSG000000060600	enolase 3, beta muscle [Source:MGI Symbol;Acc:MGI:95395]	11	70657202	1	ENSMF00730001521170	ENOLASE EC_4.2.1.11 2 PHOSPHO D GLYCERATE HYDRO LYASE 2 PHOSPHOGLYCERATE DEHYDRATASE
Tac2	-3.16	3.25E-02	ENSMUSG000000025400	tachykinin 2 [Source:MGI Symbol;Acc:MGI:98476]	10	127724478	1	ENSMF00670001237727	TACHYKININ 3 NEUROKININ B NKB NEUROMEDIN K]
Pdzn3	-3.14	4.03E-09	ENSMUSG000000035357	PDZ domain containing RING finger 3 [Source:MGI Symbol;Acc:MGI:1933157]	6	101149609	-1	ENSMF00250000001242	E3 UBIQUITIN LIGASE PDZRN3 EC_6.3.2.- PDZ DOMAIN CONTAINING RING FINGER 3
Tet3	-3.10	4.77E-02	ENSMUSG000000034832	tet methylcytosine dioxygenase 3 [Source:MGI Symbol;Acc:MGI:2446229]	6	83362373	-1	ENSMF00250000000921	SEMAPHORIN CYTOPLASMIC DOMAIN ASSOCIATED 3 SEMACAP3
Ttyh1	-3.09	4.08E-02	ENSMUSG000000030428	tweety homolog 1 (Drosophila) [Source:MGI Symbol;Acc:MGI:1889007]	7	4119408	1	ENSMF00250000001068	METHYLCYTOSINE DIOXYGENASE EC_1.14.11.- N2
Ap1s2	-3.06	2.50E-02	ENSMUSG000000031367	adaptor-related protein complex 1, sigma 2 subunit [Source:MGI Symbol;Acc:MGI:1889383]	X	163909017	1	ENSMF005000000269841	TWEETY HOMOLOG AP 1 COMPLEX SUBUNIT SIGMA ADAPTER RELATED COMPLEX 1 SUBUNIT SIGMA ADAPTOR COMPLEX AP 1 SUBUNIT SIGMA CLATHRIN ASSEMBLY COMPLEX 1 SIGMA SMALL CHAIN GOLGI ADAPTOR HA1/AP1 ADAPTIN SIGMA SUBUNIT SIGMA SUBUNIT OF AP 1 CLATHRIN SIGMA ADAPTIN ADAPTIN
2810442I21Rik	-3.01	1.11E-02	ENSMUSG000000087060	RIKEN cDNA 2810442I21 gene [Source:MGI Symbol;Acc:MGI:1919985]	11	16935154	-1		
Fmn1	-2.96	4.92E-04	ENSMUSG000000044042	formin 1 [Source:MGI Symbol;Acc:MGI:101815]	2	113327736	1	ENSMF00250000001548	FORMIN
Irgm2	-2.92	7.55E-03	ENSMUSG000000069874	immunity-related GTPase family M member 2 [Source:MGI Symbol;Acc:MGI:1926262]	11	58199618	1	ENSMF00250000001767	INTERFERON INDUCIBLE GTPASE 5 EC_3.6.5.- IMMUNITY RELATED GTPASE CINEMA 1
Wbp1	-2.88	1.20E-03	ENSMUSG000000030035	WW domain binding protein 1 [Source:MGI Symbol;Acc:MGI:104710]	6	83119044	-1	ENSMF005000000273692	WW DOMAIN BINDING 1 WBP 1
Egr1	-2.86	5.40E-06	ENSMUSG000000038418	early growth response 1 [Source:MGI Symbol;Acc:MGI:95295]	18	34859823	1	ENSMF00560000770969	EARLY GROWTH RESPONSE 1 EGR 1
Gp1ba	-2.86	1.11E-03	ENSMUSG000000050675	glycoprotein 1b, alpha polypeptide [Source:MGI Symbol;Acc:MGI:1333744]	11	70639122	1	ENSMF004000000132126	PLATELET GLYCOPROTEIN IB ALPHA CHAIN PRECURSOR GP IB ALPHA GPIB ALPHA GPIBA
Tmem163	-2.84	4.59E-03	ENSMUSG000000026347	transmembrane protein 163 [Source:MGI Symbol;Acc:MGI:1919410]	1	127486546	-1	ENSMF00250000007006	GLYCOPROTEIN IBALPHA CD42B ANTIGEN TRANSMEMBRANE 163 SYNAPTIC VESICLE MEMBRANE OF 31 KDA

Trim30a	-2.83	2.30E-02	ENSMUSG00000030921	tripartite motif-containing 30A [Source:MGI Symbol;Acc:MGI:98178]	7	104409025	-1	ENSMF00600000921153	TRIPARTITE MOTIF CONTAINING 5 EC_6.3.2.-TRIM5ALPHA
Gas7	-2.79	1.15E-02	ENSMUSG00000033066	growth arrest specific 7 [Source:MGI Symbol;Acc:MGI:1202388]	11	67455437	1	ENSMF00250000005898	GROWTH ARREST SPECIFIC 7 GAS 7
Col14a1	-2.78	3.39E-03	ENSMUSG000000022371	collagen, type XIV, alpha 1 [Source:MGI Symbol;Acc:MGI:1341272]	15	55307750	1	ENSMF00740001589200	COLLAGEN ALPHA 1 CHAIN
Ank3	-2.74	1.05E-06	ENSMUSG000000069601	ankyrin 3, epithelial [Source:MGI Symbol;Acc:MGI:88026]	10	69533772	1	ENSMF005000000269628	ANKYRIN ANK ANKYRIN
Syt11	-2.72	1.61E-03	ENSMUSG000000068923	synaptotagmin XI [Source:MGI Symbol;Acc:MGI:1859547]	3	88744700	-1	ENSMF005000000270270	SYNAPTOTAGMIN SYNAPTOTAGMIN
Prnp	-2.71	7.93E-03	ENSMUSG000000079037	prion protein [Source:MGI Symbol;Acc:MGI:97769]	2	131909928	1	ENSMF002500000000454	MAJOR PRION PRECURSOR PRP PRP27 30 PRP33 35C CD230 ANTIGEN
Itgb3	-2.70	8.19E-05	ENSMUSG000000020689	integrin beta 3 [Source:MGI Symbol;Acc:MGI:96612]	11	104608000	1	ENSMF00730001521296	INTEGRIN BETA PRECURSOR
Gyg	-2.67	1.93E-07	ENSMUSG000000019528	glycogenin [Source:MGI Symbol;Acc:MGI:1351614]	3	20122084	-1	ENSMF002500000001801	GLYCOGENIN 1 GN 1 GN1 EC_2.4.1.186
Dhrs3	-2.65	7.50E-06	ENSMUSG000000066026	dehydrogenase/reductase (SDR family) member 3 [Source:MGI Symbol;Acc:MGI:1315215]	4	144892827	1	ENSMF005000000271255	SHORT CHAIN DEHYDROGENASE/REDUCTASE 3 EC_1.1.1.300 RETINAL SHORT CHAIN DEHYDROGENASE/REDUCTASE 1 RETSDR1
Upk3b	-2.63	6.40E-03	ENSMUSG000000042985	uroplakin 3B [Source:MGI Symbol;Acc:MGI:2140882]	5	136038496	1	ENSMF00670001236600	UROPLAKIN 3B PRECURSOR UP3B UROPLAKIN IIIB UPIIB P35
Adamtsl1	-2.62	1.15E-02	ENSMUSG000000066113	ADAMTS-like 1 [Source:MGI Symbol;Acc:MGI:1924989]	4	86053915	1	ENSMF00740001589326	ADAMTS 1 PRECURSOR ADAMTSL 1 PUNCTIN 1
Cpe	-2.61	2.79E-03	ENSMUSG000000037852	carboxypeptidase E [Source:MGI Symbol;Acc:MGI:101932]	8	64592558	-1	ENSMF00730001521835	CARBOXYPEPTIDASE E PRECURSOR CPE EC_3.4.17.10 CARBOXYPEPTIDASE H CPH ENKEPHALIN CONVERTASE PROHORMONE PROCESSING CARBOXYPEPTIDASE
Dip2c	-2.60	2.33E-02	ENSMUSG000000048264	DIP2 disco-interacting protein 2 homolog C (Drosophila) [Source:MGI Symbol;Acc:MGI:1920179]	13	9276528	1	ENSMF002500000000652	DISCO INTERACTING 2 HOMOLOG DIP2 HOMOLOG
Cpm	-2.60	3.97E-03	ENSMUSG000000020183	carboxypeptidase M [Source:MGI Symbol;Acc:MGI:1917824]	10	117629500	1	ENSMF00730001521968	CARBOXYPEPTIDASE D PRECURSOR EC_3.4.17.22 METALLOCARBOXYPEPTIDASE D GP180
Lcp1	-2.58	3.88E-05	ENSMUSG000000021998	lymphocyte cytosolic protein 1 [Source:MGI Symbol;Acc:MGI:104808]	14	75131101	1	ENSMF002500000001554	PLASTIN
Srl	-2.57	3.20E-02	ENSMUSG000000022519	sarcalumenin [Source:MGI Symbol;Acc:MGI:2146620]	16	4480216	-1	ENSMF00730001522355	SARCALUMENIN PRECURSOR
Plag1	-2.56	3.88E-03	ENSMUSG000000003282	pleiomorphic adenoma gene 1 [Source:MGI Symbol;Acc:MGI:1891916]	4	3900996	-1	ENSMF00730001522033	ZINC FINGER PLEIOMORPHIC ADENOMA
Cd248	-2.56	2.53E-04	ENSMUSG000000056481	CD248 antigen, endosialin [Source:MGI Symbol;Acc:MGI:1917695]	19	5068078	1	ENSMF005000000275140	ENDOSIALIN PRECURSOR TUMOR ENDOTHELIAL MARKER 1 CD248 ANTIGEN
Ttr	-2.52	1.20E-03	ENSMUSG000000061808	transthyretin [Source:MGI Symbol;Acc:MGI:98865]	18	20665250	1	ENSMF005000000271252	TRANSTHYRETIN PRECURSOR PREALBUMIN
Plek	-2.52	1.74E-07	ENSMUSG000000020120	pleckstrin [Source:MGI Symbol;Acc:MGI:1860485]	11	16971206	-1	ENSMF00740001589409	PLECKSTRIN
Ssbp2	-2.52	9.60E-05	ENSMUSG000000003992	single-stranded DNA binding protein 2 [Source:MGI Symbol;Acc:MGI:1914220]	13	91460283	1	ENSMF002500000000946	SINGLE STRANDED DNA BINDING SEQUENCE SPECIFIC SINGLE STRANDED DNA BINDING
Dock4	-2.50	4.58E-02	ENSMUSG000000035954	dedicator of cytokinesis 4 [Source:MGI Symbol;Acc:MGI:1918006]	12	40446053	1	ENSMF002500000000526	DEDICATOR OF CYTOKINESIS
Gm15441	-2.50	3.52E-02	ENSMUSG000000074398	predicted gene 15441 [Source:MGI Symbol;Acc:MGI:3641753]	3	96555765	-1		
Lbh	-2.50	6.77E-03	ENSMUSG000000024063	limb-bud and heart [Source:MGI Symbol;Acc:MGI:1925139]	17	72918305	1	ENSMF00670001236640	LBH
Leprel1	-2.45	5.57E-05	ENSMUSG000000038168	leprecan-like 1 [Source:MGI Symbol;Acc:MGI:2146663]	16	25959288	-1	ENSMF005000000269952	PROLYL 3 HYDROXYLASE 1 PRECURSOR EC_1.14.11.7 LEUCINE AND PROLINE ENRICHED PROTEOGLYCAN 1 LEPRECAN 1
Zfpm2	-2.44	6.51E-03	ENSMUSG000000022306	zinc finger protein, multitype 2 [Source:MGI Symbol;Acc:MGI:1334444]	15	40655042	1	ENSMF00740001589423	ZINC FINGER ZFPM1 FRIEND OF GATA 1 FOG 1 FRIEND OF GATA 1 ZINC FINGER MULTITYPE 1
Mef2c	-2.42	1.30E-02	ENSMUSG000000005583	myocyte enhancer factor 2C [Source:MGI Symbol;Acc:MGI:99458]	13	83504034	1	ENSMF002500000000700	MYOCYTE SPECIFIC ENHANCER FACTOR
Rasa3	-2.41	2.00E-03	ENSMUSG000000031453	RAS p21 protein activator 3 [Source:MGI Symbol;Acc:MGI:1197013]	8	13566950	-1	ENSMF00650001140008	RAS GTPASE ACTIVATING

Glb1l	-2.37	4.70E-02	ENSMUSG00000026200	galactosidase, beta 1-like [Source:MGI Symbol;Acc:MGI:1921827]	1	75198243	-1	ENSM00740001589169	BETA GALACTOSIDASE PRECURSOR EC_3.2.1.23
Angpt1	-2.36	2.10E-03	ENSMUSG00000022309	angiotensinogen 1 [Source:MGI Symbol;Acc:MGI:108448]	15	42424727	-1	ENSM00500000269808	ANGIOTENSINOGEN PRECURSOR
Mmp16	-2.36	4.30E-03	ENSMUSG00000028226	matrix metalloproteinase 16 [Source:MGI Symbol;Acc:MGI:1276107]	4	17852893	1	ENSM00400000131720	MATRIX METALLOPROTEINASE PRECURSOR MMP MEMBRANE TYPE MATRIX METALLOPROTEINASE MT
Psrc1	-2.36	9.89E-03	ENSMUSG000000068744	proline/serine-rich coiled-coil 1 [Source:MGI Symbol;Acc:MGI:1913099]	3	108383839	1	ENSM00250000008391	PROLINE/SERINE RICH COILED COIL 1
Emb	-2.35	1.20E-05	ENSMUSG000000021728	embigin [Source:MGI Symbol;Acc:MGI:95321]	13	117220625	1	ENSM00500000273736	EMBIGIN PRECURSOR
Adamts15	-2.32	4.49E-02	ENSMUSG00000033453	a disintegrin-like and metalloproteinase (reprolysin type) with thrombospondin type 1 motif, 15 [Source:MGI Symbol;Acc:MGI:2449569]	9	30899155	-1	ENSM00730001521602	A DISINTEGRIN AND METALLOPROTEINASE WITH THROMBOSPONDIN MOTIFS PRECURSOR ADAM TS
Syne1	-2.30	3.96E-03	ENSMUSG00000019769	spectrin repeat containing, nuclear envelope 1 [Source:MGI Symbol;Acc:MGI:1927152]	10	5020203	-1	ENSM00250000000542	NESPRIN 2 NUCLEAR ENVELOPE SPECTRIN REPEAT 2 NUCLEUS AND ACTIN CONNECTING ELEMENT
Zfp938	-2.30	4.69E-02	ENSMUSG000000062931	zinc finger protein 938 [Source:MGI Symbol;Acc:MGI:3621440]	10	82224850	-1	ENSM00730001521153	PROTEIN NUANCE SYNAPTIC NUCLEAR ENVELOPE 2 SYNE 2
Adam22	-2.30	4.42E-02	ENSMUSG000000040537	a disintegrin and metalloproteinase domain 22 [Source:MGI Symbol;Acc:MGI:1340046]	5	8072352	-1	ENSM00410000138484	ZINC FINGER
Usp29	-2.29	2.07E-05	ENSMUSG000000051527	ubiquitin specific peptidase 29 [Source:MGI Symbol;Acc:MGI:1888998]	7	6961160	1	ENSM00250000004084	DISINTEGRIN AND METALLOPROTEINASE DOMAIN CONTAINING PRECURSOR ADAM
Hs3st3b1	-2.27	2.10E-03	ENSMUSG000000070407	heparan sulfate (glucosamine) 3-O-sulfotransferase 3B1 [Source:MGI Symbol;Acc:MGI:1333853]	11	63885792	-1	ENSM00730001521766	METALLOPROTEINASE DISINTEGRIN AND CYSTEINE RICH MDC
Dact1	-2.26	5.22E-04	ENSMUSG000000044548	dapper homolog 1, antagonist of beta-catenin (xenopus) [Source:MGI Symbol;Acc:MGI:1891740]	12	71309884	1	ENSM00250000008177	UBIQUITIN CARBOXYL TERMINAL HYDROLASE 37 EC_3.4.19.12 DEUBIQUITINATING ENZYME 37
Pbx3	-2.22	1.53E-03	ENSMUSG000000038718	pre B cell leukemia homeobox 3 [Source:MGI Symbol;Acc:MGI:97496]	2	34171457	-1	ENSM00250000000950	UBIQUITIN THIOESTERASE 37 UBIQUITIN SPECIFIC PROCESSING PROTEASE 37
Cd47	-2.22	3.53E-04	ENSMUSG000000055447	CD47 antigen (Rh-related antigen, integrin-associated signal transducer) [Source:MGI Symbol;Acc:MGI:96617]	16	49855618	1	ENSM00250000005008	HEPARAN SULFATE GLUCOSAMINE 3 O-SULFOTRANSFERASE HEPARAN SULFATE D
Stc2	-2.22	2.47E-02	ENSMUSG000000020303	stanniocalcin 2 [Source:MGI Symbol;Acc:MGI:1316731]	11	31357307	-1	ENSM00260000051055	GLUCOSAMINYL 3 O-SULFOTRANSFERASE 3 OST HEPARAN SULFATE 3 O-SULFOTRANSFERASE H3 OST
Pdgfc	-2.21	4.60E-02	ENSMUSG000000028019	platelet-derived growth factor, C polypeptide [Source:MGI Symbol;Acc:MGI:1859631]	3	81036416	1	ENSM00250000004929	DAPPER 1
Lpl	-2.20	1.32E-02	ENSMUSG00000015568	lipoprotein lipase [Source:MGI Symbol;Acc:MGI:96820]	8	68880491	1	ENSM00400000131738	PRE B CELL LEUKEMIA TRANSCRIPTION FACTOR HOMEODOMAIN
Gbe1	-2.19	1.35E-02	ENSMUSG000000022707	glucan (1,4-alpha-), branching enzyme 1 [Source:MGI Symbol;Acc:MGI:1921435]	16	70313949	1	ENSM00250000003836	LEUKOCYTE SURFACE ANTIGEN CD47 PRECURSOR INTEGRIN ASSOCIATED IAP CD47 ANTIGEN
Rnf181	-2.19	3.06E-02	ENSMUSG000000055850	ring finger protein 181 [Source:MGI Symbol;Acc:MGI:1913760]	6	72359714	-1	ENSM00500000272789	STANNIOCALCIN 2 STC 2
Arl3	-2.18	6.51E-03	ENSMUSG000000025035	ADP-ribosylation factor-like 3 [Source:MGI Symbol;Acc:MGI:1929699]	19	46531109	-1	ENSM00670001235392	PLATELET DERIVED GROWTH FACTOR C PRECURSOR PDGF C SPINAL CORD DERIVED GROWTH FACTOR [CONTAINS PLATELET DERIVED GROWTH FACTOR C LATENT FORM PDGFC LATENT FORM ; PLATELET DERIVED GROWTH FACTOR C RECEPTOR BINDING FORM PDGFC RECEPTOR BINDING FORM]

Ednra	-2.16	2.28E-02	ENSMUSG00000031616	endothelin receptor type A [Source:MGI Symbol;Acc:MGI:105923]	8	77663031	-1	ENSMF00500000269879	ENDOTHELIN B RECEPTOR PRECURSOR ET B ET BR ENDOTHELIN RECEPTOR NON SELECTIVE TYPE
Aldoc	-2.15	4.41E-03	ENSMUSG00000017390	aldolase C, fructose-bisphosphate [Source:MGI Symbol;Acc:MGI:101863]	11	78322968	1	ENSMF00025000000488	FRUCTOSE BISPHOSPHATE ALDOLASE EC_4.1.2.13 TYPE ALDOLASE
Ptprd	-2.15	4.39E-04	ENSMUSG000000028399	protein tyrosine phosphatase, receptor type, D [Source:MGI Symbol;Acc:MGI:97812]	4	75941238	-1	ENSMF00740001589097	RECEPTOR TYPE TYROSINE PHOSPHATASE PRECURSOR EC_3.1.3.48
Grin2d	-2.14	2.40E-02	ENSMUSG00000002771	glutamate receptor, ionotropic, NMDA2D (epsilon 4) [Source:MGI Symbol;Acc:MGI:95823]	7	45831883	-1	ENSMF00730001521500	GLUTAMATE RECEPTOR IONOTROPIC NMDA PRECURSOR GLUTAMATE [NMDA] RECEPTOR SUBUNIT EPSILON N METHYL D ASPARTATE RECEPTOR SUBTYPE
Epha7	-2.14	4.72E-05	ENSMUSG000000028289	Eph receptor A7 [Source:MGI Symbol;Acc:MGI:95276]	4	28813131	1	ENSMF00730001521142	EPHRIN TYPE A RECEPTOR PRECURSOR EC_2.7.10.1 KINASE
Synpo2	-2.13	3.30E-02	ENSMUSG000000050315	synaptopodin 2 [Source:MGI Symbol;Acc:MGI:2153070]	3	123076519	-1	ENSMF000270000056592	SYNAPTOPODIN 2 MYOPODIN
Mrvi1	-2.12	1.43E-02	ENSMUSG000000005611	MRV integration site 1 [Source:MGI Symbol;Acc:MGI:1338023]	7	110868266	-1	ENSMF000250000005160	MRV11 INOSITOL 1 4 5 TRISPHOSPHATE RECEPTOR ASSOCIATED CGMP KINASE SUBSTRATE JAW1 RELATED MRV11
Gm4524	-2.06	4.81E-02	ENSMUSG000000090257	predicted gene 4524 [Source:MGI Symbol;Acc:MGI:3782709]	16	25956475	1		
Postn	-2.04	2.97E-08	ENSMUSG000000027750	periostin, osteoblast specific factor [Source:MGI Symbol;Acc:MGI:1926321]	3	54361109	1	ENSMF000250000001947	TRANSFORMING GROWTH FACTOR BETA INDUCED IG H3 PRECURSOR BETA IG H3 KERATO EPITHELIN RGD CONTAINING COLLAGEN ASSOCIATED RGD CAP
Serpinf1	-2.04	1.46E-03	ENSMUSG000000000753	serine (or cysteine) peptidase inhibitor, clade F, member 1 [Source:MGI Symbol;Acc:MGI:108080]	11	75409769	-1	ENSMF000390000126421	PIGMENT EPITHELIUM DERIVED FACTOR PRECURSOR PEDF SERPIN F1
Pdlim5	-2.02	1.43E-02	ENSMUSG000000028273	PDZ and LIM domain 5 [Source:MGI Symbol;Acc:MGI:1927489]	3	142239586	-1	ENSMF00740001589114	PDZ AND LIM DOMAIN
Pdp1	-2.02	4.65E-02	ENSMUSG000000049225	pyruvate dehydrogenase phosphatase catalytic subunit 1 [Source:MGI Symbol;Acc:MGI:2685870]	4	11958184	-1	ENSMF000250000002844	[PYRUVATE DEHYDROGENASE [ACETYL TRANSFERRING]] PHOSPHATASE 1 MITOCHONDRIAL PRECURSOR PDP 1 EC_3.1.3.43 PHOSPHATASE 2C PYRUVATE DEHYDROGENASE PHOSPHATASE CATALYTIC SUBUNIT 1 PDPC 1 RHO GTPASE ACTIVATING RHO TYPE GTPASE ACTIVATING GTPASE ACTIVATING
Arhgap31	-2.02	3.64E-02	ENSMUSG000000022799	Rho GTPase activating protein 31 [Source:MGI Symbol;Acc:MGI:1333857]	16	38598340	-1	ENSMF000250000001205	6 PHOSPHOFRUCTOKINASE MUSCLE TYPE EC_2.7.1.11 PHOSPHOFRUCTO 1 KINASE ISOZYME A PFK A PHOSPHOFRUCTOKINASE M PHOSPHOFRUCTOKINASE 1 PHOSPHOHEXOKINASE
Pfkfb	-2.00	4.81E-04	ENSMUSG000000021196	phosphofructokinase, platelet [Source:MGI Symbol;Acc:MGI:1891833]	13	6579768	-1	ENSMF00730001521507	
Sema6d	-1.99	1.76E-03	ENSMUSG000000027200	sema domain, transmembrane domain (TM), and cytoplasmic domain, (semaphorin) 6D [Source:MGI Symbol;Acc:MGI:2387661]	2	124089969	1	ENSMF00730001521376	SEMAPHORIN PRECURSOR
Hspa4l	-1.98	1.62E-02	ENSMUSG000000025757	heat shock protein 4 like [Source:MGI Symbol;Acc:MGI:107422]	3	40744495	1	ENSMF000360000109870	HEAT SHOCK
Vldlr	-1.98	3.43E-02	ENSMUSG000000024924	very low density lipoprotein receptor [Source:MGI Symbol;Acc:MGI:98935]	19	27216484	1	ENSMF00740001589117	LOW DENSITY LIPOPROTEIN RECEPTOR RECEPTOR
Cdon	-1.98	3.26E-03	ENSMUSG000000038119	cell adhesion molecule-related/down-regulated by oncogenes [Source:MGI Symbol;Acc:MGI:1926387]	9	35421128	1	ENSMF000250000002137	CELL ADHESION MOLECULE RELATED/DOWN REGULATED BY ONCOGENES PRECURSOR
Meis1	-1.96	3.59E-03	ENSMUSG000000020160	Meis homeobox 1 [Source:MGI Symbol;Acc:MGI:104717]	11	18880428	-1	ENSMF00730001521384	HOMEODOMAIN
Ndrp2	-1.95	6.47E-03	ENSMUSG000000004558	N-myc downstream regulated gene 2 [Source:MGI Symbol;Acc:MGI:1352498]	14	51905271	-1	ENSMF000250000000535	N MYC DOWNSTREAM REGULATED GENE
Ptprk	-1.93	6.74E-04	ENSMUSG000000019889	protein tyrosine phosphatase, receptor type, K [Source:MGI Symbol;Acc:MGI:103310]	10	28074820	1	ENSMF000310000088999	RECEPTOR TYPE TYROSINE PHOSPHATASE PRECURSOR R PTP EC_3.1.3.48 RECEPTOR TYPE TYROSINE PHOSPHATASE
Rufy3	-1.93	4.61E-02	ENSMUSG000000029291	RUN and FYVE domain containing 3 [Source:MGI Symbol;Acc:MGI:106484]	5	88583574	1	ENSMF000250000001058	RUN AND FYVE DOMAIN CONTAINING

Nexn	-1.91	4.98E-06	ENSMUSG00000039103	nexilin [Source:MGI Symbol;Acc:MGI:1916060]	3	152236986	-1	ENSMF00250000002729	NEXILIN F ACTIN BINDING
Wt1	-1.90	1.24E-02	ENSMUSG00000016458	Wilms tumor 1 homolog [Source:MGI Symbol;Acc:MGI:98968]	2	105126529	1	ENSMF00250000002802	WILMS TUMOR HOMOLOG
Zdbf2	-1.90	3.12E-06	ENSMUSG000000027520	zinc finger, DBF-type containing 2 [Source:MGI Symbol;Acc:MGI:1921134]	1	63273265	1	ENSMF00570000852452	DBF4 TYPE ZINC FINGER CONTAINING 2
Akap13	-1.89	4.36E-04	ENSMUSG000000066406	A kinase (PRKA) anchor protein 13 [Source:MGI Symbol;Acc:MGI:2676556]	7	75455534	1	ENSMF00250000000618	RHO GUANINE NUCLEOTIDE EXCHANGE FACTOR 2 GUANINE NUCLEOTIDE EXCHANGE FACTOR H1 GEF H1
270008101 5Rik	-1.89	4.10E-03	ENSMUSG000000053080	RIKEN cDNA 2700081015 gene [Source:MGI Symbol;Acc:MGI:1919667]	19	7417625	1	ENSMF00740001589717	UNCHARACTERIZED
Mpped2	-1.89	8.83E-04	ENSMUSG000000016386	metallophosphoesterase domain containing 2 [Source:MGI Symbol;Acc:MGI:1924265]	2	106693269	1	ENSMF00500000270317	METALLOPHOSPHOESTERASE MPPED2 EC_3.1.-.- METALLOPHOSPHOESTERASE DOMAIN CONTAINING 2
Foxp1	-1.88	1.54E-02	ENSMUSG000000030067	forkhead box P1 [Source:MGI Symbol;Acc:MGI:1914004]	6	98925338	-1	ENSMF00250000000673	FORKHEAD BOX
Acta2	-1.88	1.58E-05	ENSMUSG000000035783	actin, alpha 2, smooth muscle, aorta [Source:MGI Symbol;Acc:MGI:87909]	19	34241090	-1	ENSMF00730001521060	ACTIN
Smtnl2	-1.88	2.92E-02	ENSMUSG000000045667	smoothelin-like 2 [Source:MGI Symbol;Acc:MGI:2442764]	11	72389164	-1	ENSMF00250000001249	SMOOTHELIN
Kdr	-1.88	4.38E-03	ENSMUSG000000062960	kinase insert domain protein receptor [Source:MGI Symbol;Acc:MGI:96683]	5	75932827	-1	ENSMF00440000236870	VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR PRECURSOR VEGFR EC_2.7.10.1 FMS TYROSINE KINASE FLT TYROSINE KINASE RECEPTOR
Nbea	-1.86	1.96E-02	ENSMUSG000000027799	neurobeachin [Source:MGI Symbol;Acc:MGI:1347075]	3	55625205	-1	ENSMF00730001521650	NEUROBEACHIN
Kif5c	-1.86	3.58E-03	ENSMUSG000000026764	kinesin family member 5C [Source:MGI Symbol;Acc:MGI:1098269]	2	49619298	1	ENSMF00670001235340	KINESIN HEAVY CHAIN KINESIN HEAVY CHAIN KINESIN HEAVY CHAIN
Cask	-1.85	1.25E-02	ENSMUSG000000031012	calcium/calmodulin-dependent serine protein kinase (MAGUK family) [Source:MGI Symbol;Acc:MGI:1309489]	X	13517080	-1	ENSMF00730001521718	55 KDA ERYTHROCYTE MEMBRANE P55 MEMBRANE PROTEIN PALMITOYLATED 1
Zfp36	-1.85	3.43E-02	ENSMUSG000000044786	zinc finger protein 36 [Source:MGI Symbol;Acc:MGI:99180]	7	28376784	-1	ENSMF00500000274606	TRISTETRAPROLIN TTP GROWTH FACTOR INDUCIBLE NUCLEAR NUP475 TIS11A TIS11 ZINC FINGER 36 ZFP 36
Tiparp	-1.85	4.28E-02	ENSMUSG000000034640	TCDD-inducible poly(ADP-ribose) polymerase [Source:MGI Symbol;Acc:MGI:2159210]	3	65528410	1	ENSMF00250000007887	TCDD INDUCIBLE POLY [ADP RIBOSE] POLYMERASE EC_2.4.2.30 ADP RIBOSYLTRANSFERASE DIPHTHERIA TOXIN 14 ARTD14
Tshz2	-1.85	6.55E-03	ENSMUSG000000047907	teashirt zinc finger family member 2 [Source:MGI Symbol;Acc:MGI:2153084]	2	169633013	1	ENSMF00250000001998	TEASHIRT HOMOLOG
Plxdc2	-1.84	1.98E-02	ENSMUSG000000026748	plexin domain containing 2 [Source:MGI Symbol;Acc:MGI:1914698]	2	16356304	1	ENSMF00250000002327	PLEXIN DOMAIN CONTAINING PRECURSOR TUMOR ENDOTHELIAL MARKER 7
Heg1	-1.83	8.87E-03	ENSMUSG000000075254	HEG homolog 1 (zebrafish) [Source:MGI Symbol;Acc:MGI:1924696]	16	33684466	1	ENSMF00250000004916	HEG PRECURSOR
Itm2a	-1.83	1.18E-02	ENSMUSG000000031239	integral membrane protein 2A [Source:MGI Symbol;Acc:MGI:107706]	X	107397099	-1	ENSMF006000000921249	INTEGRAL MEMBRANE 2B IMMATURE BRI2 IMBRI2 TRANSMEMBRANE BRI BRI [CONTAINS BRI2 MEMBRANE FORM MATURE BRI2 MBRI2 ; BRI2 INTRACELLULAR DOMAIN BRI2 ICD ; BRI2C SOLUBLE FORM; BRI23 PEPTIDE BRI2 23 ABRI23 C TERMINAL PEPTIDE P23 PEPTIDE]
Mapre2	-1.83	4.12E-03	ENSMUSG000000024277	microtubule-associated protein, RP/EB family, member 2 [Source:MGI Symbol;Acc:MGI:106271]	18	23752333	1	ENSMF00250000000867	MICROTUBULE ASSOCIATED RP/EB FAMILY MEMBER
Adam12	-1.82	1.34E-02	ENSMUSG000000054555	a disintegrin and metalloproteinase domain 12 (meltrin alpha) [Source:MGI Symbol;Acc:MGI:105378]	7	133883199	-1	ENSMF00500000269660	DISINTEGRIN AND METALLOPROTEINASE DOMAIN CONTAINING PRECURSOR ADAM EC_3.4.24.-
Prtg	-1.81	1.42E-03	ENSMUSG000000036030	protogenin homolog (Gallus gallus) [Source:MGI Symbol;Acc:MGI:2444710]	9	72806874	1	ENSMF00740001589250	IMMUNOGLOBULIN SUPERFAMILY DCC SUBCLASS MEMBER PRECURSOR
Fads1	-1.81	1.13E-02	ENSMUSG000000010663	fatty acid desaturase 1 [Source:MGI Symbol;Acc:MGI:1923517]	19	10182888	1	ENSMF00250000001297	FATTY ACID DESATURASE 2 EC_1.14.19.- DELTA 6 FATTY ACID DESATURASE DESATURASE DELTA 6 DESATURASE

Tek	-1.81	3.48E-03	ENSMUSG00000006386	endothelial-specific receptor tyrosine kinase [Source:MGI Symbol;Acc:MGI:98664]	4	94739289	1	ENSM00730001521762	RECEPTOR PRECURSOR EC_2.7.10.1 TYROSINE KINASE WITH IG AND EGF HOMOLOGY DOMAINS 2
Ghr	-1.80	1.15E-02	ENSMUSG000000055737	growth hormone receptor [Source:MGI Symbol;Acc:MGI:95708]	15	3317760	-1	ENSM00710001441690	GROWTH HORMONE RECEPTOR PRECURSOR GH RECEPTOR SOMATOTROPIN RECEPTOR [CONTAINS GROWTH HORMONE BINDING GH BINDING GHBP SERUM BINDING]
Gria3	-1.79	3.29E-03	ENSMUSG000000001986	glutamate receptor, ionotropic, AMPA3 (alpha 3) [Source:MGI Symbol;Acc:MGI:95810]	X	41400854	1	ENSM00720001492020	GLUTAMATE RECEPTOR PRECURSOR GLUR AMPA SELECTIVE GLUTAMATE RECEPTOR GLUR
Lphn2	-1.79	4.73E-03	ENSMUSG000000028184	latrophilin 2 [Source:MGI Symbol;Acc:MGI:2139714]	3	148815586	-1	ENSM00260000050328	GLUTAMATE RECEPTOR IONOTROPIC AMPA LATROPHILIN
Pde3a	-1.79	3.39E-02	ENSMUSG000000041741	phosphodiesterase 3A, cGMP inhibited [Source:MGI Symbol;Acc:MGI:1860764]	6	141249269	1	ENSM00310000089029	CGMP INHIBITED 3' 5' CYCLIC PHOSPHODIESTERASE B EC_3.1.4.17 CGIPDE1 CYCLIC GMP INHIBITED PHOSPHODIESTERASE B CGI PDE B
Lrrc1	-1.78	4.97E-02	ENSMUSG000000032352	leucine rich repeat containing 1 [Source:MGI Symbol;Acc:MGI:2442313]	9	77430823	-1	ENSM00730001522046	SCRIBBLE
Gas1	-1.78	4.57E-02	ENSMUSG000000052957	growth arrest specific 1 [Source:MGI Symbol;Acc:MGI:95655]	13	60174405	-1	ENSM00560000771676	GROWTH ARREST SPECIFIC 1 PRECURSOR GAS 1
Fign	-1.77	3.53E-02	ENSMUSG000000075324	fidgetin [Source:MGI Symbol;Acc:MGI:1890647]	2	63971507	-1	ENSM00510000502752	SPASTIN EC_3.6.4.3
Peg3	-1.77	1.73E-05	ENSMUSG000000002265	paternally expressed 3 [Source:MGI Symbol;Acc:MGI:104748]	7	6703892	-1	ENSM00440000236978	PATERNALLY EXPRESSED GENE 3
Ext1	-1.76	6.17E-03	ENSMUSG000000061731	exostoses (multiple) 1 [Source:MGI Symbol;Acc:MGI:894663]	15	53064038	-1	ENSM00500000269819	EXOSTOSIN EC_2.4.1.224 EC_2.4.1.- 225 GLUCURONOSYL N ACETYLGUCOSAMINYL PROTEOGLYCAN/N ACETYLGUCOSAMINYL PROTEOGLYCAN 4 ALPHA N ACETYLGUCOSAMINYLTRANSFERASE MULTIPLE EXOSTOSES 1 HOMOLOG
Dsc2	-1.75	1.61E-02	ENSMUSG000000024331	desmocollin 2 [Source:MGI Symbol;Acc:MGI:103221]	18	20030633	-1	ENSM00730001521931	DESMOCOLLIN PRECURSOR
Pip4k2a	-1.75	1.98E-02	ENSMUSG000000026737	phosphatidylinositol-5-phosphate 4-kinase, type II, alpha [Source:MGI Symbol;Acc:MGI:1298206]	2	18842255	-1	ENSM00260000050567	PHOSPHATIDYLINOSITOL 5 PHOSPHATE 4 KINASE TYPE 2 EC_2.7.1.149 1 PHOSPHATIDYLINOSITOL 5 PHOSPHATE 4 KINASE 2 DIPHOSPHOINOSITIDE KINASE 2 PHOSPHATIDYLINOSITOL 5 PHOSPHATE 4 KINASE TYPE II PI 5 P 4 KINASE TYPE II PIP4KII PTDINS 5 P 4 KINASE 2
Zfp608	-1.75	2.32E-02	ENSMUSG000000052713	zinc finger protein 608 [Source:MGI Symbol;Acc:MGI:2442338]	18	54888045	-1	ENSM00600000921260	ZINC FINGER
Lgr4	-1.75	4.12E-02	ENSMUSG000000050199	leucine-rich repeat-containing G protein-coupled receptor 4 [Source:MGI Symbol;Acc:MGI:1891468]	2	109917647	1	ENSM00350000105433	LEUCINE RICH REPEAT CONTAINING G COUPLED RECEPTOR PRECURSOR
Tecr	-1.73	1.15E-03	ENSMUSG000000031708	trans-2,3-enoyl-CoA reductase [Source:MGI Symbol;Acc:MGI:1915408]	8	83571700	-1	ENSM00250000002457	VERY LONG CHAIN ENOYL COA REDUCTASE EC_1.3.1.93 SYNAPTIC GLYCOPROTEIN SC2 TRANS 2 3 ENOYL COA REDUCTASE TER
Hnrnp3	-1.73	1.63E-04	ENSMUSG000000020069	heterogeneous nuclear ribonucleoprotein H3 [Source:MGI Symbol;Acc:MGI:1926462]	10	63014664	-1	ENSM00740001589125	HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN HNRNP [CONTAINS HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN N TERMINALLY PROCESSED]
Plod2	-1.70	2.99E-04	ENSMUSG000000032374	procollagen lysine, 2-oxoglutarate 5-dioxygenase 2 [Source:MGI Symbol;Acc:MGI:1347007]	9	92542223	1	ENSM00250000001315	PROCOLLAGEN LYSINE 2 OXOGLUTARATE 5 DIOXYGENASE PRECURSOR EC_1.14.11.4 LYSYL HYDROXYLASE
Txnip	-1.70	2.69E-02	ENSMUSG000000038393	thioredoxin interacting protein [Source:MGI Symbol;Acc:MGI:1889549]	3	96557957	1	ENSM00500000269878	ARRESTIN DOMAIN CONTAINING
Satb1	-1.69	3.31E-02	ENSMUSG000000023927	special AT-rich sequence binding protein 1 [Source:MGI Symbol;Acc:MGI:105084]	17	51736187	-1	ENSM00250000003208	DNA BINDING SPECIAL AT RICH SEQUENCE BINDING
Flrt3	-1.69	8.81E-03	ENSMUSG000000051379	fibronectin leucine rich transmembrane protein 3 [Source:MGI Symbol;Acc:MGI:1918686]	2	140650914	-1	ENSM00250000003081	LEUCINE RICH REPEAT TRANSMEMBRANE PRECURSOR FIBRONECTIN DOMAIN CONTAINING LEUCINE RICH TRANSMEMBRANE

Pgk1-rs7	-1.69	3.52E-02	ENSMUSG00000066632	phosphoglycerate kinase-1, related sequence 7 [Source:MGI Symbol;Acc:MGI:97562]	12	10898566	-1	ENSMF00250000000826	PHOSPHOGLYCERATE KINASE EC_2.7.2.3
Ankrd50	-1.68	3.97E-02	ENSMUSG00000044864	ankyrin repeat domain 50 [Source:MGI Symbol;Acc:MGI:2139777]	3	38449261	-1	ENSMF00740001589110	ALPHA LT1A PRECURSOR ALPHA LT1A ALPHA ALPHA
Zcchc3	-1.68	3.98E-02	ENSMUSG00000074682	zinc finger, CCHC domain containing 3 [Source:MGI Symbol;Acc:MGI:1915167]	2	152411956	-1	ENSMF00360000110094	ZINC FINGER CCHC DOMAIN CONTAINING 3
Cdkn1a	-1.67	2.73E-02	ENSMUSG00000023067	cyclin-dependent kinase inhibitor 1A (P21) [Source:MGI Symbol;Acc:MGI:104556]	17	29090979	1	ENSMF00250000009219	CYCLIN DEPENDENT KINASE INHIBITOR 1 CDK INTERACTING 1 MELANOMA DIFFERENTIATION ASSOCIATED P21
Syne2	-1.67	2.03E-02	ENSMUSG00000063450	spectrin repeat containing, nuclear envelope 2 [Source:MGI Symbol;Acc:MGI:2449316]	12	75818134	1	ENSMF00250000000542	NESPRIN 2 NUCLEAR ENVELOPE SPECTRIN REPEAT 2 NUCLEUS AND ACTIN CONNECTING ELEMENT PROTEIN NUANCE SYNAPTIC NUCLEAR ENVELOPE 2 SYNE 2
9530068E07Rik	-1.66	2.35E-02	ENSMUSG00000036275	RIKEN cDNA 9530068E07 gene [Source:MGI Symbol;Acc:MGI:2654705]	11	52396428	1	ENSMF00250000007666	KERATINOCYTE ASSOCIATED TRANSMEMBRANE 2 PRECURSOR
Apop	-1.66	4.58E-02	ENSMUSG00000020609	apolipoprotein B [Source:MGI Symbol;Acc:MGI:88052]	12	7977648	1	ENSMF00740001589094	APOLIPOPROTEIN B 100 PRECURSOR APO B 100 [CONTAINS APOLIPOPROTEIN B 48 APO B 48]
Ltbp1	-1.65	8.96E-03	ENSMUSG00000001870	latent transforming growth factor beta binding protein 1 [Source:MGI Symbol;Acc:MGI:109151]	17	75005568	1	ENSMF00740001589166	LATENT TRANSFORMING GROWTH FACTOR BETA BINDING PRECURSOR LTBP
Ppp1r12a	-1.65	3.48E-03	ENSMUSG00000019907	protein phosphatase 1, regulatory (inhibitor) subunit 12A [Source:MGI Symbol;Acc:MGI:1309528]	10	108162400	1	ENSMF00500000269806	PHOSPHATASE 1 REGULATORY SUBUNIT 12A MYOSIN PHOSPHATASE TARGETING SUBUNIT 1 MYOSIN PHOSPHATASE TARGET SUBUNIT 1 PHOSPHATASE MYOSIN BINDING SUBUNIT
Gm12867	-1.64	2.20E-02	ENSMUSG00000086683	predicted gene 12867 [Source:MGI Symbol;Acc:MGI:3651003]	4	119130292	-1		
Steap2	-1.64	2.35E-02	ENSMUSG00000015653	six transmembrane epithelial antigen of prostate 2 [Source:MGI Symbol;Acc:MGI:1921301]	5	5664831	-1	ENSMF00250000001178	METALLOREDUCTASE EC_1.16.1.- SIX TRANSMEMBRANE EPITHELIAL ANTIGEN OF PROSTATE
Nrk	-1.63	2.86E-03	ENSMUSG00000052854	Nik related kinase [Source:MGI Symbol;Acc:MGI:1351326]	X	138914430	1	ENSMF00260000050335	KINASE EC_2.7.11.1 KINASE MAPK/ERK KINASE KINASE MEK KINASE KINASE MEKKK KINASE
Cdh3	-1.62	3.36E-02	ENSMUSG00000061048	cadherin 3 [Source:MGI Symbol;Acc:MGI:88356]	8	106510913	1	ENSMF00730001521172	CADHERIN PRECURSOR CADHERIN CADHERIN
Morf411	-1.62	7.38E-03	ENSMUSG00000062270	mortality factor 4 like 1 [Source:MGI Symbol;Acc:MGI:1096551]	9	90091671	-1	ENSMF00250000002633	MORTALITY FACTOR 4 MORF RELATED GENE TRANSCRIPTION FACTOR
Adamts9	-1.62	1.87E-02	ENSMUSG00000030022	a disintegrin-like and metallopeptidase (repolyisin type) with thrombospondin type 1 motif, 9 [Source:MGI Symbol;Acc:MGI:1916320]	6	92772699	-1	ENSMF00730001522056	A DISINTEGRIN AND METALLOPROTEINASE WITH THROMBOSPONDIN MOTIFS 20 PRECURSOR ADAM TS 20 ADAM TS20 ADAMTS 20 EC_3.4.24.-
Sec61a1	-1.60	1.03E-02	ENSMUSG00000030082	Sec61 alpha 1 subunit (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1858417]	6	88503601	-1	ENSMF00250000001640	TRANSPORT SEC61 SUBUNIT ALPHA
Filip1l	-1.60	8.89E-03	ENSMUSG00000043336	filamin A interacting protein 1-like [Source:MGI Symbol;Acc:MGI:1925999]	16	57353093	1	ENSMF00500000270371	FILAMIN A INTERACTING 1
Tgfbbr3	-1.59	3.50E-02	ENSMUSG00000029287	transforming growth factor, beta receptor III [Source:MGI Symbol;Acc:MGI:104637]	5	107106570	-1	ENSMF00250000005418	TRANSFORMING GROWTH FACTOR BETA RECEPTOR TYPE 3 PRECURSOR TGF BETA RECEPTOR TYPE 3 TGFR 3 BETAGLYCAN TRANSFORMING GROWTH FACTOR BETA RECEPTOR III TGF BETA RECEPTOR TYPE III
Arhgdia	-1.59	2.09E-02	ENSMUSG00000025132	Rho GDP dissociation inhibitor (GDI) alpha [Source:MGI Symbol;Acc:MGI:2178103]	11	120578104	-1	ENSMF00250000002426	RHO GDP DISSOCIATION INHIBITOR RHO GDI RHO GDI
Igf2	-1.59	7.70E-04	ENSMUSG00000048583	insulin-like growth factor 2 [Source:MGI Symbol;Acc:MGI:96434]	7	142650766	-1	ENSMF00500000271817	INSULIN GROWTH FACTOR II PRECURSOR IGF II [CONTAINS INSULIN GROWTH FACTOR II; PREPTIN]
Zeb1	-1.59	4.01E-02	ENSMUSG00000024238	zinc finger E-box binding homeobox 1 [Source:MGI Symbol;Acc:MGI:1344313]	18	5591860	1	ENSMF00250000001350	ZINC FINGER E BOX BINDING HOMEBOX 1 TRANSCRIPTION FACTOR 8 TCF 8
Vcan	-1.58	1.47E-03	ENSMUSG00000021614	versican [Source:MGI Symbol;Acc:MGI:102889]	13	89655312	-1	ENSMF00730001521436	CORE PRECURSOR CHONDROITIN SULFATE PROTEOGLYCAN
Tanc2	-1.58	1.84E-02	ENSMUSG00000053580	tetratricopeptide repeat, ankyrin repeat and coiled-coil containing 2 [Source:MGI Symbol;Acc:MGI:2444121]	11	105589986	1	ENSMF00250000001143	TETRATRICOPEPTIDE REPEAT ANKYRIN REPEAT AND COILED COIL DOMAIN CONTAINING

Hipk3	-1.57	4.90E-02	ENSMUSG00000027177	homeodomain interacting protein kinase 3 [Source:MGI Symbol;Acc:MGI:1314882]	2	104426481	-1	ENSMF00420000140522	HOMEODOMAIN INTERACTING KINASE EC_2.7.11.1
Meis2	-1.57	1.13E-02	ENSMUSG00000027210	Meis homeobox 2 [Source:MGI Symbol;Acc:MGI:108564]	2	115863064	-1	ENSMF00730001521384	HOMEBOX
Aldoa	-1.56	8.99E-03	ENSMUSG00000030695	aldolase A, fructose-bisphosphate [Source:MGI Symbol;Acc:MGI:87994]	7	126795234	-1	ENSMF00250000000488	FRUCTOSE BISPHOSPHATE ALDOLASE EC_4.1.2.13 TYPE ALDOLASE
Scd2	-1.56	7.28E-03	ENSMUSG00000025203	stearoyl-Coenzyme A desaturase 2 [Source:MGI Symbol;Acc:MGI:98240]	19	44293676	1	ENSMF00750001632354	ACYL COA DESATURASE EC_1.14.19.1 DELTA 9 DESATURASE DELTA 9 DESATURASE FATTY ACID DESATURASE STEAROYL COA DESATURASE
Clcn5	-1.55	4.60E-02	ENSMUSG00000004317	chloride channel 5 [Source:MGI Symbol;Acc:MGI:99486]	X	7153810	-1	ENSMF00280000058697	H + /CL EXCHANGE TRANSPORTER CHLORIDE CHANNEL CLC CHLORIDE TRANSPORTER CLC
Gm8203	-1.54	2.18E-02	ENSMUSG00000060214	predicted pseudogene 8203 [Source:MGI Symbol;Acc:MGI:3646499]	6	116173634	1		
Fstl1	-1.54	9.06E-03	ENSMUSG00000022816	follistatin-like 1 [Source:MGI Symbol;Acc:MGI:102793]	16	37776873	1	ENSMF00250000004661	FOLLISTATIN RELATED 1 PRECURSOR FOLLISTATIN 1
Kdm6b	-1.53	3.31E-02	ENSMUSG00000018476	KDM1 lysine (K)-specific demethylase 6B [Source:MGI Symbol;Acc:MGI:2448492]	11	69398508	-1	ENSMF00250000000912	HISTONE DEMETHYLASE UTY EC_1.14.11.- UBIQUITOUSLY TRANSCRIBED TPR ON THE Y CHROMOSOME UBIQUITOUSLY TRANSCRIBED Y CHROMOSOME TETRATRICOPEPTIDE REPEAT
Hirip3	-1.53	1.76E-02	ENSMUSG00000042606	HIRA interacting protein 3 [Source:MGI Symbol;Acc:MGI:2142364]	7	126861972	1	ENSMF00250000008953	HIRA INTERACTING 3
Cd44	-1.52	4.72E-02	ENSMUSG00000005087	CD44 antigen [Source:MGI Symbol;Acc:MGI:88338]	2	102811141	-1	ENSMF00670001235665	CD44 ANTIGEN PRECURSOR EXTRACELLULAR MATRIX RECEPTOR III ECMR III GP90 LYMPHOCYTE HOMING/ADHESION RECEPTOR HUTCH I HERMES ANTIGEN HYALURONATE RECEPTOR PHAGOCYTIC GLYCOPROTEIN 1 PGP 1 PHAGOCYTIC GLYCOPROTEIN I PGP I CD44 ANTIGEN
Rab7	-1.50	9.37E-03	ENSMUSG00000079477	RAB7, member RAS oncogene family [Source:MGI Symbol;Acc:MGI:105068]	6	87999106	-1	ENSMF00390000126319	RAS RELATED RAB
d14_decrease									
Gene Name	foldChange	padj	Ensembl Gene ID	Description	Chromosome Name	Gene Start (bp)	Strand	Ensembl Protein Family ID(s)	Ensembl Family Description
Mpl	-Inf	5.72E-04	ENSMUSG00000006389	myeloproliferative leukemia virus oncogene [Source:MGI Symbol;Acc:MGI:97076]	4	118442415	-1	ENSMF00250000007415	THROMBOPOIETIN RECEPTOR PRECURSOR TPO R MYELOPROLIFERATIVE LEUKEMIA PROTO ONCOGENE C MPL CD110 ANTIGEN
Ptgds	-Inf	9.04E-03	ENSMUSG00000015090	prostaglandin D2 synthase (brain) [Source:MGI Symbol;Acc:MGI:99261]	2	25466709	-1	ENSMF00500000272118	PROSTAGLANDIN H2 D ISOMERASE PRECURSOR EC_5.3.99.2 GLUTATHIONE INDEPENDENT PGD SYNTHASE LIPOCALIN TYPE PROSTAGLANDIN D SYNTHASE PROSTAGLANDIN D2 SYNTHASE PGD2 SYNTHASE PGDS PGDS2
Ahsg	-Inf	3.06E-02	ENSMUSG00000022868	alpha-2-HS-glycoprotein [Source:MGI Symbol;Acc:MGI:107189]	16	22892042	1	ENSMF00500000271269	ALPHA 2 HS GLYCOPROTEIN PRECURSOR FETUIN A
H2-M10.2	-Inf	4.13E-02	ENSMUSG00000023083	histocompatibility 2, M region locus 10.2 [Source:MGI Symbol;Acc:MGI:1276525]	17	36284227	-1	ENSMF00730001521062	HLA CLASS I HISTOCOMPATIBILITY ANTIGEN A ALPHA CHAIN PRECURSOR MHC CLASS I ANTIGEN
Klhl4	-Inf	2.17E-02	ENSMUSG00000025597	kelch-like 4 [Source:MGI Symbol;Acc:MGI:2442829]	X	114474333	1	ENSMF00730001521894	KELCH
Car9	-Inf	7.42E-04	ENSMUSG00000028463	carbonic anhydrase 9 [Source:MGI Symbol;Acc:MGI:2447188]	4	43506966	1	ENSMF00670001235433	CARBONIC ANHYDRASE PRECURSOR EC_4.2.1.1 CARBONATE DEHYDRATASE CARBONIC ANHYDRASE CA
Mylpf	-Inf	4.09E-02	ENSMUSG00000030672	myosin light chain, phosphorylatable, fast skeletal muscle [Source:MGI Symbol;Acc:MGI:97273]	7	127211608	1	ENSMF00730001521620	MYOSIN REGULATORY LIGHT CHAIN 2
Tnxb	-Inf	2.28E-02	ENSMUSG00000033327	tenascin XB [Source:MGI Symbol;Acc:MGI:1932137]	17	34670535	1	ENSMF00740001589132	TENASCIN PRECURSOR TN
Art3	-Inf	3.63E-02	ENSMUSG00000034842	ADP-ribosyltransferase 3 [Source:MGI Symbol;Acc:MGI:1202729]	5	92331827	1	ENSMF00500000271513	ECTO ADP RIBOSYLTRANSFERASE 3 PRECURSOR EC_2.4.2.31 ADP RIBOSYLTRANSFERASE C2 AND C3 TOXIN 3 ARTC3 MONO ADP RIBOSYL TRANSFERASE 3 NAD P + ARGININE ADP RIBOSYLTRANSFERASE 3

Zcchc5	-Inf	4.02E-03	ENSMUSG00000047686	zinc finger, CCHC domain containing 5 [Source:MGI Symbol;Acc:MGI:2685221]	X	106837082	-1	ENSMF00470000251613	ZINC FINGER CCHC DOMAIN CONTAINING 5
C130071C03Rik	-Inf	5.39E-03	ENSMUSG00000050334	RIKEN cDNA C130071C03 gene [Source:MGI Symbol;Acc:MGI:2443574]	13	83721381	1		
Gm25357	-Inf	1.64E-03	ENSMUSG00000064679	predicted gene, 25357 [Source:MGI Symbol;Acc:MGI:5455134]	12	109657125	1		
2310050B05Rik	-Inf	2.28E-02	ENSMUSG00000085779	RIKEN cDNA 2310050B05 gene [Source:MGI Symbol;Acc:MGI:1916928]	10	81194609	1		
Gm6910	-94.70	8.28E-09	ENSMUSG00000055763	predicted gene 6910 [Source:MGI Symbol;Acc:MGI:3648043]	13	66007672	1		
Plagl1	-92.91	2.68E-79	ENSMUSG00000019817	pleiomorphic adenoma gene-like 1 [Source:MGI Symbol;Acc:MGI:1100874]	10	13090691	1	ENSMF00730001522033	ZINC FINGER PLEIOMORPHIC ADENOMA
Emcn	-52.20	1.19E-05	ENSMUSG00000054690	endomucin [Source:MGI Symbol;Acc:MGI:1891716]	3	137341067	1	ENSMF00670001237003	ENDOMUCIN PRECURSOR ENDOMUCIN MUCIN 14 MUC 14
Atp6v0d2	-41.14	1.98E-21	ENSMUSG00000028238	ATPase, H+ transporting, lysosomal V0 subunit D2 [Source:MGI Symbol;Acc:MGI:1924415]	4	19876841	-1	ENSMF00250000003242	V TYPE PROTON ATPASE SUBUNIT D V ATPASE SUBUNIT D V ATPASE KDA SUBUNIT VACUOLAR PROTON PUMP SUBUNIT D G COUPLED RECEPTOR 98 PRECURSOR MONOGENIC AUDIOGENIC SEIZURE SUSCEPTIBILITY 1 VERY LARGE G COUPLED RECEPTOR 1
Gpr98	-38.51	8.88E-04	ENSMUSG00000069170	G protein-coupled receptor 98 [Source:MGI Symbol;Acc:MGI:1274784]	13	81095068	-1	ENSMF00250000002503	MONOGENIC AUDIOGENIC SEIZURE SUSCEPTIBILITY 1 VERY LARGE G COUPLED RECEPTOR 1
Vtn	-37.36	3.26E-04	ENSMUSG00000017344	vitronectin [Source:MGI Symbol;Acc:MGI:98940]	11	78499091	1	ENSMF00250000003087	VITRONECTIN PRECURSOR VN S SERUM SPREADING FACTOR
Mctp1	-32.28	2.36E-03	ENSMUSG00000021596	multiple C2 domains, transmembrane 1 [Source:MGI Symbol;Acc:MGI:1926021]	13	76384535	1	ENSMF00250000001118	MULTIPLE C2 AND TRANSMEMBRANE DOMAIN CONTAINING
MyI3	-29.28	9.11E-06	ENSMUSG00000059741	myosin, light polypeptide 3 [Source:MGI Symbol;Acc:MGI:97268]	9	110763646	1	ENSMF00250000000438	MYOSIN LIGHT CHAIN MYOSIN LIGHT CHAIN MYOSIN LIGHT CHAIN
AF357425	-27.84	1.07E-04	ENSMUSG00000088294	snoRNA AF357425 [Source:MGI Symbol;Acc:MGI:3053434]	12	109636012	1		
Actc1	-26.34	1.20E-41	ENSMUSG00000068614	actin, alpha, cardiac muscle 1 [Source:MGI Symbol;Acc:MGI:87905]	2	114047282	-1	ENSMF00730001521060	ACTIN
Rybp	-25.97	3.71E-12	ENSMUSG00000072872	RING1 and YY1 binding protein [Source:MGI Symbol;Acc:MGI:1929059]	6	100228566	-1	ENSMF006000000921629	RING1 AND YY1 BINDING DEATH EFFECTOR DOMAIN ASSOCIATED FACTOR DED ASSOCIATED FACTOR
Gm23508	-23.04	3.64E-02	ENSMUSG00000065013	predicted gene, 23508 [Source:MGI Symbol;Acc:MGI:5453285]	12	109653033	1		
Myh6	-22.51	3.28E-36	ENSMUSG00000040752	myosin, heavy polypeptide 6, cardiac muscle, alpha [Source:MGI Symbol;Acc:MGI:97255]	14	54941921	-1	ENSMF00250000000024	MYOSIN MYOSIN HEAVY CHAIN MYOSIN HEAVY CHAIN MUSCLE
Col15a1	-21.32	2.20E-02	ENSMUSG00000028339	collagen, type XV, alpha 1 [Source:MGI Symbol;Acc:MGI:88449]	4	47208161	1	ENSMF00740001589266	COLLAGEN ALPHA 1 XV CHAIN PRECURSOR[CONTAINS RESTIN ENDOSTATIN XV]
Gpr82	-20.62	2.82E-02	ENSMUSG00000047678	G protein-coupled receptor 82 [Source:MGI Symbol;Acc:MGI:2441734]	X	13661363	1	ENSMF00260000051557	PROBABLE G COUPLED RECEPTOR 82
Wdr17	-19.74	3.65E-02	ENSMUSG00000039375	WD repeat domain 17 [Source:MGI Symbol;Acc:MGI:1924662]	8	54629055	-1	ENSMF00250000004932	WD REPEAT CONTAINING 17
Ppp1r14a	-19.20	1.56E-03	ENSMUSG00000037166	protein phosphatase 1, regulatory (inhibitor) subunit 14A [Source:MGI Symbol;Acc:MGI:1931139]	7	29289320	1	ENSMF00500000278452	PHOSPHATASE 1 REGULATORY SUBUNIT 14A 17 KDA PKC POTENTIATED INHIBITORY OF PP1 KINASE C POTENTIATED INHIBITOR OF 17 KDA CPI 17
Ctsk	-19.08	5.54E-22	ENSMUSG00000028111	cathepsin K [Source:MGI Symbol;Acc:MGI:107823]	3	95499286	1	ENSMF00250000000108	PRECURSOR
Gpihbp1	-18.86	4.60E-02	ENSMUSG00000022579	GPI-anchored HDL-binding protein 1 [Source:MGI Symbol;Acc:MGI:1915703]	15	75596658	1	ENSMF00670001242333	GLYCOSYLPHOSPHATIDYLINOSITOL ANCHORED HIGH DENSITY LIPOPROTEIN BINDING 1 PRECURSOR GPI HBP1 GPI ANCHORED HDL BINDING 1 HIGH DENSITY LIPOPROTEIN BINDING 1
Ddx3y	-18.50	2.28E-18	ENSMUSG00000069045	DEAD (Asp-Glu-Ala-Asp) box polypeptide 3, Y-linked [Source:MGI Symbol;Acc:MGI:1349406]	Y	1260715	-1	ENSMF00730001521315	ATP DEPENDENT RNA HELICASE EC_3.6.4.13

Clec5a	-18.21	1.07E-04	ENSMUSG00000029915	C-type lectin domain family 5, member a [Source:MGI Symbol;Acc:MGI:1345151]	6	40574894	-1	ENSMF00430000230340	C TYPE LECTIN DOMAIN FAMILY 5 MEMBER A C TYPE LECTIN SUPERFAMILY MEMBER 5 MYELOID DAP12 ASSOCIATING LECTIN 1 MDL 1
Myh7	-18.01	4.10E-17	ENSMUSG00000053093	myosin, heavy polypeptide 7, cardiac muscle, beta [Source:MGI Symbol;Acc:MGI:2155600]	14	54970688	-1	ENSMF00250000000024	MYOSIN MYOSIN HEAVY CHAIN MYOSIN HEAVY CHAIN MUSCLE
Itgal	-17.63	2.86E-04	ENSMUSG00000030830	integrin alpha L [Source:MGI Symbol;Acc:MGI:96606]	7	127296260	1	ENSMF00730001521375	INTEGRIN ALPHA PRECURSOR CD11 ANTIGEN FAMILY MEMBER GLYCOPROTEIN ALPHA LEUKOCYTE ANTIGEN
Gm23474	-17.06	2.03E-12	ENSMUSG00000089509	predicted gene, 23474 [Source:MGI Symbol;Acc:MGI:5453251]	12	109633768	1		
Igsf5	-16.96	7.31E-06	ENSMUSG00000000159	immunoglobulin superfamily, member 5 [Source:MGI Symbol;Acc:MGI:1919308]	16	96361668	1	ENSMF00500000273376	IMMUNOGLOBULIN SUPERFAMILY MEMBER 5 IGSF5 JUNCTIONAL ADHESION MOLECULE 4 JAM 4
DQ267100	-16.74	3.81E-05	ENSMUSG00000084549	snoRNA DQ267100 [Source:MGI Symbol;Acc:MGI:5439865]	12	109649617	1		
Alox5ap	-16.31	3.27E-03	ENSMUSG00000060063	arachidonate 5-lipoxygenase activating protein [Source:MGI Symbol;Acc:MGI:107505]	5	149265058	1	ENSMF00500000272786	ARACHIDONATE 5 LIPOXYGENASE ACTIVATING FLAP MK 886 BINDING
Gm24598	-16.11	3.26E-04	ENSMUSG00000084459	predicted gene, 24598 [Source:MGI Symbol;Acc:MGI:5454375]	X	64496584	1		
Htra3	-15.97	7.39E-03	ENSMUSG00000029096	HtrA serine peptidase 3 [Source:MGI Symbol;Acc:MGI:1925808]	5	35652041	-1	ENSMF00250000001030	SERINE PROTEASE HTRA2 MITOCHONDRIAL PRECURSOR EC_3.4.21.108 HIGH TEMPERATURE REQUIREMENT A2
Plcxd3	-15.40	1.33E-02	ENSMUSG00000049148	phosphatidylinositol-specific phospholipase C, X domain containing 3 [Source:MGI Symbol;Acc:MGI:2442605]	15	4375491	1	ENSMF00500000271247	PI PLC X DOMAIN CONTAINING
Hpcal4	-15.04	1.04E-02	ENSMUSG00000046093	hippocalcin-like 4 [Source:MGI Symbol;Acc:MGI:2157521]	4	123183227	1	ENSMF00500000269655	UNKNOWN
Ptpn22	-14.63	8.25E-04	ENSMUSG00000027843	protein tyrosine phosphatase, non-receptor type 22 (lymphoid) [Source:MGI Symbol;Acc:MGI:107170]	3	103859795	1	ENSMF00730001521639	TYROSINE PHOSPHATASE NON RECEPTOR TYPE EC_3.1.3.48 PHOSPHATASE
Meg3	-14.18	1.05E-56	ENSMUSG00000021268	maternally expressed 3 [Source:MGI Symbol;Acc:MGI:1202886]	12	109541001	1		
St8sia3	-14.06	2.14E-02	ENSMUSG00000056812	ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 3 [Source:MGI Symbol;Acc:MGI:106019]	18	64254359	1	ENSMF00600000921256	CMP N ACETYLNEURAMINATE POLY ALPHA 2 8 SIALYLTRANSFERASE EC_2.4.99.- ALPHA 2 8 SIALYLTRANSFERASE 8D POLYSIALYLTRANSFERASE 1 SIALYLTRANSFERASE 8D SIAT8 D SIALYLTRANSFERASE ST8SIA IV ST8SIAIV
Gm24895	-13.93	2.49E-08	ENSMUSG00000084691	predicted gene, 24895 [Source:MGI Symbol;Acc:MGI:5454672]	12	109646129	1		
MyI2	-13.76	7.32E-08	ENSMUSG00000013936	myosin, light polypeptide 2, regulatory, cardiac, slow [Source:MGI Symbol;Acc:MGI:97272]	5	122100951	1	ENSMF00730001521620	MYOSIN REGULATORY LIGHT CHAIN 2
Cd109	-13.04	3.93E-04	ENSMUSG00000046186	CD109 antigen [Source:MGI Symbol;Acc:MGI:2445221]	9	78615546	1	ENSMF00730001521791	CD109 ANTIGEN PRECURSOR ALPHA 2 MACROGLOBULIN CD109 ANTIGEN PHOSPHOGLYCERATE MUTASE EC_3.1.3.13 EC_5.4.2.- 11 EC_5.4.-.- 2 4 BPG DEPENDENT PGAM PHOSPHOGLYCERATE MUTASE ISOZYME PGAM
Pgam2	-12.64	4.21E-02	ENSMUSG00000020475	phosphoglycerate mutase 2 [Source:MGI Symbol;Acc:MGI:1933118]	11	5801640	-1	ENSMF00250000001043	PGAM PHOSPHOGLYCERATE MUTASE ISOZYME PGAM
Serpina6	-12.54	4.23E-02	ENSMUSG00000060807	serine (or cysteine) peptidase inhibitor, clade A, member 6 [Source:MGI Symbol;Acc:MGI:88278]	12	103646630	-1	ENSMF00250000000235	PRECURSOR
Ambp	-12.47	6.33E-03	ENSMUSG00000028356	alpha 1 microglobulin/bikunin [Source:MGI Symbol;Acc:MGI:88002]	4	63143275	-1	ENSMF00500000271237	AMBP PRECURSOR[CONTAINS ALPHA 1 MICROGLOBULIN; INTER ALPHA TRYPSIN INHIBITOR LIGHT CHAIN ITI LC BIKUNIN HI 30 ; TRYPSTATIN]
Clec4n	-12.41	1.37E-04	ENSMUSG00000023349	C-type lectin domain family 4, member n [Source:MGI Symbol;Acc:MGI:1861231]	6	123229843	1	ENSMF00500000271808	C TYPE LECTIN DOMAIN FAMILY 6 MEMBER A C TYPE LECTIN SUPERFAMILY MEMBER 10 DENDRITIC CELL ASSOCIATED C TYPE LECTIN 2 DC ASSOCIATED C TYPE LECTIN 2 DECTIN 2

Gm23600	-12.34	1.48E-05	ENSMUSG00000087885	predicted gene, 23600 [Source:MGI Symbol;Acc:MGI:5453377]	12	109643748	1		
AF357355	-11.94	2.66E-05	ENSMUSG00000064621	snoRNA AF357355 [Source:MGI Symbol;Acc:MGI:3843217]	12	109654627	1		
Gm22205	-11.49	1.48E-02	ENSMUSG00000084604	predicted gene, 22205 [Source:MGI Symbol;Acc:MGI:5451982]	12	109688055	1		
Fabp4	-10.84	1.31E-03	ENSMUSG00000062515	fatty acid binding protein 4, adipocyte [Source:MGI Symbol;Acc:MGI:88038]	3	10204347	-1	ENSMF00670001235367	FATTY ACID BINDING PROTEIN TYPE FATTY ACID BINDING FABP FATTY ACID BINDING
Pcp4	-10.84	1.36E-03	ENSMUSG00000090223	Purkinje cell protein 4 [Source:MGI Symbol;Acc:MGI:97509]	16	96467606	1	ENSMF00560000777821	UNKNOWN
Sqrdl	-10.69	3.38E-02	ENSMUSG00000005803	sulfide quinone reductase-like (yeast) [Source:MGI Symbol;Acc:MGI:1929899]	2	122765237	1	ENSMF00250000003266	SULFIDE:QUINONE OXIDOREDUCTASE MITOCHONDRIAL PRECURSOR EC 1
Gm23912	-10.49	2.05E-03	ENSMUSG00000077879	predicted gene, 23912 [Source:MGI Symbol;Acc:MGI:5453689]	12	109618114	1		
Slc9b2	-9.99	1.46E-02	ENSMUSG00000037994	solute carrier family 9, subfamily B (NHA2, cation proton antiporter 2), member 2 [Source:MGI Symbol;Acc:MGI:2140077]	3	135307700	1	ENSMF00250000001905	MITOCHONDRIAL SODIUM/HYDROGEN EXCHANGER 9B2 MITOCHONDRIAL NA + /H + EXCHANGER NHA2 NA + /H + EXCHANGER DOMAIN CONTAINING 2 NHE DOMAIN CONTAINING 2 SODIUM/HYDROGEN EXCHANGER DOMAIN CONTAINING 2 SOLUTE CARRIER FAMILY 9 SUBFAMILY B MEMBER 2
Chd5	-9.78	2.57E-04	ENSMUSG00000005045	chromodomain helicase DNA binding protein 5 [Source:MGI Symbol;Acc:MGI:3036258]	4	152338651	1	ENSMF00730001521383	CHROMODOMAIN HELICASE DNA BINDING EC_3.6.4.12 ATP DEPENDENT HELICASE
Dpep2	-9.61	3.75E-03	ENSMUSG00000053687	dipeptidase 2 [Source:MGI Symbol;Acc:MGI:2442042]	8	105984944	-1	ENSMF00250000001170	DIPEPTIDASE EC_3.4.13.19
Tm4sf5	-9.44	2.09E-07	ENSMUSG00000018919	transmembrane 4 superfamily member 5 [Source:MGI Symbol;Acc:MGI:1922854]	11	70505244	1	ENSMF005000000273589	TRANSMEMBRANE 4 L6 FAMILY MEMBER 5
Lyz2	-9.40	5.02E-11	ENSMUSG00000069516	lysozyme 2 [Source:MGI Symbol;Acc:MGI:96897]	10	117277334	-1	ENSMF005000000270117	LYSOZYME C EC_3.2.1.17 1 4 BETA N ACETYLMURAMIDASE C
Rbm24	-8.58	3.31E-05	ENSMUSG00000038132	RNA binding motif protein 24 [Source:MGI Symbol;Acc:MGI:3610364]	13	46418300	1	ENSMF00250000001992	RNA BINDING RNA BINDING MOTIF
Clec11a	-8.21	3.74E-02	ENSMUSG00000004473	C-type lectin domain family 11, member a [Source:MGI Symbol;Acc:MGI:1298219]	7	44303770	-1	ENSMF00380000124768	C TYPE LECTIN DOMAIN FAMILY 11 MEMBER A PRECURSOR LYMPHOCYTE SECRETED C TYPE LECTIN STEM CELL GROWTH FACTOR
Pitpnm3	-8.15	3.75E-02	ENSMUSG00000040543	PITPNM family member 3 [Source:MGI Symbol;Acc:MGI:2685726]	11	72047528	-1	ENSMF005000000269931	MEMBRANE ASSOCIATED PHOSPHATIDYLINOSITOL TRANSFER PHOSPHATIDYLINOSITOL TRANSFER PROTEIN MEMBRANE ASSOCIATED PITPNM PYK2 N TERMINAL DOMAIN INTERACTING RECEPTOR NIR
Acp5	-8.15	2.07E-16	ENSMUSG00000001348	acid phosphatase 5, tartrate resistant [Source:MGI Symbol;Acc:MGI:87883]	9	22126731	-1	ENSMF00250000006122	TARTRATE RESISTANT ACID PHOSPHATASE TYPE 5 PRECURSOR TR AP EC_3.1.3.2 TARTRATE RESISTANT ACID ATPASE TRATPASE TYPE 5 ACID PHOSPHATASE
Ms4a7	-8.03	3.10E-04	ENSMUSG00000024672	membrane-spanning 4-domains, subfamily A, member 7 [Source:MGI Symbol;Acc:MGI:1918846]	19	11321039	-1	ENSMF005000000275711	MEMBRANE SPANNING 4 DOMAINS SUBFAMILY A MEMBER 7 CD20 ANTIGEN 4 CD20/FC EPSILON RI BETA FAMILY MEMBER 4 FOUR SPAN TRANSMEMBRANE 2
Traf1	-7.85	1.05E-02	ENSMUSG00000026875	TNF receptor-associated factor 1 [Source:MGI Symbol;Acc:MGI:101836]	2	34941750	-1	ENSMF005000000269755	TNF RECEPTOR ASSOCIATED FACTOR
Pygm	-7.85	4.55E-02	ENSMUSG00000032648	muscle glycogen phosphorylase [Source:MGI Symbol;Acc:MGI:97830]	19	6384399	1	ENSMF00250000001172	GLYCOGEN PHOSPHORYLASE FORM EC_2.4.1.1
Clec4a2	-7.50	4.11E-05	ENSMUSG00000030148	C-type lectin domain family 4, member a2 [Source:MGI Symbol;Acc:MGI:1349412]	6	123106428	1	ENSMF005000000271140	C TYPE LECTIN DOMAIN FAMILY 4 MEMBER A C TYPE LECTIN SUPERFAMILY MEMBER 6 DENDRITIC CELL
Trpm5	-7.40	6.32E-05	ENSMUSG00000009246	transient receptor potential cation channel, subfamily M, member 5 [Source:MGI Symbol;Acc:MGI:1861718]	7	143069153	-1	ENSMF00730001521708	TRANSIENT RECEPTOR POTENTIAL CATION CHANNEL SUBFAMILY M MEMBER LONG TRANSIENT RECEPTOR POTENTIAL CHANNEL LTRPC
Stap1	-7.37	1.24E-02	ENSMUSG00000029254	signal transducing adaptor family member 1 [Source:MGI Symbol;Acc:MGI:1926193]	5	86071746	1	ENSMF005000000272876	SIGNAL TRANSDUCING ADAPTOR 1 STAP 1 STEM CELL ADAPTOR 1

Afp	-6.87	5.09E-10	ENSMUSG00000054932	alpha fetoprotein [Source:MGI Symbol;Acc:MGI:87951]	5	90490714	1	ENSMF00250000001052	PRECURSOR
Hba-x	-6.73	7.45E-03	ENSMUSG00000055609	hemoglobin X, alpha-like embryonic chain in Hba complex [Source:MGI Symbol;Acc:MGI:96019]	11	32276400	1	ENSMF00500000269637	HEMOGLOBIN SUBUNIT ALPHA ALPHA GLOBIN HEMOGLOBIN ALPHA CHAIN
Ttyh1	-6.51	3.03E-10	ENSMUSG00000030428	tweety homolog 1 (Drosophila) [Source:MGI Symbol;Acc:MGI:1889007]	7	4119408	1	ENSMF00250000001068	TWEETY HOMOLOG
Ttn	-6.38	3.15E-25	ENSMUSG00000051747	titin [Source:MGI Symbol;Acc:MGI:98864]	2	76703980	-1	ENSMF00740001589077	EC_2.7.11.1
Eltld1	-6.28	1.68E-03	ENSMUSG00000039167	EGF, latrophilin seven transmembrane domain containing 1 [Source:MGI Symbol;Acc:MGI:2655562]	3	151437887	1	ENSMF00260000050328	LATROPHILIN
Alb	-6.28	5.87E-03	ENSMUSG00000029368	albumin [Source:MGI Symbol;Acc:MGI:87991]	5	90460889	1	ENSMF00250000001052	PRECURSOR
Rtl1	-6.15	1.36E-09	ENSMUSG00000085925	retrotransposon-like 1 [Source:MGI Symbol;Acc:MGI:2656842]	12	109589194	-1	ENSMF00500000275807	RETROTRANSPON 1 MAMMALIAN RETROTRANSPON DERIVED 1 PATERNALLY EXPRESSED GENE 11 RETROTRANSPON DERIVED PEG11
Hrc	-6.10	5.27E-03	ENSMUSG00000038239	histidine rich calcium binding protein [Source:MGI Symbol;Acc:MGI:96226]	7	45335290	1	ENSMF00250000007393	SARCOPLASMIC RETICULUM HISTIDINE RICH CALCIUM BINDING PRECURSOR
Itgb2	-6.01	1.60E-05	ENSMUSG00000000290	integrin beta 2 [Source:MGI Symbol;Acc:MGI:96611]	10	77530252	1	ENSMF00730001521210	INTEGRIN BETA PRECURSOR SUBUNIT BETA SUBUNIT BETA ANTIGEN
Stt18	-5.95	8.91E-03	ENSMUSG00000033740	suppression of tumorigenicity 18 [Source:MGI Symbol;Acc:MGI:2446700]	1	6487231	1	ENSMF00740001589218	MYELIN TRANSCRIPTION FACTOR 1 MYT1
Ccdc57	-5.83	2.81E-02	ENSMUSG00000048445	coiled-coil domain containing 57 [Source:MGI Symbol;Acc:MGI:1918526]	11	120826529	-1	ENSMF00250000009383	COILED COIL DOMAIN CONTAINING 57
Scml4	-5.83	2.07E-02	ENSMUSG00000044770	sex comb on midleg-like 4 (Drosophila) [Source:MGI Symbol;Acc:MGI:2446140]	10	42860370	1	ENSMF00250000001294	SEX COMB ON MIDLEG
Uty	-5.80	2.41E-07	ENSMUSG00000068457	ubiquitously transcribed tetratricopeptide repeat gene, Y chromosome [Source:MGI Symbol;Acc:MGI:894810]	Y	1096861	-1	ENSMF00250000000912	HISTONE DEMETHYLASE UTY EC_1.14.11.- UBIQUITOUSLY TRANSCRIBED TPR ON THE Y CHROMOSOME UBIQUITOUSLY TRANSCRIBED Y CHROMOSOME TETRATRICOPEPTIDE REPEAT
Mpeg1	-5.67	6.23E-03	ENSMUSG00000046805	macrophage expressed gene 1 [Source:MGI Symbol;Acc:MGI:1333743]	19	12460779	1	ENSMF00250000007015	MACROPHAGE EXPRESSED GENE 1 PRECURSOR MACROPHAGE GENE 1 MPG 1
Rorc	-5.64	5.55E-04	ENSMUSG00000028150	RAR-related orphan receptor gamma [Source:MGI Symbol;Acc:MGI:104856]	3	94372794	1	ENSMF00250000000937	NUCLEAR RECEPTOR ROR NUCLEAR RECEPTOR RZR NUCLEAR RECEPTOR SUBFAMILY 1 GROUP F MEMBER RETINOID RELATED ORPHAN RECEPTOR
Actn2	-5.46	6.60E-03	ENSMUSG00000052374	actinin alpha 2 [Source:MGI Symbol;Acc:MGI:109192]	13	12269426	-1	ENSMF00440000236866	ALPHA ACTININ F ACTIN CROSS LINKING NON MUSCLE ALPHA ACTININ
Gm15851	-5.44	1.98E-02	ENSMUSG00000090208	predicted gene 15851 [Source:MGI Symbol;Acc:MGI:3801734]	1	133906531	1		
Myom1	-5.43	5.90E-08	ENSMUSG00000024049	myomesin 1 [Source:MGI Symbol;Acc:MGI:1341430]	17	71019521	1	ENSMF00260000050477	MYOMESIN MYOMESIN FAMILY MEMBER
Rbfox1	-5.41	2.47E-02	ENSMUSG00000008658	RNA binding protein, fox-1 homolog (C. elegans) 1 [Source:MGI Symbol;Acc:MGI:1926224]	16	6809222	1	ENSMF00250000000843	RNA BINDING FOX 1 HOMOLOG 1 ATAXIN 2 BINDING 1 FOX 1 HOMOLOG
Prelp	-5.25	1.67E-05	ENSMUSG00000041577	proline arginine-rich end leucine-rich repeat [Source:MGI Symbol;Acc:MGI:2151110]	1	133910304	-1	ENSMF00370000118606	PRECURSOR KERATAN SULFATE PROTEOGLYCAN
C8g	-5.24	1.59E-02	ENSMUSG00000015083	complement component 8, gamma polypeptide [Source:MGI Symbol;Acc:MGI:88237]	2	25498651	-1	ENSMF00500000273486	COMPLEMENT COMPONENT C8 GAMMA CHAIN PRECURSOR
Mmp12	-5.16	1.47E-02	ENSMUSG00000049723	matrix metalloproteinase 12 [Source:MGI Symbol;Acc:MGI:97005]	9	7344381	1	ENSMF00400000131728	MATRIX METALLOPROTEINASE MMP
AB124611	-5.13	1.32E-02	ENSMUSG00000057191	cDNA sequence AB124611 [Source:MGI Symbol;Acc:MGI:3043001]	9	21526176	1	ENSMF00250000019864	HIDE1 PRECURSOR
Prkar2b	-5.03	6.62E-04	ENSMUSG00000002997	protein kinase, cAMP dependent regulatory, type II beta [Source:MGI Symbol;Acc:MGI:97760]	12	31958476	-1	ENSMF00730001521993	CAMP DEPENDENT KINASE TYPE II REGULATORY SUBUNIT
Celsr2	-4.95	4.20E-03	ENSMUSG00000068740	cadherin, EGF LAG seven-pass G-type receptor 2 (flamingo homolog, Drosophila) [Source:MGI Symbol;Acc:MGI:1858235]	3	108390851	-1	ENSMF00560000770988	CADHERIN EGF LAG SEVEN PASS G TYPE RECEPTOR MULTIPLE EPIDERMAL GROWTH FACTOR DOMAINS MULTIPLE EGF DOMAINS

Esm1	-4.88	1.46E-02	ENSMUSG00000042379	endothelial cell-specific molecule 1 [Source:MGI Symbol;Acc:MGI:1918940]	13	113209659	1	ENSM00250000009559	ENDOTHELIAL CELL SPECIFIC MOLECULE 1 PRECURSOR ESM 1
Clec12a	-4.84	3.17E-04	ENSMUSG00000053063	C-type lectin domain family 12, member a [Source:MGI Symbol;Acc:MGI:3040968]	6	129342691	1	ENSM00500000274062	C TYPE LECTIN DOMAIN FAMILY 12 MEMBER A C TYPE LECTIN MOLECULE 1 CLL 1 MYELOID INHIBITORY C TYPE LECTIN RECEPTOR MICL
Trf	-4.80	1.89E-03	ENSMUSG00000032554	transferrin [Source:MGI Symbol;Acc:MGI:98821]	9	103204001	-1	ENSM00250000000343	PRECURSOR
Otx2	-4.70	1.32E-02	ENSMUSG00000021848	orthodenticle homolog 2 (Drosophila) [Source:MGI Symbol;Acc:MGI:97451]	14	48657679	-1	ENSM00500000269876	HOMEODOMAIN
Lyve1	-4.67	4.76E-03	ENSMUSG00000030787	lymphatic vessel endothelial hyaluronan receptor 1 [Source:MGI Symbol;Acc:MGI:2136348]	7	110850607	-1	ENSM002500000008298	LYMPHATIC VESSEL ENDOTHELIAL HYALURONIC ACID RECEPTOR 1 PRECURSOR LYVE 1 CELL SURFACE RETENTION SEQUENCE BINDING 1 CRSHP 1 EXTRACELLULAR LINK DOMAIN CONTAINING 1
6330403K07Rik	-4.65	9.48E-08	ENSMUSG00000018451	RIKEN cDNA 6330403K07 gene [Source:MGI Symbol;Acc:MGI:1918001]	11	71031941	-1		
Tlr13	-4.62	2.54E-02	ENSMUSG00000033777	toll-like receptor 13 [Source:MGI Symbol;Acc:MGI:3045213]	X	106143204	1	ENSM00500000272137	TOLL RECEPTOR 13 PRECURSOR
Fam189b	-4.60	5.67E-03	ENSMUSG00000032657	family with sequence similarity 189, member B [Source:MGI Symbol;Acc:MGI:1915771]	3	89183143	1	ENSM00250000004648	UNKNOWN
Fgb	-4.53	3.78E-02	ENSMUSG00000033831	fibrinogen beta chain [Source:MGI Symbol;Acc:MGI:99501]	3	83042247	-1	ENSM00500000270953	FIBRINOGEN BETA CHAIN FIBRINOPEPTIDE B; FIBRINOGEN BETA CHAIN]
Syk	-4.50	1.61E-03	ENSMUSG00000021457	spleen tyrosine kinase [Source:MGI Symbol;Acc:MGI:99515]	13	52583173	1	ENSM00260000050604	TYROSINE KINASE SYK EC 2.7.10.2 SPLEEN TYROSINE KINASE
Flrt1	-4.48	4.72E-02	ENSMUSG00000047787	fibronectin leucine rich transmembrane protein 1 [Source:MGI Symbol;Acc:MGI:3026647]	19	7092014	-1	ENSM00250000003081	LEUCINE RICH REPEAT TRANSMEMBRANE PRECURSOR FIBRONECTIN DOMAIN CONTAINING LEUCINE RICH TRANSMEMBRANE
Mybpc3	-4.46	4.01E-02	ENSMUSG00000002100	myosin binding protein C, cardiac [Source:MGI Symbol;Acc:MGI:102844]	2	91118144	1	ENSM00740001589136	MYOSIN BINDING C TYPE MYBP C C PROTEIN MUSCLE
Hlf	-4.39	3.05E-15	ENSMUSG00000003949	hepatic leukemia factor [Source:MGI Symbol;Acc:MGI:96108]	11	90336536	-1	ENSM00250000001169	THYROTROPH EMBRYONIC FACTOR
Cfp	-4.37	2.90E-03	ENSMUSG00000001128	complement factor properdin [Source:MGI Symbol;Acc:MGI:97545]	X	20925454	-1	ENSM00500000272133	PROPERDIN PRECURSOR COMPLEMENT FACTOR P
C77370	-4.33	4.12E-03	ENSMUSG00000046449	expressed sequence C77370 [Source:MGI Symbol;Acc:MGI:2148050]	X	104077434	-1	ENSM00250000008212	UNCHARACTERIZED
Penk	-4.20	2.90E-02	ENSMUSG00000045573	preproenkephalin [Source:MGI Symbol;Acc:MGI:104629]	4	4133531	-1	ENSM00250000002448	PROENKEPHALIN A PRECURSOR[CONTAINS SYNENKEPHALIN; MET ENKEPHALIN OPIOID GROWTH FACTOR OGF ; PENK 114 133 ; PENK 143 ; MET ENKEPHALIN ARG GLY LEU; LEU ENKEPHALIN; PENK ; MET ENKEPHALIN ARG PHE]
Colec11	-4.10	1.89E-02	ENSMUSG00000036655	collectin sub-family member 11 [Source:MGI Symbol;Acc:MGI:1918943]	12	28594173	-1	ENSM00500000270764	COLLECTIN PRECURSOR COLLECTIN 1 CL
Pamr1	-4.02	5.87E-03	ENSMUSG00000027188	peptidase domain containing associated with muscle regeneration 1 [Source:MGI Symbol;Acc:MGI:2445082]	2	102550012	1	ENSM00250000005055	INACTIVE SERINE PROTEASE PAMR1 PRECURSOR PEPTIDASE DOMAIN CONTAINING ASSOCIATED WITH MUSCLE REGENERATION 1 REGENERATION ASSOCIATED MUSCLE PROTEASE HOMOLOG
Sorbs2	-3.92	2.36E-05	ENSMUSG00000031626	sorbin and SH3 domain containing 2 [Source:MGI Symbol;Acc:MGI:1924574]	8	45507788	1	ENSM00550000743175	SORBIN AND SH3 DOMAIN CONTAINING 2 ARG/ABL INTERACTING 2 ARGBP2
Mthfs	-3.91	1.56E-02	ENSMUSG00000066442	5, 10-methenyltetrahydrofolate synthetase [Source:MGI Symbol;Acc:MGI:1340032]	9	89199379	1	ENSM00500000272413	5 FORMYLTETRAHYDROFOLATE CYCLO LIGASE EC 6.3.3.2 5 10 METHENYL TETRAHYDROFOLATE SYNTHETASE MTHFS METHENYL THF SYNTHETASE
S100a16	-3.91	1.00E-02	ENSMUSG00000074457	S100 calcium binding protein A16 [Source:MGI Symbol;Acc:MGI:1915110]	3	90537254	1	ENSM00600000921934	S100 A16 S100 CALCIUM BINDING A16
Fcgrt	-3.88	1.41E-02	ENSMUSG00000003420	Fc receptor, IgG, alpha chain transporter [Source:MGI Symbol;Acc:MGI:103017]	7	45092993	-1	ENSM00320000100198	IGG RECEPTOR FCRN LARGE SUBUNIT P51 PRECURSOR FCRN IGG FC FRAGMENT RECEPTOR TRANSPORTER ALPHA CHAIN NEONATAL FC RECEPTOR
Mmp9	-3.87	5.62E-07	ENSMUSG00000017737	matrix metalloproteinase 9 [Source:MGI Symbol;Acc:MGI:97011]	2	164940780	1	ENSM00260000050469	MATRIX METALLOPROTEINASE 9 PRECURSOR MMP 9 EC 3.4.24.35.92 KDA GELATINASE 92 KDA TYPE IV COLLAGENASE GELATINASE B GELB

Gap43	-3.86	3.31E-05	ENSMUSG00000047261	growth associated protein 43 [Source:MGI Symbol;Acc:MGI:95639]	16	42248442	-1	ENSM00250000005389	NEUROMODULIN AXONAL MEMBRANE GAP 43 GROWTH ASSOCIATED 43
Elavl2	-3.85	1.92E-02	ENSMUSG00000008489	ELAV (embryonic lethal, abnormal vision, Drosophila)-like 2 (Hu antigen B) [Source:MGI Symbol;Acc:MGI:1100887]	4	91250763	-1	ENSM00250000000588	ELAV
Tnni3	-3.85	1.95E-02	ENSMUSG000000035458	troponin 1, cardiac 3 [Source:MGI Symbol;Acc:MGI:98783]	7	4518305	-1	ENSM00670001235399	TROPONIN I MUSCLE TROPONIN I
Mcaml	-3.83	3.39E-05	ENSMUSG000000032135	melanoma cell adhesion molecule [Source:MGI Symbol;Acc:MGI:1933966]	9	44134469	1	ENSM005000000271112	CELL SURFACE GLYCOPROTEIN MUC18 PRECURSOR MELANOMA CELL ADHESION MOLECULE MELANOMA ASSOCIATED ANTIGEN MUC18 CD146 ANTIGEN
Emilin2	-3.81	1.02E-02	ENSMUSG000000024053	elastin microfibril interfacer 2 [Source:MGI Symbol;Acc:MGI:2389136]	17	71252176	-1	ENSM002500000004424	EMILIN 2 PRECURSOR ELASTIN MICROFIBRIL INTERFACE LOCATED 2 ELASTIN MICROFIBRIL INTERFACER 2
Epha3	-3.78	3.17E-08	ENSMUSG000000052504	Eph receptor A3 [Source:MGI Symbol;Acc:MGI:99612]	16	63543538	-1	ENSM00730001521142	EPHRIN TYPE A RECEPTOR PRECURSOR EC_2.7.10.1 KINASE
Ccl9	-3.75	1.26E-02	ENSMUSG000000019122	chemokine (C-C motif) ligand 9 [Source:MGI Symbol;Acc:MGI:104533]	11	83572919	-1	ENSM005000000283516	C C MOTIF CHEMOKINE 9 PRECURSOR CCF18 MACROPHAGE INFLAMMATORY 1 GAMMA MIP 1 GAMMA MACROPHAGE INFLAMMATORY RELATED 2 MRP 2 SMALL INDUCIBLE CYTOKINE A9 [CONTAINS CCL9 29 101 ; CCL9 30 101 ; CCL9 31 101]
Fgd5	-3.66	4.02E-02	ENSMUSG000000034037	FYVE, RhoGEF and PH domain containing 5 [Source:MGI Symbol;Acc:MGI:2443369]	6	91978878	1	ENSM00730001522245	FYVE RHOGEF AND PH DOMAIN CONTAINING ZINC FINGER FYVE DOMAIN CONTAINING
Medag	-3.63	3.68E-04	ENSMUSG000000029659	mesenteric estrogen dependent adipogenesis [Source:MGI Symbol;Acc:MGI:1917967]	5	149411749	1	ENSM002500000007718	MESENTERIC ESTROGEN DEPENDENT ADIPOGENESIS ACTIVATED IN W/WV MOUSE STOMACH 3 MESENTERIC ESTROGEN DEPENDENT ADIPOSE 4 MEDA 4
Laptm5	-3.55	1.78E-07	ENSMUSG000000028581	lysosomal-associated protein transmembrane 5 [Source:MGI Symbol;Acc:MGI:108046]	4	130913125	1	ENSM002500000008983	LYSOSOMAL ASSOCIATED TRANSMEMBRANE 5 LYSOSOMAL ASSOCIATED MULTITRANSMEMBRANE 5 RETINOIC ACID INDUCIBLE E3
P2ry6	-3.54	8.16E-03	ENSMUSG000000048779	pyrimidinergic receptor P2Y, G-protein coupled, 6 [Source:MGI Symbol;Acc:MGI:2673874]	7	100937638	-1	ENSM005600000771055	P2Y PURINOCEPTOR
Cox6b2	-3.50	2.20E-02	ENSMUSG000000051811	cytochrome c oxidase subunit VIb polypeptide 2 [Source:MGI Symbol;Acc:MGI:3044182]	7	4751792	-1	ENSM00670001239628	CYTOCHROME C OXIDASE SUBUNIT 6B2 CYTOCHROME C OXIDASE SUBUNIT VIB 2 COX VIB 2 CYTOCHROME C OXIDASE SUBUNIT VIB TESTIS SPECIFIC
Pf4	-3.44	1.02E-02	ENSMUSG000000029373	platelet factor 4 [Source:MGI Symbol;Acc:MGI:1888711]	5	90772435	1	ENSM00670001243526	PLATELET FACTOR 4 PRECURSOR PF 4 C X C MOTIF CHEMOKINE 4
Adamtsl5	-3.43	4.41E-02	ENSMUSG000000043822	ADAMTS-like 5 [Source:MGI Symbol;Acc:MGI:1913798]	10	80339110	-1	ENSM005000000272033	ADAMTS 5 PRECURSOR ADAMTSL 5 THROMBOSPONDIN TYPE 1 DOMAIN CONTAINING 6
Pik3ap1	-3.38	3.59E-02	ENSMUSG000000025017	phosphoinositide-3-kinase adaptor protein 1 [Source:MGI Symbol;Acc:MGI:1933177]	19	41274218	-1	ENSM002500000004065	PHOSPHOINOSITIDE 3 KINASE ADAPTER 1 B CELL ADAPTER PHOSPHOINOSITIDE 3 KINASE B CELL PHOSPHOINOSITIDE 3 KINASE ADAPTER 1
Slc37a2	-3.37	6.64E-03	ENSMUSG000000032122	solute carrier family 37 (glycerol-3-phosphate transporter), member 2 [Source:MGI Symbol;Acc:MGI:1929693]	9	37229149	-1	ENSM00750001632401	SUGAR PHOSPHATE EXCHANGER 2 SOLUTE CARRIER FAMILY 37 MEMBER 2
Zfp354a	-3.35	1.42E-03	ENSMUSG000000020364	zinc finger protein 354A [Source:MGI Symbol;Acc:MGI:103172]	11	51059257	1	ENSM002500000000002	ZINC FINGER
C3	-3.34	6.43E-10	ENSMUSG000000024164	complement component 3 [Source:MGI Symbol;Acc:MGI:88227]	17	57203970	-1	ENSM002500000000285	COMPLEMENT C3 COMPLEMENT C3 BETA CHAIN; COMPLEMENT C3 ALPHA C3A ANAPHYLATOXIN; COMPLEMENT
Col2a1	-3.31	3.72E-04	ENSMUSG000000022483	collagen, type II, alpha 1 [Source:MGI Symbol;Acc:MGI:88452]	15	97975602	-1	ENSM002500000000184	COLLAGEN ALPHA I CHAIN PRECURSOR ALPHA TYPE I COLLAGEN
Tnfrsf11a	-3.30	4.88E-04	ENSMUSG000000026321	tumor necrosis factor receptor superfamily, member 11a [Source:MGI Symbol;Acc:MGI:1314891]	1	105780723	1	ENSM005000000273624	TUMOR NECROSIS FACTOR RECEPTOR SUPERFAMILY MEMBER 11A PRECURSOR OSTEOCLAST DIFFERENTIATION FACTOR RECEPTOR ODFR RECEPTOR ACTIVATOR OF NF KB CD265 ANTIGEN

Tnnt3	-3.28	1.55E-02	ENSMUSG00000061723	troponin T3, skeletal, fast [Source:MGI Symbol;Acc:MGI:109550]	7	142498836	1	ENSMF00600000921149	TROPONIN T MUSCLE MUSCLE TROPONIN T
Spp1	-3.25	6.99E-03	ENSMUSG00000029304	secreted phosphoprotein 1 [Source:MGI Symbol;Acc:MGI:98389]	5	104435118	1	ENSMF00250000005452	OSTEOPONTIN PRECURSOR BONE SIALOPROTEIN 1 SECRETED PHOSPHOPROTEIN 1 SPP 1 AP 1 COMPLEX SUBUNIT SIGMA ADAPTER RELATED COMPLEX 1 SUBUNIT SIGMA ADAPTOR COMPLEX AP 1 SUBUNIT SIGMA CLATHRIN ASSEMBLY COMPLEX 1 SIGMA SMALL CHAIN GOLGI ADAPTOR HA1/AP1 ADAPTIN SIGMA SUBUNIT SIGMA SUBUNIT OF AP 1 CLATHRIN SIGMA ADAPTIN ADAPTIN
Ap1s2	-3.25	5.46E-03	ENSMUSG00000031367	adaptor-related protein complex 1, sigma 2 subunit [Source:MGI Symbol;Acc:MGI:1889383]	X	163909017	1	ENSMF00500000269841	MYOSIN LIGHT CHAIN MYOSIN LIGHT CHAIN MYOSIN LIGHT CHAIN INTEGRIN ALPHA 4 PRECURSOR CD49 ANTIGEN FAMILY MEMBER D INTEGRIN ALPHA IV VLA 4 SUBUNIT ALPHA CD49D ANTIGEN
MyI4	-3.22	1.96E-02	ENSMUSG00000061086	myosin, light polypeptide 4 [Source:MGI Symbol;Acc:MGI:97267]	11	104550663	1	ENSMF00250000000438	REELIN EC_3.4.21.-
Itga4	-3.17	3.03E-05	ENSMUSG00000027009	integrin alpha 4 [Source:MGI Symbol;Acc:MGI:96603]	2	79255426	1	ENSMF00500000270234	CYTOCHROME B ASCORBATE DEPENDENT 3 EC 1 CYTOCHROME B561 FAMILY MEMBER A3
ReIn	-3.15	1.32E-02	ENSMUSG00000042453	reelin [Source:MGI Symbol;Acc:MGI:103022]	5	21884454	-1	ENSMF00740001589472	NEBULIN RELATED ANCHORING N RAP
Cybrd1	-3.13	6.19E-06	ENSMUSG00000027015	cytochrome b reductase 1 [Source:MGI Symbol;Acc:MGI:2654575]	2	71117923	1	ENSMF00670001235694	PHOSPHOLEMMAN PRECURSOR FXYD DOMAIN CONTAINING ION TRANSPORT REGULATOR 1
Nebi	-3.09	1.26E-03	ENSMUSG00000053702	nebulette [Source:MGI Symbol;Acc:MGI:1921353]	2	17343909	-1	ENSMF00740001589165	TETRASPANIN 31 TSPAN 31 SARCOMA AMPLIFIED SEQUENCE HOMOLOG
Fxyd1	-3.05	5.49E-03	ENSMUSG00000036570	FXYD domain-containing ion transport regulator 1 [Source:MGI Symbol;Acc:MGI:1889273]	7	31051681	-1	ENSMF00670001237581	INTEGRIN ALPHA PRECURSOR RECEPTOR SUBUNIT ALPHA [CONTAINS INTEGRIN ALPHA HEAVY CHAIN; INTEGRIN ALPHA LIGHT CHAIN]
Tspan13	-3.04	1.10E-02	ENSMUSG00000020577	tetraspanin 13 [Source:MGI Symbol;Acc:MGI:1913359]	12	36014557	-1	ENSMF00250000004389	SODIUM/HYDROGEN EXCHANGER NA + /H + EXCHANGER NHE SOLUTE CARRIER FAMILY 9 MEMBER
Itga8	-3.03	3.82E-06	ENSMUSG00000026768	integrin alpha 8 [Source:MGI Symbol;Acc:MGI:109442]	2	12106632	-1	ENSMF00500000269717	COLLAGEN ALPHA 1 CHAIN
Slc9a9	-3.01	1.83E-02	ENSMUSG00000031129	solute carrier family 9 (sodium/hydrogen exchanger), member 9 [Source:MGI Symbol;Acc:MGI:2679732]	9	94669909	1	ENSMF00730001521509	C5A ANAPHYLATOXIN CHEMOTACTIC RECEPTOR 1 C5A ANAPHYLATOXIN CHEMOTACTIC RECEPTOR C5A R C5AR CD88 ANTIGEN
Col14a1	-2.96	3.55E-06	ENSMUSG00000022371	collagen, type XIV, alpha 1 [Source:MGI Symbol;Acc:MGI:1341272]	15	55307750	1	ENSMF00740001589200	SKI/DACH DOMAIN CONTAINING 1 DLN 1
C5ar1	-2.95	4.15E-02	ENSMUSG00000049130	complement component 5a receptor 1 [Source:MGI Symbol;Acc:MGI:88232]	7	16246743	-1	ENSMF00670001235886	PROTEASOME ASSEMBLY CHAPERONE 1
Skida1	-2.94	1.16E-02	ENSMUSG00000054074	SKI/DACH domain containing 1 [Source:MGI Symbol;Acc:MGI:1919918]	2	18040676	-1	ENSMF00250000007590	CGMP INHIBITED 3' 5' CYCLIC PHOSPHODIESTERASE B EC_3.1.4.17 CGIPDE1 CYCLIC GMP INHIBITED PHOSPHODIESTERASE B CGI PDE B
Psmg1	-2.94	1.53E-02	ENSMUSG00000022913	proteasome (prosome, macropain) assembly chaperone 1 [Source:MGI Symbol;Acc:MGI:1860263]	16	95979933	-1	ENSMF00250000008319	C3A ANAPHYLATOXIN CHEMOTACTIC RECEPTOR C3AR C3A R
Pde3b	-2.92	9.18E-03	ENSMUSG00000030671	phosphodiesterase 3B, cGMP-inhibited [Source:MGI Symbol;Acc:MGI:1333863]	7	114415281	1	ENSMF00310000089029	N ALPHA ACETYLTRANSFERASE EC_2.3.1.88 N TERMINAL ACETYLTRANSFERASE COMPLEX ARD1 SUBUNIT HOMOLOG NATA CATALYTIC SUBUNIT SODIUM/CALCIUM EXCHANGER 1 PRECURSOR NA + /CA 2+ EXCHANGE 1 SOLUTE CARRIER FAMILY 8 MEMBER 1
C3ar1	-2.92	6.43E-10	ENSMUSG00000040552	complement component 3a receptor 1 [Source:MGI Symbol;Acc:MGI:1097680]	6	122847138	-1	ENSMF00500000273608	LUNG ADENOMA SUSCEPTIBILITY 2 PRECURSOR
Naa10	-2.90	1.12E-03	ENSMUSG00000031388	N(alpha)-acetyltransferase 10, NAtA catalytic subunit [Source:MGI Symbol;Acc:MGI:1915255]	X	73916873	-1	ENSMF00670001235397	ZINC FINGER HOMEODOMAIN ZINC FINGER HOMEODOMAIN ZFH
Slc8a1	-2.90	3.60E-07	ENSMUSG00000054640	solute carrier family 8 (sodium/calcium exchanger), member 1 [Source:MGI Symbol;Acc:MGI:107956]	17	81388691	-1	ENSMF00710001441664	MYOSIN CLASS I UNCONVENTIONAL MYOSIN TYPE I MYOSIN
4930503L1 9Rik	-2.89	4.17E-02	ENSMUSG00000044906	RIKEN cDNA 4930503L19 gene [Source:MGI Symbol;Acc:MGI:1922045]	18	70453140	-1	ENSMF00250000009134	
Zfhx4	-2.86	9.48E-08	ENSMUSG00000025255	zinc finger homeodomain 4 [Source:MGI Symbol;Acc:MGI:2137668]	3	5218526	1	ENSMF00740001589135	
Myo1f	-2.85	2.93E-02	ENSMUSG00000024300	myosin IF [Source:MGI Symbol;Acc:MGI:107711]	17	33555719	1	ENSMF00730001521590	

Camk2a	-2.84	4.36E-04	ENSMUSG00000024617	calcium/calmodulin-dependent protein kinase II alpha [Source:MGI Symbol;Acc:MGI:88256]	18	60925618	1	ENSMF00250000000111	CALCIUM/CALMODULIN DEPENDENT KINASE TYPE II SUBUNIT CAM KINASE II SUBUNIT CAMK II SUBUNIT EC_2.7.11.17
Neil3	-2.80	1.64E-02	ENSMUSG00000039396	nei like 3 (E. coli) [Source:MGI Symbol;Acc:MGI:2384588]	8	53586867	-1	ENSMF00250000007239	ENDONUCLEASE 8 3 EC_3.2.2.- EC_4.2.99.18 DNA GLYCOSYLASE FPG2 DNA GLYCOSYLASE/AP LYASE NEIL3 ENDONUCLEASE VIII 3 NEI 3
Ccdc3	-2.80	1.27E-03	ENSMUSG00000026676	coiled-coil domain containing 3 [Source:MGI Symbol;Acc:MGI:1921436]	2	5137776	1	ENSMF00250000007599	COILED COIL DOMAIN CONTAINING 3 PRECURSOR FAT/VESSEL DERIVED SECRETORY FAVINE
Itgam	-2.80	4.85E-02	ENSMUSG00000030786	integrin alpha M [Source:MGI Symbol;Acc:MGI:96607]	7	128062640	1	ENSMF00730001521375	INTEGRIN ALPHA PRECURSOR CD11 ANTIGEN FAMILY MEMBER GLYCOPROTEIN ALPHA LEUKOCYTE ANTIGEN
Cerkl	-2.78	4.01E-02	ENSMUSG00000075256	ceramide kinase-like [Source:MGI Symbol;Acc:MGI:3037816]	2	79330543	-1	ENSMF00380000124792	CERAMIDE KINASE
Tyrobp	-2.78	4.50E-07	ENSMUSG00000030579	TYRO protein tyrosine kinase binding protein [Source:MGI Symbol;Acc:MGI:1277211]	7	30413788	1	ENSMF00720001492117	TYRO TYROSINE KINASE BINDING PRECURSOR DNAX ACTIVATION 12
Csf1r	-2.78	1.53E-06	ENSMUSG00000024621	colony stimulating factor 1 receptor [Source:MGI Symbol;Acc:MGI:1339758]	18	61105572	1	ENSMF00730001521364	MAST/STEM CELL GROWTH FACTOR RECEPTOR KIT PRECURSOR SCFR EC_2.7.10.1 PROTO ONCOGENE C KIT TYROSINE KINASE KIT
Ampd3	-2.77	4.54E-02	ENSMUSG00000005686	adenosine monophosphate deaminase 3 [Source:MGI Symbol;Acc:MGI:1096344]	7	110768206	1	ENSMF00250000001063	AMP DEAMINASE EC_3.5.4.6 DEAMINASE
Ctss	-2.77	1.05E-05	ENSMUSG00000038642	cathepsin S [Source:MGI Symbol;Acc:MGI:107341]	3	95526786	1	ENSMF00250000000108	PRECURSOR
Sema3a	-2.75	3.64E-04	ENSMUSG00000028883	sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3A [Source:MGI Symbol;Acc:MGI:107558]	5	13396784	1	ENSMF00480000262738	SEMAPHORIN PRECURSOR
Msr1	-2.72	1.52E-02	ENSMUSG00000025044	macrophage scavenger receptor 1 [Source:MGI Symbol;Acc:MGI:98257]	8	39581700	-1	ENSMF00470000251495	MACROPHAGE SCAVENGER RECEPTOR TYPES I AND II MACROPHAGE ACETYLATED LDL RECEPTOR I AND II CD204 ANTIGEN
Tle2	-2.71	4.92E-02	ENSMUSG00000034771	transducin-like enhancer of split 2, homolog of Drosophila E(spl) [Source:MGI Symbol;Acc:MGI:104635]	10	81574561	1	ENSMF00250000000505	TRANSDUCIN ENHANCER
Calclrl	-2.69	1.20E-02	ENSMUSG000000059588	calcitonin receptor-like [Source:MGI Symbol;Acc:MGI:1926944]	2	84330626	-1	ENSMF002700000056464	CALCITONIN GENE RELATED PEPTIDE TYPE 1 RECEPTOR PRECURSOR CGRP TYPE 1 RECEPTOR CALCITONIN RECEPTOR RECEPTOR
Nckap1l	-2.68	8.56E-04	ENSMUSG000000022488	NCK associated protein 1 like [Source:MGI Symbol;Acc:MGI:1926063]	15	103453825	1	ENSMF00250000001880	NCK ASSOCIATED 1 1 MEMBRANE ASSOCIATED HEM
Gngt2	-2.67	7.81E-03	ENSMUSG00000038811	guanine nucleotide binding protein (G protein), gamma transducing activity polypeptide 2 [Source:MGI Symbol;Acc:MGI:893584]	11	95837216	1	ENSMF00500000280893	UNKNOWN
Kif2c	-2.66	1.43E-02	ENSMUSG00000028678	kinesin family member 2C [Source:MGI Symbol;Acc:MGI:1921054]	4	117159639	-1	ENSMF00250000000916	KINESIN
Nes	-2.66	9.56E-07	ENSMUSG00000004891	nestin [Source:MGI Symbol;Acc:MGI:101784]	3	87971078	1	ENSMF00250000003899	NESTIN
Tek	-2.66	1.70E-04	ENSMUSG00000006386	endothelial-specific receptor tyrosine kinase [Source:MGI Symbol;Acc:MGI:98664]	4	94739289	1	ENSMF00730001521762	RECEPTOR PRECURSOR EC_2.7.10.1 TYROSINE KINASE WITH IG AND EGF HOMOLOGY DOMAINS 2
Ryr2	-2.63	3.16E-03	ENSMUSG00000021313	ryanodine receptor 2, cardiac [Source:MGI Symbol;Acc:MGI:99685]	13	11553103	-1	ENSMF00250000000332	RYANODINE RECEPTOR RYR MUSCLE CALCIUM RELEASE CHANNEL MUSCLE TYPE RYANODINE RECEPTOR TYPE RYANODINE RECEPTOR
C1qa	-2.62	4.51E-02	ENSMUSG00000036887	complement component 1, q subcomponent, alpha polypeptide [Source:MGI Symbol;Acc:MGI:88223]	4	136895917	-1	ENSMF00500000275142	COMPLEMENT C1Q SUBCOMPONENT SUBUNIT A PRECURSOR
Emr1	-2.62	2.28E-02	ENSMUSG00000004730	EGF-like module containing, mucin-like, hormone receptor-like sequence 1 [Source:MGI Symbol;Acc:MGI:106912]	17	57358686	1	ENSMF00730001521501	EGF MODULE CONTAINING MUCIN HORMONE RECEPTOR PRECURSOR EGF MODULE RECEPTOR
Actg2	-2.61	3.44E-04	ENSMUSG000000059430	actin, gamma 2, smooth muscle, enteric [Source:MGI Symbol;Acc:MGI:104589]	6	83512905	-1	ENSMF00730001521060	ACTIN

Adamtsl1	-2.61	1.31E-03	ENSMUSG00000066113	ADAMTS-like 1 [Source:MGI Symbol;Acc:MGI:1924989]	4	86053915	1	ENSM00740001589326	ADAMTS 1 PRECURSOR ADAMTSL 1 PUNCTIN 1
Susd2	-2.60	1.72E-02	ENSMUSG00000006342	sushi domain containing 2 [Source:MGI Symbol;Acc:MGI:1918983]	10	75636619	-1	ENSM00250000004169	PRECURSOR
Lcp2	-2.58	3.23E-02	ENSMUSG00000002699	lymphocyte cytosolic protein 2 [Source:MGI Symbol;Acc:MGI:1321402]	11	34046920	1	ENSM00250000006667	LYMPHOCYTE CYTOSOLIC 2 SH2 DOMAIN CONTAINING LEUKOCYTE OF 76 KDA SLP 76 TYROSINE PHOSPHOPROTEIN SLP76
Evi2a	-2.55	3.49E-02	ENSMUSG00000078771	ecotropic viral integration site 2a [Source:MGI Symbol;Acc:MGI:95458]	11	79526560	-1	ENSM00250000009974	EVI2A PRECURSOR ECOTROPIC VIRAL INTEGRATION SITE 2A EVI 2A
Fxyd5	-2.54	5.73E-04	ENSMUSG00000009687	FXD domain-containing ion transport regulator 5 [Source:MGI Symbol;Acc:MGI:1201785]	7	31032722	-1	ENSM00500000284382	FXD DOMAIN CONTAINING ION TRANSPORT REGULATOR 5 PRECURSOR
Gfra1	-2.53	1.42E-02	ENSMUSG00000025089	glial cell line derived neurotrophic factor family receptor alpha 1 [Source:MGI Symbol;Acc:MGI:1100842]	19	58235604	-1	ENSM00500000269996	GDNF FAMILY RECEPTOR ALPHA 1 PRECURSOR GDNF RECEPTOR ALPHA 1 GDNFR ALPHA 1 GFR ALPHA 1 TGF BETA RELATED NEUROTROPHIC FACTOR RECEPTOR 1
Mmp16	-2.52	1.01E-05	ENSMUSG00000028226	matrix metalloproteinase 16 [Source:MGI Symbol;Acc:MGI:1276107]	4	17852893	1	ENSM00400000131720	MMP MEMBRANE TYPE MATRIX METALLOPROTEINASE MT MMP MEMBRANE TYPE MATRIX METALLOPROTEINASE MMP
Alg13	-2.52	1.12E-02	ENSMUSG00000041718	asparagine-linked glycosylation 13 [Source:MGI Symbol;Acc:MGI:1914824]	X	144317812	1	ENSM00500000273192	UDP N ACETYLGALACTOSAMINE TRANSFERASE SUBUNIT ALG13 HOMOLOG EC_2.4.1.141 GLYCOSYLTRANSFERASE 28 DOMAIN CONTAINING 1
Npr3	-2.51	1.97E-02	ENSMUSG00000022206	natriuretic peptide receptor 3 [Source:MGI Symbol;Acc:MGI:97373]	15	11839896	-1	ENSM00250000005463	ATRIAL NATRIURETIC PEPTIDE RECEPTOR 3 PRECURSOR ATRIAL NATRIURETIC PEPTIDE CLEARANCE RECEPTOR ATRIAL NATRIURETIC PEPTIDE RECEPTOR TYPE C ANP C ANPR C NPR C
Sgpp1	-2.47	1.46E-02	ENSMUSG00000021054	sphingosine-1-phosphate phosphatase 1 [Source:MGI Symbol;Acc:MGI:2135760]	12	75714248	-1	ENSM00600000921341	SPHINGOSINE 1 PHOSPHATE PHOSPHATASE 1 SPPASE1 EC_3.1.3.- SPHINGOSINE 1 PHOSPHATASE 1
S100a4	-2.46	3.47E-02	ENSMUSG00000001020	S100 calcium binding protein A4 [Source:MGI Symbol;Acc:MGI:1330282]	3	90603770	1	ENSM00670001236603	S100 A4 METASTASIN PLACENTAL CALCIUM BINDING S100 CALCIUM BINDING A4
Cd68	-2.44	3.04E-04	ENSMUSG00000018774	CD68 antigen [Source:MGI Symbol;Acc:MGI:88342]	11	69664213	-1	ENSM00250000008114	MACROSIALIN PRECURSOR CD68 ANTIGEN
Ptprc	-2.44	5.99E-03	ENSMUSG00000026395	protein tyrosine phosphatase, receptor type, C [Source:MGI Symbol;Acc:MGI:97810]	1	138062861	-1	ENSM00740001589127	RECEPTOR TYPE TYROSINE PHOSPHATASE PRECURSOR TYROSINE PHOSPHATASE R PTP EC_3.1.3.48
Col9a2	-2.43	2.20E-02	ENSMUSG00000028626	collagen, type IX, alpha 2 [Source:MGI Symbol;Acc:MGI:88466]	4	121039385	1	ENSM00740001589281	COLLAGEN ALPHA IX CHAIN
Cyp4v3	-2.41	1.74E-02	ENSMUSG00000079057	cytochrome P450, family 4, subfamily v, polypeptide 3 [Source:MGI Symbol;Acc:MGI:2142763]	8	45269671	-1	ENSM00400000131707	CYTOCHROME P450
Sparcl1	-2.41	1.29E-03	ENSMUSG00000029309	SPARC-like 1 [Source:MGI Symbol;Acc:MGI:108110]	5	104079111	-1	ENSM00250000001867	SPARC PRECURSOR BASEMENT MEMBRANE 40 BM 40 OSTEOONECTIN ON SECRETED ACIDIC AND RICH IN CYSTEINE
Pbx3	-2.39	3.44E-04	ENSMUSG00000038718	pre B cell leukemia homeobox 3 [Source:MGI Symbol;Acc:MGI:97496]	2	34171457	-1	ENSM00250000000950	PRE B CELL LEUKEMIA TRANSCRIPTION FACTOR HOMEBOX
Sept10	-2.38	7.84E-03	ENSMUSG00000019917	septin 10 [Source:MGI Symbol;Acc:MGI:1918110]	10	59164113	-1	ENSM00350000105408	SEPTIN
Arrb2	-2.37	4.89E-03	ENSMUSG000000060216	arrestin, beta 2 [Source:MGI Symbol;Acc:MGI:99474]	11	70432635	1	ENSM00250000000572	ARRESTIN
Cldn25	-2.35	6.81E-04	ENSMUSG00000022744	claudin 25 [Source:MGI Symbol;Acc:MGI:2447860]	16	58727910	1	ENSM00250000006965	CLAUDIN DOMAIN CONTAINING 1
Syt11	-2.34	1.56E-02	ENSMUSG000000068923	synaptotagmin XI [Source:MGI Symbol;Acc:MGI:1859547]	3	88744700	-1	ENSM00500000270270	SYNAPTOTAGMIN SYNAPTOTAGMIN
Mrc1	-2.31	1.07E-04	ENSMUSG00000026712	mannose receptor, C type 1 [Source:MGI Symbol;Acc:MGI:97142]	2	14229414	1	ENSM00740001589142	RECEPTOR PRECURSOR 180 RECEPTOR TYPE RECEPTOR RECEPTOR
Adarb1	-2.27	1.18E-02	ENSMUSG00000020262	adenosine deaminase, RNA-specific, B1 [Source:MGI Symbol;Acc:MGI:891999]	10	77290726	-1	ENSM00250000000663	DOUBLE STRANDED RNA SPECIFIC EDITASE EC_3.5.-.- RNA ADENOSINE DEAMINASE RNA EDITING DEAMINASE RNA EDITING ENZYME DSRNA ADENOSINE DEAMINASE

Cx3cr1	-2.25	2.16E-02	ENSMUSG00000052336	chemokine (C-X3-C) receptor 1 [Source:MGI Symbol;Acc:MGI:1333815]	9	119901616	-1	ENSM00250000000182	C C CHEMOKINE RECEPTOR TYPE 5 C C CKR 5 CC CKR 5 CCR 5 CCR5 CD195 ANTIGEN
Gm10664	-2.24	1.60E-02	ENSMUSG00000074303	predicted gene 10664 [Source:MGI Symbol;Acc:MGI:3642370]	8	65014856	-1		
Zmat1	-2.24	2.00E-02	ENSMUSG00000052676	zinc finger, matrin type 1 [Source:MGI Symbol;Acc:MGI:2442284]	X	134971372	-1	ENSM00740001589516	LYSINE RICH COILED COIL 1
Igf1	-2.24	1.26E-05	ENSMUSG00000020053	insulin-like growth factor 1 [Source:MGI Symbol;Acc:MGI:96432]	10	87858265	1	ENSM00670001235466	INSULIN GROWTH FACTOR I PRECURSOR IGF I SOMATOMEDIN
Ssbp2	-2.24	4.79E-04	ENSMUSG00000003992	single-stranded DNA binding protein 2 [Source:MGI Symbol;Acc:MGI:1914220] a disintegrin-like and metallopeptidase (reprolysin type) with thrombospondin type 1 motif, 15 [Source:MGI Symbol;Acc:MGI:2449569]	13	91460283	1	ENSM00250000000946	SINGLE STRANDED DNA BINDING SEQUENCE SPECIFIC SINGLE STRANDED DNA BINDING
Adamts15	-2.22	2.51E-02	ENSMUSG00000033453	Ttk protein kinase [Source:MGI Symbol;Acc:MGI:1194921]	9	30899155	-1	ENSM00730001521602	A DISINTEGRIN AND METALLOPROTEINASE WITH THROMBOSPONDIN MOTIFS PRECURSOR ADAM TS ADAM ADAMTS
Ttk	-2.20	1.68E-03	ENSMUSG00000038379	post-GPI attachment to proteins 2 [Source:MGI Symbol;Acc:MGI:2385286]	9	83834689	1	ENSM00740001589212	DUAL SPECIFICITY KINASE TTK EC_2.7.12.1
Pgap2	-2.20	1.52E-02	ENSMUSG00000030990	a disintegrin and metallopeptidase domain 23 [Source:MGI Symbol;Acc:MGI:1345162]	7	102210208	1	ENSM00670001235981	POST GPI ATTACHMENT TO PROTEINS FACTOR 2 FGF RECEPTOR ACTIVATING 1 DISINTEGRIN AND METALLOPROTEINASE DOMAIN CONTAINING PRECURSOR ADAM
Adam23	-2.20	2.63E-03	ENSMUSG00000025964	integral membrane protein 2A [Source:MGI Symbol;Acc:MGI:107706]	1	63445891	1	ENSM00410000138484	METALLOPROTEINASE DISINTEGRIN AND CYSTEINE RICH MDC INTEGRAL MEMBRANE 2B IMMATURE BRI2 IMBRI2 TRANSMEMBRANE BRI BRI [CONTAINS BRI2 MEMBRANE FORM MATURE BRI2 MBRI2 ; BRI2 INTRACELLULAR DOMAIN BRI2 ICD ; BRI2C SOLUBLE FORM; BRI23 PEPTIDE BRI2 23 ABRI23 C TERMINAL PEPTIDE P23 PEPTIDE]
Itm2a	-2.19	6.39E-06	ENSMUSG00000031239	predicted gene 15441 [Source:MGI Symbol;Acc:MGI:3641753]	X	107397099	-1	ENSM006000000921249	
Gm15441	-2.13	3.82E-02	ENSMUSG00000074398	growth differentiation factor 6 [Source:MGI Symbol;Acc:MGI:95689]	3	96555765	-1		
Gdf6	-2.11	2.37E-03	ENSMUSG00000051279	a disintegrin and metallopeptidase domain 22 [Source:MGI Symbol;Acc:MGI:1340046]	4	9844372	1	ENSM00500000270369	GROWTH/DIFFERENTIATION FACTOR PRECURSOR GDF DISINTEGRIN AND METALLOPROTEINASE DOMAIN CONTAINING PRECURSOR ADAM
Adam22	-2.11	8.34E-03	ENSMUSG00000040537	serine (or cysteine) peptidase inhibitor, clade G, member 1 [Source:MGI Symbol;Acc:MGI:894696]	5	8072352	-1	ENSM00410000138484	METALLOPROTEINASE DISINTEGRIN AND CYSTEINE RICH MDC PLASMA PROTEASE C1 INHIBITOR PRECURSOR C1
Serping1	-2.09	1.07E-03	ENSMUSG00000023224	carboxypeptidase E [Source:MGI Symbol;Acc:MGI:101932]	2	84765387	-1	ENSM00260000051123	INH C1INH C1 ESTERASE INHIBITOR C1 INHIBITING FACTOR SERPIN G1 CARBOXYPEPTIDASE E PRECURSOR CPE
Cpe	-2.09	3.57E-04	ENSMUSG00000037852	troponin T2, cardiac [Source:MGI Symbol;Acc:MGI:104597]	8	64592558	-1	ENSM00730001521835	EC_3.4.17.10 CARBOXYPEPTIDASE H CPH ENKEPHALIN CONVERTASE PROHORMONE PROCESSING CARBOXYPEPTIDASE
Tnnt2	-2.08	3.26E-05	ENSMUSG00000026414	predicted gene 5537 [Source:MGI Symbol;Acc:MGI:3643179]	1	135836386	1	ENSM00600000921149	TROPONIN T MUSCLE MUSCLE TROPONIN T
Gm5537	-2.08	2.37E-03	ENSMUSG00000069008	signal-regulatory protein alpha [Source:MGI Symbol;Acc:MGI:108563]	3	58102609	-1		
Sirpa	-2.07	1.30E-02	ENSMUSG00000037902	stanniocalcin 2 [Source:MGI Symbol;Acc:MGI:1316731]	2	129592835	1	ENSM00500000269963	TYROSINE PHOSPHATASE NON RECEPTOR TYPE SUBSTRATE 1 PRECURSOR SHP SUBSTRATE 1 SHPS 1 BRAIN IG MOLECULE WITH TYROSINE BASED ACTIVATION MOTIFS BIT CD172 ANTIGEN FAMILY MEMBER A INHIBITORY RECEPTOR SHPS 1 SIGNAL REGULATORY ALPHA 1 SIRP ALPHA 1 CD172A ANTIGE
Stc2	-2.05	3.07E-02	ENSMUSG00000020303	glucan (1,4-alpha-), branching enzyme 1 [Source:MGI Symbol;Acc:MGI:1921435]	11	31357307	-1	ENSM00260000051055	STANNIOCALCIN 2 STC 2
Gbe1	-2.02	2.28E-02	ENSMUSG00000022707	centrosomal protein 55 [Source:MGI Symbol;Acc:MGI:1921357]	16	70313949	1	ENSM00250000003836	1 4 ALPHA GLUCAN BRANCHING ENZYME EC_2.4.1.18 GLYCOGEN BRANCHING ENZYME
Cep55	-2.02	4.96E-02	ENSMUSG00000024989	HEG homolog 1 (zebrafish) [Source:MGI Symbol;Acc:MGI:1924696]	19	38055025	1	ENSM00250000005405	CENTROSOMAL OF 55 KDA CEP55
Heg1	-2.01	3.69E-05	ENSMUSG00000075254		16	33684466	1	ENSM00250000004916	HEG PRECURSOR

Pappa	-2.00	7.45E-03	ENSMUSG00000028370	pregnancy-associated plasma protein A [Source:MGI Symbol;Acc:MGI:97479]	4	65124174	1	ENSMF00250000001846	PAPPALYSIN 1 PRECURSOR EC_3.4.24.79 INSULIN GROWTH FACTOR DEPENDENT IGF BINDING 4 PROTEASE IGF DEPENDENT IGFBP 4 PROTEASE IGFBP 4ASE PREGNANCY ASSOCIATED PLASMA A PAPP A
Nexn	-2.00	3.92E-05	ENSMUSG00000039103	nexilin [Source:MGI Symbol;Acc:MGI:1916060]	3	152236986	-1	ENSMF00250000002729	NEXILIN F ACTIN BINDING
Gm13075	-1.98	1.01E-02	ENSMUSG00000086061	predicted gene 13075 [Source:MGI Symbol;Acc:MGI:3651958]	4	141398829	1		
Rufy3	-1.98	2.73E-02	ENSMUSG00000029291	RUN and FYVE domain containing 3 [Source:MGI Symbol;Acc:MGI:106484]	5	88583574	1	ENSMF00250000001058	RUN AND FYVE DOMAIN CONTAINING
Pgk1-rs7	-1.97	6.11E-03	ENSMUSG00000066632	phosphoglycerate kinase-1, related sequence 7 [Source:MGI Symbol;Acc:MGI:97562]	12	10898566	-1	ENSMF00250000000826	PHOSPHOGLYCERATE KINASE EC_2.7.2.3
Spc25	-1.97	1.01E-02	ENSMUSG00000005233	SPC25, NDC80 kinetochore complex component, homolog (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1913692]	2	69193895	-1	ENSMF00250000007942	KINETOCHORE SPC25
Fam162a	-1.95	8.92E-03	ENSMUSG00000003955	family with sequence similarity 162, member A [Source:MGI Symbol;Acc:MGI:1917436]	16	36043844	-1	ENSMF005000000274855	FAM162A E2 INDUCED GENE 5 GROWTH AND TRANSFORMATION DEPENDENT HGTD P
Apobec1	-1.94	7.22E-04	ENSMUSG00000040613	apolipoprotein B mRNA editing enzyme, catalytic polypeptide 1 [Source:MGI Symbol;Acc:MGI:103298]	6	122577792	-1	ENSMF005000000272650	C >U EDITING ENZYME APOBEC 1 EC_3.5.4.- APOLIPOPROTEIN B EDITING ENZYME 1
Cd248	-1.94	9.73E-03	ENSMUSG000000056481	CD248 antigen, endosialin [Source:MGI Symbol;Acc:MGI:1917695]	19	5068078	1	ENSMF005000000275140	ENDOSIALIN PRECURSOR TUMOR ENDOTHELIAL MARKER 1 CD248 ANTIGEN
Bub1	-1.91	2.41E-02	ENSMUSG000000027379	budding uninhibited by benzimidazoles 1 homolog (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1100510]	2	127801122	-1	ENSMF005000000271523	MITOTIC CHECKPOINT SERINE/THREONINE KINASE BUB1 EC_2.7.11.1 BUB1A
Des	-1.91	3.77E-02	ENSMUSG000000026208	desmin [Source:MGI Symbol;Acc:MGI:94885]	1	75360329	1	ENSMF00730001521291	VIMENTIN
Col18a1	-1.91	3.75E-02	ENSMUSG000000001435	collagen, type XVIII, alpha 1 [Source:MGI Symbol;Acc:MGI:88451]	10	77052178	-1	ENSMF00740001589266	COLLAGEN ALPHA 1 XV CHAIN PRECURSOR[CONTAINS RESTIN ENDOSTATIN XV]
H2afz	-1.91	8.43E-04	ENSMUSG000000037894	H2A histone family, member Z [Source:MGI Symbol;Acc:MGI:1888388]	3	137864487	1	ENSMF005000000270313	HISTONE H2A
Pgk1	-1.91	2.09E-04	ENSMUSG000000062070	phosphoglycerate kinase 1 [Source:MGI Symbol;Acc:MGI:97555]	X	106187100	1	ENSMF00250000000826	PHOSPHOGLYCERATE KINASE EC_2.7.2.3
Sfr1	-1.90	8.55E-05	ENSMUSG000000025066	SWI5 dependent recombination repair 1 [Source:MGI Symbol;Acc:MGI:1915038]	19	47731756	1	ENSMF00250000007302	SWI5 DEPENDENT RECOMBINATION DNA REPAIR 1 HOMOLOG MEIOSIS 5 HOMOLOG
Cit	-1.89	4.01E-02	ENSMUSG000000029516	citron [Source:MGI Symbol;Acc:MGI:105313]	5	115845278	1	ENSMF00520000517879	CITRON RHO INTERACTING KINASE EC_2.7.11.1 SERINE/THREONINE KINASE 21
Sgce	-1.89	2.75E-02	ENSMUSG000000004631	sarcoglycan, epsilon [Source:MGI Symbol;Acc:MGI:1329042]	6	4674350	-1	ENSMF00250000002718	ALPHA SARCOGLYCAN PRECURSOR ALPHA SG 50 KDA DYSTROPHIN ASSOCIATED GLYCOPROTEIN 50DAG ADHALIN
Fmn1	-1.87	1.34E-02	ENSMUSG000000044042	formin 1 [Source:MGI Symbol;Acc:MGI:101815]	2	113327736	1	ENSMF00250000001548	FORMIN
Casc5	-1.86	1.27E-02	ENSMUSG000000027326	cancer susceptibility candidate 5 [Source:MGI Symbol;Acc:MGI:1923714]	2	119047119	1	ENSMF00250000005190	CASC5 CANCER SUSCEPTIBILITY CANDIDATE GENE 5 KINETOCHORE NULL 1
Ect2	-1.85	4.98E-02	ENSMUSG000000027699	ect2 oncogene [Source:MGI Symbol;Acc:MGI:95281]	3	27097222	-1	ENSMF00250000003297	ECT2 EPITHELIAL CELL TRANSFORMING SEQUENCE 2 ONCOGENE
Gm8203	-1.83	1.22E-03	ENSMUSG000000060214	predicted pseudogene 8203 [Source:MGI Symbol;Acc:MGI:3646499]	6	116173634	1		
Smc4	-1.82	3.48E-04	ENSMUSG000000034349	structural maintenance of chromosomes 4 [Source:MGI Symbol;Acc:MGI:1917349]	3	69004738	1	ENSMF005000000269973	STRUCTURAL MAINTENANCE OF CHROMOSOMES 4 SMC 4 SMC 4 CHROMOSOME XCAP C DISINTEGRIN AND METALLOPROTEINASE DOMAIN CONTAINING 10 PRECURSOR ADAM 10
Adam10	-1.82	3.70E-03	ENSMUSG000000054693	a disintegrin and metallopeptidase domain 10 [Source:MGI Symbol;Acc:MGI:109548]	9	70678997	1	ENSMF00390000126345	EC_3.4.24.81 KUZBANIAN HOMOLOG MAMMALIAN DISINTEGRIN METALLOPROTEASE CD156C ANTIGEN

Fyb	-1.82	3.16E-02	ENSMUSG00000022148	FYN binding protein [Source:MGI Symbol;Acc:MGI:1346327]	15	6579871	1	ENSMF00250000005863	FYN BINDING ADHESION AND DEGRANULATION PROMOTING ADAPTOR ADAP FYB 120/130 P120/P130 FYN T BINDING SLAP 130 SLP 76 ASSOCIATED PHOSPHOPROTEIN
Glis2	-1.81	4.04E-02	ENSMUSG00000014303	GLIS family zinc finger 2 [Source:MGI Symbol;Acc:MGI:1932535]	16	4594713	1	ENSMF00730001522492	ZINC FINGER GLIS2 GLI SIMILAR 2 NEURONAL KRUEPPEL
Idh2	-1.80	2.28E-02	ENSMUSG00000030541	isocitrate dehydrogenase 2 (NADP+), mitochondrial [Source:MGI Symbol;Acc:MGI:96414]	7	80094846	-1	ENSMF00610000952871	ISOCITRATE DEHYDROGENASE [NADP] IDH EC_1.1.1.42 IDP NADP + SPECIFIC ICDH OXALOSUCCINATE DECARBOXYLASE
Atf5	-1.78	1.42E-02	ENSMUSG00000038539	activating transcription factor 5 [Source:MGI Symbol;Acc:MGI:2141857]	7	44812257	-1	ENSMF005000000275963	CYCLIC AMP DEPENDENT TRANSCRIPTION FACTOR ATF 5 CAMP DEPENDENT TRANSCRIPTION FACTOR ATF 5 ACTIVATING TRANSCRIPTION FACTOR 5 TRANSCRIPTION FACTOR ATFX
Mki67	-1.78	5.03E-04	ENSMUSG00000031004	antigen identified by monoclonal antibody Ki 67 [Source:MGI Symbol;Acc:MGI:106035]	7	135689788	-1	ENSMF005000000272970	ANTIGEN KI 67
Bub1b	-1.76	3.94E-02	ENSMUSG00000040084	budding uninhibited by benzimidazoles 1 homolog, beta (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1333889]	2	118598211	1	ENSMF00250000005223	MITOTIC CHECKPOINT SERINE/THREONINE KINASE BUB1 BETA EC_2.7.11.1 MAD3/BUB1 RELATED KINASE MITOTIC CHECKPOINT KINASE MAD3L
Nsmce2	-1.76	3.61E-02	ENSMUSG00000059586	non-SMC element 2 homolog (MMS21, S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1915751]	15	59374198	1	ENSMF00250000007238	E3 SUMO LIGASE NSE2 EC_6.3.2.- MMS21 HOMOLOG NON STRUCTURAL MAINTENANCE OF CHROMOSOMES ELEMENT 2 HOMOLOG NON SMC ELEMENT 2 HOMOLOG
Ltbp1	-1.76	2.29E-03	ENSMUSG00000001870	latent transforming growth factor beta binding protein 1 [Source:MGI Symbol;Acc:MGI:109151]	17	75005568	1	ENSMF00740001589166	LATENT TRANSFORMING GROWTH FACTOR BETA BINDING PRECURSOR LTBP
Ndc80	-1.75	3.42E-02	ENSMUSG000000024056	NDC80 homolog, kinetochore complex component (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:1914302]	17	71496100	-1	ENSMF00250000007693	KINETOCHORE NDC80 HOMOLOG KINETOCHORE HEC1 KINETOCHORE ASSOCIATED 2
Hirip3	-1.73	1.97E-03	ENSMUSG000000042606	HIRA interacting protein 3 [Source:MGI Symbol;Acc:MGI:2142364]	7	126861972	1	ENSMF00250000008953	HIRA INTERACTING 3
Ccdc88a	-1.72	5.47E-03	ENSMUSG000000032740	coiled coil domain containing 88A [Source:MGI Symbol;Acc:MGI:1925177]	11	29373658	1	ENSMF00250000000961	DAPLE COILED COIL DOMAIN CONTAINING 88C DVL ASSOCIATING WITH A HIGH FREQUENCY OF LEUCINE RESIDUES
Top2a	-1.71	1.71E-03	ENSMUSG000000020914	topoisomerase (DNA) II alpha [Source:MGI Symbol;Acc:MGI:98790]	11	98992943	-1	ENSMF00740001589149	DNA TOPOISOMERASE 2 EC_5.99.1.3 DNA TOPOISOMERASE II
Ogdh	-1.71	2.87E-02	ENSMUSG000000020456	oxoglutarate (alpha-ketoglutarate) dehydrogenase (lipoamide) [Source:MGI Symbol;Acc:MGI:1098267]	11	6291633	1	ENSMF00750001632363	2 OXOGLUTARATE DEHYDROGENASE MITOCHONDRIAL PRECURSOR 2 OXOGLUTARATE DEHYDROGENASE COMPLEX COMPONENT E1 OGDCE1 ALPHA KETOGLUTARATE DEHYDROGENASE
Vim	-1.71	2.37E-03	ENSMUSG000000026728	vimentin [Source:MGI Symbol;Acc:MGI:98932]	2	13573927	1	ENSMF00730001521291	VIMENTIN
Cd44	-1.69	6.03E-03	ENSMUSG00000005087	CD44 antigen [Source:MGI Symbol;Acc:MGI:88338]	2	102811141	-1	ENSMF00670001235665	CD44 ANTIGEN PRECURSOR EXTRACELLULAR MATRIX RECEPTOR III ECMR III GP90 LYMPHOCYTE HOMING/ADHESION RECEPTOR HUTCH I HERMES ANTIGEN HYALURONATE RECEPTOR PHAGOCYTIC GLYCOPROTEIN 1 PGP 1 PHAGOCYTIC GLYCOPROTEIN I PGP I CD44 ANTIGEN
Pdzrn3	-1.69	1.69E-02	ENSMUSG000000035357	PDZ domain containing RING finger 3 [Source:MGI Symbol;Acc:MGI:1933157]	6	101149609	-1	ENSMF00250000001242	E3 UBIQUITIN LIGASE PDZRN3 EC_6.3.2.- PDZ DOMAIN CONTAINING RING FINGER 3 SEMAPHORIN CYTOPLASMIC DOMAIN ASSOCIATED 3 SEMACAP3
Hnrnpa1	-1.68	3.23E-03	ENSMUSG000000046434	heterogeneous nuclear ribonucleoprotein A1 [Source:MGI Symbol;Acc:MGI:104820]	15	103240432	1	ENSMF00270000056431	HETEROGENEOUS NUCLEAR RIBONUCLEOPROTEIN
Nasp	-1.66	6.57E-03	ENSMUSG000000028693	nuclear autoantigenic sperm protein (histone-binding) [Source:MGI Symbol;Acc:MGI:1355328]	4	116601052	-1	ENSMF00250000002304	NUCLEAR AUTOANTIGENIC SPERM NASP

Txnip	-1.66	1.15E-02	ENSMUSG00000038393	thioredoxin interacting protein [Source:MGI Symbol;Acc:MGI:1889549]	3	96557957	1	ENSMF00500000269878	ARRESTIN DOMAIN CONTAINING
Ccdc34	-1.66	1.01E-02	ENSMUSG00000027160	coiled-coil domain containing 34 [Source:MGI Symbol;Acc:MGI:1915451]	2	110017817	1	ENSMF00500000273588	COILED COIL DOMAIN CONTAINING 34
Ccnd3	-1.65	2.82E-02	ENSMUSG00000034165	cyclin D3 [Source:MGI Symbol;Acc:MGI:88315]	17	47505051	1	ENSMF00250000001580	G1/S SPECIFIC CYCLIN
Zdbf2	-1.63	3.89E-03	ENSMUSG00000027520	zinc finger, DBF-type containing 2 [Source:MGI Symbol;Acc:MGI:1921134]	1	63273265	1	ENSMF00570000852452	DBF4 TYPE ZINC FINGER CONTAINING 2
Fth1	-1.63	4.39E-03	ENSMUSG00000024661	ferritin heavy chain 1 [Source:MGI Symbol;Acc:MGI:95588]	19	9982703	1	ENSMF00500000269681	FERRITIN HEAVY CHAIN FERRITIN H SUBUNIT EC_1.16.3.1
Aldoa	-1.62	8.20E-03	ENSMUSG00000030695	aldolase A, fructose-bisphosphate [Source:MGI Symbol;Acc:MGI:87994]	7	126795234	-1	ENSMF00250000000488	FRUCTOSE BISPHOSPHATE ALDOLASE EC_4.1.2.13 TYPE ALDOLASE
Gpi1	-1.62	4.33E-02	ENSMUSG00000036427	glucose phosphate isomerase 1 [Source:MGI Symbol;Acc:MGI:95797]	7	34202122	-1	ENSMF00250000000760	GLUCOSE 6 PHOSPHATE ISOMERASE GPI EC_5.3.1.9 PHOSPHOGLUCOSE ISOMERASE PGI PHOSPHOHEXOSE ISOMERASE PHI
Mid1	-1.62	2.98E-02	ENSMUSG00000035299	midline 1 [Source:MGI Symbol;Acc:MGI:1100537]	X	169685199	1	ENSMF00400000131788	E3 UBIQUITIN LIGASE MIDLINE 1 EC_6.3.2.- RING FINGER MIDLINE 1 TRIPARTITE MOTIF CONTAINING 18
Nrep	-1.60	9.91E-03	ENSMUSG00000042834	neuronal regeneration related protein [Source:MGI Symbol;Acc:MGI:99444]	18	33437019	-1	ENSMF00500000403229	UNKNOWN
Smc2	-1.59	3.62E-02	ENSMUSG00000028312	structural maintenance of chromosomes 2 [Source:MGI Symbol;Acc:MGI:106067]	4	52439243	1	ENSMF00310000089028	STRUCTURAL MAINTENANCE OF CHROMOSOMES 2 SMC 2 SMC 2 CHROMOSOME XCAP E PHOSPHOGLYCERATE MUTASE EC_3.1.3.13
Pgam1	-1.57	1.22E-02	ENSMUSG00000011752	phosphoglycerate mutase 1 [Source:MGI Symbol;Acc:MGI:97552]	19	41911871	1	ENSMF00250000001043	EC_5.4.2.- 11 EC_5.4.-.- 2 4 BPG DEPENDENT PGAM PHOSPHOGLYCERATE MUTASE ISOZYME PGAM
Cenpe	-1.56	3.72E-02	ENSMUSG00000045328	centromere protein E [Source:MGI Symbol;Acc:MGI:1098230]	3	135212563	1	ENSMF00740001589373	CENTROMERE ASSOCIATED E PRECURSOR CENTROMERE E CENP E KINESIN
Dek	-1.56	2.14E-02	ENSMUSG00000021377	DEK oncogene (DNA binding) [Source:MGI Symbol;Acc:MGI:1926209]	13	47084775	-1	ENSMF00500000272050	DEK
Sub1	-1.54	1.86E-02	ENSMUSG00000022205	SUB1 homolog (S. cerevisiae) [Source:MGI Symbol;Acc:MGI:104811]	15	11981339	-1	ENSMF00670001235917	ACTIVATED RNA POLYMERASE II TRANSCRIPTIONAL COACTIVATOR P15 POSITIVE COFACTOR 4 PC4 SUB1 HOMOLOG P14
Ckap5	-1.53	4.76E-02	ENSMUSG00000040549	cytoskeleton associated protein 5 [Source:MGI Symbol;Acc:MGI:1923036]	2	91526762	1	ENSMF00740001589187	CYTOSKELETON ASSOCIATED 5
Msn	-1.50	4.72E-02	ENSMUSG00000031207	moesin [Source:MGI Symbol;Acc:MGI:97167]	X	96096042	1	ENSMF00250000000517	MOESIN

Table S3

Category	Function	Function Annotation	B-H p-value	Molecules	# Molecules
Cell Death and Survival	cell death	cell death	2,66E-06	ABCB1, ACTC1, ADA, ADAM12, AFP, AHCTF1, ALDOA, ALDOC, ANGPT1, APOA1, APOB, ARHGDIA, ASS1, AXL, BCAS2, BMP1, BTK, CACNA1G, CACNB2, CACYBP, CAMK1D, CAMK2A, CASP2, Ccl6, Ccl9, CD44, CD47, CDC73, CDCA2, CDH1, CDKN1A, CDKN1C, CENPF, CENPJ, CENPJ, CFLAR, CLSPN, COL2A1, CORO1A, CSF1R, CUL9, CX3CR1, CYB5R3, DEDD, DLK1, DTL, DUSP9, EBF4, EDNRA, EGR1, EIF5B, EMG1, EMP1, EPHA3, EPHA7, F13A1, F2RL1, FKBP4, FOXP1, FSTL1, GAS1, GATA1, GATA3, GBE1, GHR, GIMAP4, GJB2, GLUD1, GNL3, GPR98, GRB10, GRIA3, GRIK3, GRIN2D, HCLS1, Hdac9, HIPK3, HLF, HSPB1, HSPB8, HSPD1, HSPE1, IGF2, IGFBP2, ITGB2, ITGB3, KDM6B, KDR, KIF14, KLF1, L1CAM, LAIR1, LAMA4, LCP2, LGALS9, LGR4, LRP8, LTBP1, MEF2C, Meg3, MEIS1, MLKL, MUTYH, MYB, MYBPC3, MYC, MYH6, NABP1, NANOG, NCF1, NCKAP1L, NCL, NDRG2, NEFH, NEFL, NEFM, NEK2, NELL1, NFATC4, NFIX, NFKBIB, NIF3L1, NKX3-1, NOLC1, NSMCE4A, OLR1, ORC2, PARP2, PAX1, PBX3, PDE3A, PDLIM4, PEG3, PF4, PHB2, PHLDA2, PIK3CG, PLAGL1, Pmaip1, POSTN, POT1, PPARG, PPARGC1A, PPBP, PPID, PPP1R15B, PRDX6, PRNP, PTAFR, PTPRC, PTTG1, RALB, RBP4, Rcan2, RNF17, RYBP, RYR2, SATB1, SEMA3A, SERPINF1, SFN, SGK1, SHH, SIRPA, SLC30A10, SLC8A1, SMYD1, SND1, SORBS2,	202
Cell Death and Survival	necrosis	necrosis	4,82E-05	ABCB1, ACTC1, ADA, ADAM12, AFP, ALDOA, ANGPT1, APOA1, APOB, ARHGDIA, ASS1, AXL, BCAS2, BTK, CACNA1G, CACNB2, CASP2, Ccl9, CD44, CD47, CDC73, CDCA2, CDH1, CDKN1A, CDKN1C, CENPJ, CFLAR, CLSPN, COL2A1, CORO1A, CSF1R, CUL9, CYB5R3, DLK1, DTL, DUSP9, EBF4, EDNRA, EGR1, EIF5B, EMG1, EMP1, EPHA7, F13A1, F2RL1, FKBP4, FSTL1, GAS1, GATA1, GATA3, GBE1, GHR, GIMAP4, GJB2, GLUD1, GRB10, HCLS1, Hdac9, HLF, HSPB1, HSPB8, HSPD1, HSPE1, IGF2, IGFBP2, ITGB2, ITGB3, KDR, KIF14, L1CAM, LAIR1, LGALS9, LTBP1, MEF2C, Meg3, MEIS1, MLKL, MUTYH, MYB, MYBPC3, MYC, MYH6, NABP1, NANOG, NCF1, NCL, NDRG2, NEFH, NEFL, NEFM, NEK2, NFATC4, NFIX, NFKBIB, NIF3L1, NOLC1, NSMCE4A, OLR1, PARP2, PAX1, PBX3, PDLIM4, PEG3, PF4, PIK3CG, PLAGL1, Pmaip1, POSTN, POT1, PPARG, PPARGC1A, PPBP, PPID, PRDX6, PRNP, PTAFR, PTPRC, PTTG1, RALB, RBP4, Rcan2, RYR2, SATB1, SEMA3A, SERPINF1, SFN, SGK1, SHH, SIRPA, SLC30A10, SLC8A1, SND1, SYCP2, TAGLN2, TAL1, TCF3, TDGF1, TEK, TFAP2C, TFRC, TGFB3, THBS4, TNNT2, TPR, TPT1, TRIB3, TTR, TXNIP, TYROBP, VCAN, VDAC2, WBP1, WNT6, WT1, XRCC5, ZEB1, ZFP36	157

Cell Death and Survival	apoptosis	apoptosis	9,56E-05	<p> ABCBC1, ACTC1, ADA, ADAM12, AFP, AHCTF1, ALDOA, ALDOC, ANGPT1, APOA1, ARHGDI, ASS1, AXL, BCAS2, BMP1, BTK, CAMK1D, CAMK2A, CASP2, Ccl6, Ccl9, CD44, CD47, CDC73, CDCA2, CDH1, CDKN1A, CDKN1C, CENPF, CENPJ, CFLAR, COL2A1, CORO1A, CSF1R, CUL9, CX3CR1, DEDD, EBF4, EDNR, EGR1, EPHA3, EPHA7, F2RL1, FKBP4, FOXP1, FSTL1, GAS1, GATA1, GATA3, GHR, GIMAP4, GLUD1, GNL3, GRB10, GRIA3, HCLS1, HIPK3, HLF, HSPB1, HSPB8, HSPD1, HSPE1, IGF2, ITGB2, ITGB3, KDM6B, KDR, KIF14, L1CAM, LAIR1, LAMA4, LGALS9, LGR4, LTBP1, MEF2C, MUTYH, MYB, MYC, NANOG, NCF1, NCKAP1L, NCL, NDRG2, NEFL, NELL1, NFATC4, NFKBIB, NOLC1, OLR1, ORC2, PAX1, PBX3, PDE3A, PDLIM4, PEG3, PF4, PHB2, PHLDA2, PIK3CG, PLAGL1, Pmaip1, POT1, PPARG, PPARGC1A, PPID, PRDX6, PRNP, PTAFR, PTPRC, PTTG1, RALB, RBP4, Rcan2, RNF17, RYBP, RYR2, SATB1, SEMA3A, SERPINF1, SFN, SGK1, SHH, SIRPA, SLC30A10, SLC8A1, SMYD1, SND1, SORBS2, SPINT1, SYCP2, SYCP3, TAGLN2, TAL1, TBX3, TCF3, TDGF1, TDRD1, TEK, Tex19.1, TFAP2C, TFRC, TGFB3, TNNT2, TPR, TPT1, TRIB3, TTN, TTR, TXNIP, TYROBP, VCAN, VDAC2, WBP1, WNT6, WT1, XRCC5, YBX3, ZEB1, ZFP36 </p>	159
Cell Death and Survival	survival	survival of red blood cells	1,26E-03	GATA1, HBZ, NFE2, PF4, PPBP, TAL1	6
Cell Death and Survival	cell viability	cell viability	1,47E-03	<p> ABCBC1, ABCB6, AKAP13, ALPK2, ANGPT1, APOB, ASS1, AXL, BTK, CASK, CASP2, CD44, CD47, CDH1, CDKN1A, CDKN1C, CFLAR, CSF1R, CUL9, DLK1, ELF3, F2RL1, GATA1, GATA3, GHR, GLUD1, HBZ, HLF, HSPB1, HSPD1, IGF2, IGFBP2, ITGB2, KDR, L1CAM, MCFD2, MEF2C, MICAL2, MYB, MYC, NEFH, NEFL, NEFM, NFE2, NFKBIB, NKX3-1, NOP58, NT5C3A, NUP210, OLR1, PBX3, PDGFA, PDP1, PEG3, PF4, PIK3CG, POSTN, PPARG, PPBP, PPID, PRDX6, PRNP, PTAFR, PTPRC, PTPRK, RALB, RYR2, SERPINF1, SFN, SGK1, SHH, SIRPA, SLC22A3, SND1, SWI5, TAL1, TCF3, TXNIP, TYROBP, WT1, XRCC5, ZFP36 </p>	82
Cell Death and Survival	survival	cell survival	2,16E-03	<p> ABCBC1, ABCB6, AKAP13, ALPK2, ANGPT1, APOB, ASS1, AXL, BTK, CASK, CASP2, CD44, CD47, CDH1, CDKN1A, CDKN1C, CFLAR, CSF1R, CUL9, DLK1, ELF3, EMP1, F2RL1, GATA1, GATA3, GHR, GLUD1, GRB10, HBZ, HLF, HSPB1, HSPD1, IGF2, IGFBP2, ITGB2, KDR, L1CAM, MCFD2, MEF2C, MICAL2, MYB, MYC, NDRG2, NEFH, NEFL, NEFM, NFE2, NFKBIB, NKX3-1, NOP58, NT5C3A, NUP210, OLR1, PBX3, PDGFA, PDP1, PEG3, PF4, PIK3CG, POSTN, PPARG, PPBP, PPID, PRDX6, PRNP, PTAFR, PTPRC, PTPRK, RALB, RYR2, SERPINF1, SFN, SGK1, SHH, SIRPA, SLC22A3, SND1, SWI5, TAL1, TBX3, TCF3, TXNIP, TYROBP, WT1, XRCC5, ZFP36 </p>	86
Cell Death and Survival	cell viability	cell viability of blood cells	2,50E-03	<p> APOB, BTK, CD44, CD47, CSF1R, DLK1, GATA1, GATA3, HBZ, HLF, ITGB2, KDR, MEF2C, MYB, MYC, NFE2, PF4, PIK3CG, PPBP, PRDX6, PTPRC, SHH, TAL1, TCF3, TYROBP </p>	25
Cell Death and Survival	cell viability	cell viability of hematopoietic progenitor cells	4,49E-03	<p> BTK, DLK1, GATA1, HLF, KDR, MEF2C, MYB, PF4, PPBP, TAL1, TCF3 </p>	11
Cell Death and Survival	cell death	cell death of immune cells	6,27E-03	<p> ADA, AFP, APOB, BTK, CASP2, CD44, CD47, CDKN1A, CFLAR, CORO1A, CSF1R, CUL9, DLK1, EGR1, GATA1, GATA3, GHR, GIMAP4, HCLS1, HLF, ITGB2, LAIR1, LGALS9, MEF2C, MEIS1, MYB, MYC, NFKBIB, PAX1, PF4, PIK3CG, Pmaip1, PPARG, PPBP, PRDX6, PTPRC, Rcan2, SATB1, SERPINF1, SFN, SHH, SIRPA, TCF3, TPR, TYROBP, XRCC5 </p>	46
Cell Death and Survival	self-renewal	self-renewal of cells	6,27E-03	<p> ABCBC1, CD44, EXT1, GNL3, ITGB3, MCFD2, MEIS1, MYB, NANOG, SHH, TBX3 </p>	11
Cell Death and Survival	survival	survival of erythroid progenitor cells	8,30E-03	GATA1, PF4, PPBP, TAL1	4

Cell Death and Survival	necrosis	necrosis of muscle	8,99E-03	ACTC1, ADAM12, ALDOA, ANGPT1, APOA1, CACNB2, CDKN1A, CDKN1C, CSF1R, FSTL1, HSPB1, HSPB8, HSPD1, HSPE1, IGF2, ITGB3, MYBPC3, MYC, MYH6, NCL, PPARG, PPARGC1A, SLC8A1, TNNT2, TPT1, TXNIP, WBP1	27
Cell Death and Survival	apoptosis	apoptosis of tumor cell lines	9,83E-03	ABCB1, AFP, ARHGDI, BCAS2, BTK, CASP2, CD44, CD47, CDCA2, CDH1, CDKN1A, CDKN1C, CFLAR, CSF1R, CUL9, EBF4, EGR1, GAS1, GATA1, GRB10, HCLS1, HLF, HSPB1, HSPB8, HSPD1, IGF2, KIF14, LAIR1, LTBP1, MEF2C, MYB, MYC, NANOG, NCL, NDRG2, NFKBIB, PBX3, PDLIM4, PLAGL1, Pmaip1, POT1, PPARG, PPARGC1A, PPID, PRNP, PTAFR, PTPRC, PTTG1, RALB, SATB1, SEMA3A, SERPINF1, SFN, SGK1, SIRPA, SLC30A10, SND1, TAGLN2, TAL1, TCF3, TDGF1, TFAP2C, TFRC, TGFB3, TPT1, VCAN, VDAC2, WNT6, WT1, XRCC5, ZEB1	71
Cell Death and Survival	cell viability	cell viability of leukocytes	1,18E-02	APOB, BTK, CD44, CD47, CSF1R, DLK1, GATA1, GATA3, HLF, ITGB2, MEF2C, MYB, MYC, PF4, PIK3CG, PPBP, PRDX6, PTPRC, SHH, TCF3, TYROBP	21
Cell Death and Survival	self-renewal	self-renewal of stem cells	1,18E-02	ABCB1, GNL3, MCFD2, MYB, NANOG, SHH, TBX3	7
Cell Death and Survival	cell death	cell death of muscle cells	1,23E-02	ACTC1, ADAM12, ALDOA, ANGPT1, APOA1, CACNB2, CDKN1A, CDKN1C, CSF1R, FSTL1, HSPB1, HSPB8, HSPD1, HSPE1, IGF2, ITGB3, MYBPC3, MYC, NCL, PPARG, PPARGC1A, SLC8A1, TNNT2, TPT1, TXNIP, WBP1	26
Cell Death and Survival	cell viability	cell viability of mononuclear leukocytes	1,41E-02	APOB, BTK, CD44, CD47, CSF1R, DLK1, GATA3, HLF, MEF2C, MYB, MYC, PF4, PIK3CG, PPBP, PTPRC, SHH, TCF3	17
Cell Death and Survival	cell death	cell death of tumor cell lines	1,58E-02	ABCB1, AFP, APOB, ARHGDI, AXL, BCAS2, BTK, CACNA1G, CASP2, CD44, CD47, CDCA2, CDH1, CDKN1A, CDKN1C, CENPI, CFLAR, CLSPN, CSF1R, CUL9, DTL, DUSP9, EBF4, EGR1, EMG1, GAS1, GATA1, GBE1, GRB10, HCLS1, HLF, HSPB1, HSPB8, HSPD1, IGF2, ITGB3, KIF14, LAIR1, LTBP1, MEF2C, MLKL, MYB, MYC, NABP1, NANOG, NCL, NDRG2, NEK2, NFIX, NFKBIB, NIF3L1, PBX3, PDLIM4, PLAGL1, Pmaip1, POT1, PPARG, PPARGC1A, PPID, PRNP, PTAFR, PTPRC, PTTG1, RALB, SATB1, SEMA3A, SERPINF1, SFN, SGK1, SIRPA, SLC30A10, SND1, TAGLN2, TAL1, TCF3, TDGF1, TFAP2C, TFRC, TGFB3, TPT1, VCAN, VDAC2, WNT6, WT1, XRCC5, ZEB1	86
Cell Death and Survival	cell death	cell death of hematopoietic progenitor cells	2,28E-02	ADA, BTK, CASP2, CD44, CDKN1A, CUL9, EGR1, GATA1, GIMAP4, MEIS1, MYC, NFKBIB, PAX1, PF4, PIK3CG, PTPRC, SATB1, XRCC5	18
Cell Death and Survival	apoptosis	apoptosis of breast cancer cell lines	2,32E-02	ARHGDI, BCAS2, CASP2, CD44, CDH1, CDKN1A, CFLAR, HSPB1, HSPB8, HSPD1, NANOG, NFKBIB, PPARG, PRNP, PTTG1, SGK1, SND1, TFAP2C, TFRC, TGFB3, WT1	21
Cell Death and Survival	apoptosis	apoptosis of hematopoietic progenitor cells	2,57E-02	ADA, BTK, CASP2, CD44, CUL9, EGR1, GATA1, GIMAP4, MYC, NFKBIB, PAX1, PF4, PIK3CG, PTPRC, SATB1, XRCC5	16
Cell Death and Survival	cell death	cell death of breast cancer cell lines	2,87E-02	ARHGDI, BCAS2, CASP2, CD44, CD47, CDH1, CDKN1A, CFLAR, HSPB1, HSPB8, HSPD1, NANOG, NFKBIB, PPARG, PPID, PRNP, PTTG1, SGK1, SND1, TFAP2C, TFRC, TGFB3, WT1	23
Cell Death and Survival	cell death	cell death of epithelial cell lines	3,00E-02	CASP2, CD44, CDH1, CFLAR, CSF1R, EMP1, HSPB1, HSPB8, HSPD1, MYC, Pmaip1, PPARG, PPID, PRNP, SERPINF1, SGK1, TCF3, TFRC, TRIB3, WNT6, ZEB1	21
Cell Death and Survival	apoptosis	apoptosis of B lymphocytes	3,63E-02	BTK, CASP2, CD47, CDKN1A, CFLAR, MYC, NFKBIB, PTPRC, SFN, SHH, XRCC5	11
Cell Death and Survival	apoptosis	apoptosis of endothelial cells	3,64E-02	ANGPT1, ASS1, AXL, CDKN1A, CFLAR, GATA1, HSPD1, KDR, MYC, OLR1, PPARG, PRDX6, RBP4, SEMA3A, SERPINF1	15
Cell Death and Survival	cell death	cell death of epithelial cells	3,67E-02	CASP2, CD44, CDH1, CDKN1A, CFLAR, CSF1R, EGR1, EMP1, FKBP4, HSPB1, HSPB8, HSPD1, MYB, MYC, NDRG2, Pmaip1, PPARG, PPID, PRDX6, PRNP, PTAFR, SERPINF1, SGK1, SLC8A1, TCF3, TFRC, TRIB3, WNT6, ZEB1	29
Cell Death and Survival	apoptosis	apoptosis of mononuclear leukocytes	3,67E-02	ADA, BTK, CASP2, CD44, CD47, CDKN1A, CFLAR, CORO1A, CUL9, EGR1, GIMAP4, LGALS9, MYC, NFKBIB, PAX1, PF4, PIK3CG, Pmaip1, PTPRC, Rcan2, SATB1, SFN, SHH, TPR, XRCC5	25

Cell Death and Survival	apoptosis	apoptosis of epithelial cell lines	3,89E-02	CASP2, CD44, CDH1, CFLAR, CSF1R, HSPB8, HSPD1, MYC, Pmaip1, PPID, SERPINF1, SGK1, TCF3, TFRC, TRIB3, WNT6, ZEB1	17
Cell Death and Survival	cell death	cell death of endothelial cells	4,07E-02	ANGPT1, ASS1, AXL, CDKN1A, CFLAR, F2RL1, GATA1, HSPD1, KDR, MYC, OLR1, PPARG, PRDX6, RBP4, SEMA3A, SERPINF1	16
Cell Death and Survival	cell death	cell death of heart	4,27E-02	ACTC1, ANGPT1, APOA1, CACNB2, CDKN1A, FSTL1, HSPB1, HSPB8, HSPD1, HSPE1, MYBPC3, MYH6, NCL, PPARGC1A, SLC8A1, THBS4, TXNIP	17

Table S4

Category	Function	Function Annotation	B-H p-value	Molecules	# Molecules
Cell Death and Survival	cell death	cell death	2,24E-10	ACTC1, ADA, ADAMTS16, ADARB1, AFP, AGRN, ALB, ALDOA, ANXA4, ARHGEF6, ARRB2, ASS1, ATF5, ATP6V0D2, BCL11B, Bglap (includes others), BGN, BTG2, BUB1, BUB1B, C1QA, C3, C5AR1, C8G, CALCRL, CAMK2A, CCDC88A, Ccl9, CCND3, CD44, Cd55/Daf2, CD9, CDC73, CDH1, CDH5, CERKL, CFLAR, CHD8, CHI3L1, CIT, CITED2, Clca1/Clca2, CLEC11A, CLEC5A, Clu, COL18A1, COL2A1, COL4A1, COPS5, CSF1R, CTSS, CX3CR1, Cxcl12, CXCR2, CYP1B1, DDX4, DEK, DES, DNASE1L3, DSG2, DUSP9, DYSF, EFN2, EMILIN2, EN1, EPHA3, F2RL1, FABP4, FAM162A, FBLIM1, FGFR2, FLNB, FLT1, FTH1, GABRP, GATA2, GATA3, GBA2, GBE1, GFRA1, GHRH, GJB2, GLIS2, GPI, GPR56, GPR98, GRB10, GRIK3, HDAC4, HLF, HMOX1, HNRNPA1, HOXB9, HSPB1, HSPE1, IFIH1, IGF1, IL1R1, ING5, IQGAP2, IRS1, ISG15, ITGA4, ITGAL, ITGAM, ITGB2, JUP, KLK3, KRT18, LAMA1, LCP2, LDOC1, LGALS3, LGALS3BP, LGALS9, LIMK2, LRP8, LTBP1, Lyz1/Lyz2, MAEL, MBD1, MCAM, MDM4, Meg3, MKI67, MLKL, MMP9, MSN, MSR1, MYBPC3, MYH6, NABP1, NCKAP1L, NCOA2, NDC80, NDRG1, NOS1, NUA1, OAS1, Oas1b, OGDH, OLR1, ORC2, OTX2, PBX3, PENK, PF4, Pgap2, PHLDA2, PHLPP1, PIK3AP1, PIK3CD, PIKFYVE, PLAC8, PLAGL1, PLAUR, Pmaip1, POU2F3, PPARG, PRDM16, PRDX6, PRKAR2B, PRLR, PTPN22, PTPRC, RALB, RASGRP1,	235
Cell Death and Survival	apoptosis	apoptosis	1,63E-09	ACTC1, ADA, AFP, AGRN, ALB, ALDOA, ANXA4, ARHGEF6, ARRB2, ASS1, ATF5, ATP6V0D2, BCL11B, Bglap (includes others), BGN, BTG2, BUB1, C1QA, C3, C5AR1, CALCRL, CAMK2A, CCDC88A, Ccl9, CCND3, CD44, CD9, CDC73, CDH1, CDH5, CERKL, CFLAR, CHD8, CHI3L1, CIT, CITED2, Clca1/Clca2, CLEC11A, CLEC5A, Clu, COL18A1, COL2A1, COL4A1, COPS5, CSF1R, CTSS, CX3CR1, CXCR2, CYP1B1, DES, DNASE1L3, DSG2, EFN2, EMILIN2, EN1, EPHA3, F2RL1, FAM162A, FBLIM1, FGFR2, FLNB, FLT1, FTH1, GATA3, GBA2, GFRA1, GHRH, GLIS2, GPI, GRB10, HDAC4, HLF, HMOX1, HNRNPA1, HOXB9, HSPB1, HSPE1, IFIH1, IGF1, IL1R1, ING5, IQGAP2, IRS1, ITGA4, ITGAM, ITGB2, JUP, KLK3, KRT18, LAMA1, LDOC1, LGALS3, LGALS3BP, LGALS9, LIMK2, LTBP1, MAEL, MCAM, MDM4, MKI67, MMP9, MSN, MSR1, NCKAP1L, NCOA2, NDC80, NDRG1, NOS1, NUA1, OAS1, Oas1b, OLR1, ORC2, OTX2, PBX3, PF4, Pgap2, PHLDA2, PIK3AP1, PIK3CD, PLAC8, PLAGL1, PLAUR, Pmaip1, POU2F3, PPARG, PRDM16, PRDX6, PRKAR2B, PRLR, PTPN22, PTPRC, RALB, RASGRP1, RASSF6, RB1, RB1CC1, RNF144B, RNF17, RORC, RYBP, RYR2, S100A4, SEMA3A, SEPT4, SERPINA3, SFN, SFRP1, SFRP2, SGPP1, SIRPA, SLC8A1, SORBS2, SPINT1, SPP1, SRI, ST14, ST18, STAT1, STAT2, STRA6, SUB1, SULF1, SYCP2, SYCP3, SYK, TBX3, TEK,	193

Cell Death and Survival	necrosis	necrosis	2,09E-07	ACTC1, ADA, ADAMTS16, ADARB1, AFP, AGRN, ALB, ALDOA, ARHGEF6, ARRB2, ASS1, ATF5, BCL11B, BGN, BTG2, BUB1, BUB1B, C1QA, C3, C5AR1, CALCRL, Ccl9, CCND3, CD44, CD9, CDC73, CDH1, CDH5, CFLAR, CHI3L1, CIT, Clca1/Clca2, CLEC11A, Clu, COL18A1, COL2A1, COL4A1, COPS5, CSF1R, CTSS, Cxcl12, CYP1B1, DEK, DSG2, DUSP9, DYSF, EFN2, EMILIN2, EN1, F2RL1, FABP4, FAM162A, FGFR2, FLNB, FLT1, FTH1, GABRP, GATA2, GATA3, GBA2, GBE1, GFRA1, GHRH, GJB2, GLIS2, GPI, GRB10, HDAC4, HLF, HMOX1, HNRNPA1, HOXB9, HSPB1, HSPE1, IFIH1, IGF1, IL1R1, IQGAP2, IRS1, ITGA4, ITGAL, ITGAM, ITGB2, JUP, KLK3, KRT18, LDOC1, LGALS3, LGALS3BP, LGALS9, LTBP1, Lyz1/Lyz2, MBD1, MCAM, MDM4, Meg3, MKI67, MLKL, MMP9, MSN, MSR1, MYBPC3, MYH6, NABP1, NDRG1, NOS1, NUA1, OLR1, OTX2, PBX3, PENK, PF4, PHLPP1, PIK3AP1, PIK3CD, PIKFYVE, PLAC8, PLAGL1, PLAUR, Pmaip1, PPARG, PRDX6, PRKAR2B, PRLR, PTPN22, PTPRC, RALB, RASGRP1, RB1, RB1CC1, RNF144B, RORC, RYR2, S100A4, SCT, SEMA3A, SEPT4, SERPINA3, SFN, SFR1, SFRP1, SFRP2, SGPP1, SIRPA, SLC5A5, SLC8A1, SLC9B2, SPC25, SPP1, ST14, STAT1, STAT2, STRA6, SULF1, SYCP2, SYK, TEK, TF, TFAP2C, TFRC, TNFRSF11A, TNFRSF21, TNFRSF9, TNNT3, TNNT2, TNS4, TOP2A, TPT1,	179
Cell Death and Survival	apoptosis	apoptosis of tumor cell lines	5,85E-04	AFP, ALB, ARHGEF6, ARRB2, BTG2, C5AR1, CCND3, CD44, CDH1, CFLAR, Clu, COL18A1, COL4A1, COPS5, CSF1R, CYP1B1, DSG2, EMILIN2, FGFR2, FLNB, FLT1, FTH1, GBA2, GRB10, HDAC4, HLF, HMOX1, HNRNPA1, HOXB9, HSPB1, IGF1, IL1R1, ITGAM, JUP, KLK3, KRT18, LDOC1, LGALS3, LGALS3BP, LTBP1, MDM4, MMP9, MSN, MSR1, NDRG1, NOS1, NUA1, PBX3, PLAGL1, PLAUR, Pmaip1, PPARG, PRKAR2B, PTPN22, PTPRC, RALB, RB1, RNF144B, S100A4, SEMA3A, SEPT4, SFN, SFRP1, SFRP2, SIRPA, SPP1, STAT1, STAT2, SULF1, SYK, TF, TFAP2C, TFRC, TNFRSF11A, TNFRSF21, TNS4, TOP2A, TPT1, TRAF1, TTK, USP18, WNT6	82
Cell Death and Survival	cell death	cell death of tumor cell lines	1,10E-03	ADAMTS16, AFP, ALB, ARHGEF6, ARRB2, BTG2, BUB1B, C5AR1, CCND3, CD44, CDH1, CFLAR, Clu, COL18A1, COL4A1, COPS5, CSF1R, CYP1B1, DEK, DSG2, DUSP9, EMILIN2, FGFR2, FLNB, FLT1, FTH1, GBA2, GBE1, GPI, GRB10, HDAC4, HLF, HMOX1, HNRNPA1, HOXB9, HSPB1, IGF1, IL1R1, IQGAP2, ITGA4, ITGAM, JUP, KLK3, KRT18, LDOC1, LGALS3, LGALS3BP, LTBP1, MBD1, MDM4, MLKL, MMP9, MSN, MSR1, NABP1, NDRG1, NOS1, NUA1, PBX3, PLAGL1, PLAUR, Pmaip1, PPARG, PRKAR2B, PTPN22, PTPRC, RALB, RB1, RNF144B, S100A4, SEMA3A, SEPT4, SFN, SFR1, SFRP1, SFRP2, SIRPA, SLC5A5, SLC9B2, SPC25, SPP1, STAT1, STAT2, SULF1, SYK, TF, TFAP2C, TFRC, TNFRSF11A, TNFRSF21, TNS4, TOP2A, TPT1, TRAF1, TTK, USP18, VTN, WNT5A, WNT6	99
Cell Death and Survival	cytolysis	cytolysis	1,66E-03	ALB, ARRB2, C8G, CD44, Cd55/Daf2, CX3CR1, ISG15, ITGAL, ITGB2, KRT18, LCP2, OGDH, PF4, PIK3CD, PTPRC, Serpinb9b, SPP1, STAT1, STK31, SYK, TP53I11, TYROBP	22
Cell Death and Survival	apoptosis	apoptosis of vascular smooth muscle cells	2,35E-03	ALDOA, ARRB2, CSF1R, HMOX1, HSPB1, IGF1, MKI67, PPARG, TNNT3, TNNT2, TPT1	11
Cell Death and Survival	survival	cell survival	2,87E-03	AGRN, AKAP5, ASS1, ATF5, BTG2, BUB1B, CA2, CD44, CD9, CDH1, CDH5, CFLAR, CHI3L1, CKAP5, CLEC11A, Clu, COL18A1, CSF1R, Cxcl12, DNASE1L3, ELF3, EMILIN2, EN1, F2RL1, FGFR2, FLT1, FTH1, GATA2, GATA3, GFRA1, GRB10, HBZ, HLF, HMOX1, HSPB1, IFIH1, IGF1, IRF9, IRS1, ITGAM, ITGB2, JUP, LDOC1, LGALS3, Lyz1/Lyz2, MCAM, MMP9, MSR1, NDC80, NDRG1, NUA1, OLR1, PBX3, PENK, PF4, PHLPP1, PIK3CD, PIKFYVE, PLAC8, PLAUR, PPARG, PRDX6, PROM1, PTPN22, PTPRC, RALB, RB1, RB1CC1, RORC, RYR2, S100A4, SFN, SFR1, SFRP1, SFRP2, SGPP1, SIRPA, SPP1, STAT1, STAT2, SULF1, SYK, TBX3, TNFRSF9, TOP2A, TXNIP, TYROBP, VIM, VTN, WNT5A	90

Cell Death and Survival	cell death	cell death of blood cells	3,46E-03	ADA, AFP, AGRN, BCL11B, C1QA, CD44, CD9, CFLAR, CHI3L1, CLEC11A, CSF1R, Cxcl12, FABP4, FTH1, GATA2, GATA3, HLF, HMOX1, IFIH1, IGF1, IRS1, ITGA4, ITGAL, ITGAM, ITGB2, LGALS3, LGALS9, Lyz1/Lyz2, MSR1, PF4, PIK3AP1, PIK3CD, Pmaip1, PPARG, PRDX6, PRLR, PTPRC, RB1, RORC, SFN, SIRPA, SPP1, ST14, STAT1, SYK, TNFRSF11A, TNFRSF9, TOP2A, TRAF1, TYROBP, WNT5A	51
Cell Death and Survival	cell death	cell death of immune cells	4,13E-03	ADA, AFP, BCL11B, C1QA, CD44, CD9, CFLAR, CHI3L1, CLEC11A, CSF1R, Cxcl12, FABP4, FTH1, GATA3, HLF, HMOX1, IFIH1, IGF1, IRS1, ITGA4, ITGAL, ITGAM, ITGB2, LGALS3, LGALS9, Lyz1/Lyz2, MSR1, PF4, PIK3AP1, PIK3CD, Pmaip1, PPARG, PRDX6, PRLR, PTPRC, RB1, RORC, SFN, SIRPA, SPP1, ST14, STAT1, SYK, TNFRSF11A, TNFRSF9, TOP2A, TRAF1, TYROBP, WNT5A	49
Cell Death and Survival	apoptosis	apoptosis of smooth muscle cells	1,17E-02	ALDOA, ARRB2, CSF1R, HMOX1, HSPB1, IGF1, MKI67, PPARG, RB1, TNNT3, TNNT2, TPT1	12
Cell Death and Survival	cell viability	cell viability	1,47E-02	AGRN, AKAP5, ASS1, BTG2, BUB1B, CA2, CD44, CD9, CDH1, CDH5, CFLAR, CHI3L1, CKAP5, CLEC11A, Clu, CSF1R, Cxcl12, DNASE1L3, ELF3, EMILIN2, EN1, F2RL1, FGFR2, FLT1, FTH1, GATA2, GATA3, GFRA1, HBZ, HLF, HMOX1, HSPB1, IFIH1, IGF1, IRF9, ITGAM, ITGB2, LDOC1, LGALS3, MCAM, MMP9, MSR1, NDC80, NDRG1, NUAKE1, OLR1, PBX3, PENK, PF4, PIK3CD, PIKFYVE, PLAC8, PLAUR, PPARG, PRDX6, PROM1, PTPN22, PTPRC, RALB, RB1, RB1CC1, RORC, RYR2, S100A4, SFN, SFR1, SFRP1, SFRP2, SGPP1, SIRPA, SPP1, STAT1, STAT2, SULF1, SYK, TNFRSF9, TXNIP, TYROBP, VTN, WNT5A	80

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Category	Function	Function Annotation	p-value	Molecules	# Molecules
Cardiovascular System Development and Function	development	development of cardiovascular system	1,85E-13	ACE2, ACTC1, ADA, ADRA2B, AP1S2, BMPR2, C3, C3AR1, CALCRL, CCND3, CD44, CD9, CDH5, CFLAR, CITED1, CITED2, COL11A1, COL15A1, COL18A1, COL2A1, COL4A1, CSF1R, CTSS, CX3CR1, Cxcl12, CXCR2, DLX3, ECT2, EFNB2, EPHA3, F2RL1, FABP4, FGFR2, FLNB, FLT1, GATA2, GATA3, HEG1, HMOX1, HSD17B7, HSPB1, IGF1, IRS1, IRX4, ITGA4, ITGB2, JUP, KLK3, LAMA1, LGALS3, LTBP1, MDM4, Meg3, MMP12, MMP9, MYBPC3, MYH6, MYH7, MYL2, MYL3, NOS1, OLR1, OPTC, PF4, PGK1, PLAUR, PPARG, Prl2c2 (includes others), PTX3, RB1, RB1CC1, S100A4, SEMA3A, SERPIND1, SFRP2, SIN3B, SLC8A1, SPP1, SRI, STAT1, STRA6, SULF1, SYK, TBX3, TEK, TNFRSF11A, TNNT2, TPT1, TTN, VANG2, VASH2, VIM, VTN, WNT5A, ZFPM1, ZIC3	97
Cardiovascular System Development and Function	development	development of cardiovascular tissue	6,55E-11	ACTC1, ADRA2B, BMPR2, C3, CD44, CD9, CDH5, COL11A1, COL18A1, COL4A1, CSF1R, Cxcl12, CXCR2, ECT2, EFNB2, F2RL1, FABP4, FGFR2, FLT1, HEG1, HMOX1, IGF1, KLK3, LGALS3, MMP9, MYBPC3, MYH6, MYH7, MYL2, MYL3, PF4, PLAUR, SEMA3A, SERPIND1, SIN3B, SLC8A1, SPP1, STAT1, SULF1, TEK, TNFRSF11A, TNNT2, TTN, VASH2, WNT5A, ZFPM1	47
Cardiovascular System Development and Function	development	development of blood vessel	4,82E-10	ACE2, ADA, ADRA2B, AP1S2, BMPR2, C3, C3AR1, CD44, CD9, CDH5, CITED1, CITED2, COL15A1, COL18A1, COL4A1, CSF1R, CTSS, CX3CR1, Cxcl12, CXCR2, DLX3, ECT2, EFNB2, F2RL1, FABP4, FGFR2, FLT1, GATA2, HEG1, HMOX1, HSD17B7, HSPB1, IGF1, IRS1, ITGA4, ITGB2, KLK3, LAMA1, LGALS3, LTBP1, MDM4, Meg3, MMP12, MMP9, NOS1, OLR1, OPTC, PF4, PGK1, PLAUR, PPARG, Prl2c2 (includes others), PTX3, RB1, S100A4, SEMA3A, SERPIND1, SFRP2, SLC8A1, SPP1, STAT1, STRA6, SULF1, SYK, TBX3, TEK, TNFRSF11A, TNNT2, TPT1, VASH2, VIM, VTN, WNT5A	73
Cardiovascular System Development and Function	development	development of cardiac muscle	1,30E-07	ACTC1, COL11A1, FGFR2, MYBPC3, MYH6, MYH7, MYL2, MYL3, SIN3B, TNNT2, TTN, ZFPM1	13
Cardiovascular System Development and Function	development	development of endothelial tissue	1,13E-06	ADRA2B, BMPR2, C3, CD44, CD9, CDH5, COL18A1, COL4A1, CSF1R, Cxcl12, CXCR2, ECT2, EFNB2, F2RL1, FABP4, FGFR2, FLT1, HEG1, HMOX1, IGF1, KLK3, LGALS3, MMP9, PF4, PLAUR, SEMA3A, SERPIND1, SLC8A1, SPP1, STAT1, SULF1, TEK, TNFRSF11A, VASH2, WNT5A	35
Cardiovascular System Development and Function	development	endothelial cell development	1,30E-06	ADRA2B, BMPR2, C3, CD44, CD9, CDH5, COL18A1, COL4A1, CSF1R, Cxcl12, CXCR2, ECT2, EFNB2, F2RL1, FABP4, FGFR2, FLT1, HEG1, HMOX1, IGF1, KLK3, LGALS3, MMP9, PF4, PLAUR, SEMA3A, SERPIND1, SLC8A1, STAT1, SULF1, TEK, TNFRSF11A, VASH2, WNT5A	34
Cardiovascular System Development and Function	development	development of lymph vessel	2,61E-04	CD9, Cxcl12, EFNB2, FLT1, HEG1, SYK	6
Cardiovascular System Development and Function	development	development of ventricular septum	7,27E-04	CITED2, Cxcl12, GATA3, HEG1, STRA6, TBX3, WNT5A, ZFPM1	8

Cardiovascular System Development and Function	morphology	morphology of cardiovascular system	1,49E-10	ACE2, ACTC1, ADAM10, ADRA2B, AKAP5, BMPR2, CALCRL, CCND3, CD44, CDH5, CFLAR, CITED1, CITED2, Ciu, COL15A1, COL18A1, COL2A1, COL4A1, DES, DLX3, EFNB2, EPHA3, FGFR2, FLT1, GATA3, GBE1, GJB2, H19, HBZ, HEG1, HMOX1, HSD17B7, IGF1, IRX4, ITGA4, ITGB2, JUP, KLK3, LCP2, LTBP1, MMP9, MYBPC3, MYH6, MYL2, NCKAP1L, NOS1, OTX2, PPARG, PROM1, RB1, RB1CC1, RYR2, SEMA3A, SIN3B, SLC8A1, SLCO2A1, SPINT1, SPP1, SYK, TEK, TERC, TNFRSF21, TNNT2, TTN, TXNIP	66
Cardiovascular System Development and Function	morphology	morphology of heart	1,29E-09	ACE2, ACTC1, ADAM10, ADRA2B, AKAP5, BMPR2, CALCRL, CCND3, CFLAR, CITED2, Ciu, COL18A1, COL2A1, DES, EFNB2, EPHA3, GBE1, H19, HEG1, HMOX1, HSD17B7, IRX4, ITGA4, JUP, KLK3, LTBP1, MMP9, MYBPC3, MYH6, MYL2, NOS1, OTX2, RB1CC1, RYR2, SEMA3A, SLC8A1, SLCO2A1, TEK, TNNT2, TTN, TXNIP	41
Cardiovascular System Development and Function	morphology	morphology of heart ventricle	1,77E-06	ACE2, ADRA2B, BMPR2, CCND3, CFLAR, CITED2, Ciu, COL18A1, DES, H19, HMOX1, KLK3, MMP9, MYBPC3, MYH6, NOS1, RB1CC1, RYR2, SEMA3A, SLCO2A1, TEK, TTN, TXNIP	23
Cardiovascular System Development and Function	morphology	morphology of vasculature	1,82E-04	BMPR2, CDH5, CITED1, COL18A1, COL4A1, DLX3, FGFR2, GJB2, IGF1, ITGB2, PPARG, PROM1, SLC8A1, SPINT1, SYK, TNFRSF21, TNNT2	17
Cardiovascular System Development and Function	vasculogenesis	vasculogenesis	3,67E-09	ACE2, ADA, ADRA2B, AP1S2, BMPR2, C3, CD44, CD9, CDH5, CITED1, CITED2, COL15A1, COL18A1, COL4A1, CSF1R, CX3CR1, Cxcl12, CXCR2, ECT2, EFNB2, F2RL1, FABP4, FGFR2, FLT1, HEG1, HMOX1, HSD17B7, IGF1, IRS1, ITGA4, ITGB2, KLK3, LAMA1, LGALS3, LTBP1, MDM4, Meg3, MMP12, MMP9, NOS1, OLR1, OPTC, PF4, PLAUR, PPARG, Prl2c2 (includes others), PTX3, RB1, S100A4, SEMA3A, SERPIND1, SFRP2, SLC8A1, SPP1, STAT1, STRA6, SULF1, SYK, TEK, TNFRSF11A, TNNT2, VASH2, VIM, VTN, WNT5A	65
Cardiovascular System Development and Function	morphogenesis	morphogenesis of cardiac muscle	4,79E-09	ACTC1, COL11A1, FGFR2, MYBPC3, MYH6, MYH7, MYL2, MYL3, TNNT2, TTN, ZFPM1	12
Cardiovascular System Development and Function	morphogenesis	morphogenesis of cardiac muscle tissue in heart ventricle	1,70E-07	COL11A1, FGFR2, MYBPC3, MYH6, MYH7, MYL2, MYL3, TNNT2, TTN	9
Cardiovascular System Development and Function	cell movement	cell movement of endothelial cells	2,30E-07	ADAM10, ARHGEF6, ARRB2, BMPR2, CD9, CDH5, COL18A1, COL4A1, Cxcl12, CXCR2, CYP1B1, EFNB2, F2RL1, FLNB, FLT1, GATA3, HSPB1, IGF1, ITGA4, ITGB2, KLK3, LGALS3, MMP9, OLR1, PF4, PLAUR, Prl2c2 (includes others), S100A4, SEMA3A, SERPIND1, SPP1, TEK, VIM, VTN, WNT5A	35
Cardiovascular System Development and Function	migration	migration of endothelial cells	2,35E-07	ADAM10, ARHGEF6, ARRB2, BMPR2, CD9, CDH5, COL18A1, COL4A1, Cxcl12, CXCR2, CYP1B1, EFNB2, F2RL1, FLNB, FLT1, GATA3, HSPB1, IGF1, ITGA4, ITGB2, KLK3, MMP9, OLR1, PF4, PLAUR, Prl2c2 (includes others), SEMA3A, SERPIND1, SPP1, TEK, VIM, VTN, WNT5A	33
Cardiovascular System Development and Function	contractility	contractility of heart	2,43E-07	ACE2, ACTC1, ACTG2, Ciu, DES, FXD1, HMOX1, IGF1, IRX4, JUP, KLK3, MMP9, MYBPC3, MYH6, MYH7, MYL3, MYL4, NOS1, RYR2, SLC8A1, SPP1, TNNT2, TXNIP	23

Cardiovascular System Development and Function	contractility	contractility of cardiac muscle	3,35E-06	ACE2, C1u, DES, FXYD1, HMOX1, IGF1, IRX4, JUP, KLK3, MMP9, MYBPC3, MYH6, NOS1, SLC8A1, SPP1, TNNT2, TXNIP	17
Cardiovascular System Development and Function	contractility	contractility of ventricular myocardium	1,61E-05	ACE2, DES, IGF1, IRX4, KLK3, MMP9, MYBPC3, NOS1, SLC8A1, TXNIP	10
Cardiovascular System Development and Function	cardiogenesis	cardiogenesis	4,56E-07	ACTC1, CALCRL, CCND3, CDH5, CFLAR, CITED2, COL11A1, COL2A1, Cxcl12, EPHA3, FGFR2, GATA3, HEG1, IRX4, ITGA4, JUP, MYBPC3, MYH6, MYH7, MYL2, MYL3, PPARG, RB1CC1, SIN3B, SLC8A1, SRI, STRA6, TBX3, TEK, TNNT2, TTN, VANG2, WNT5A, ZFPM1, ZIC3	36
Cardiovascular System Development and Function	angiogenesis	angiogenesis	4,99E-07	ADA, ADRA2B, AP1S2, BMPR2, C3, C3AR1, CD44, CD9, CDH5, CITED2, COL15A1, COL18A1, COL4A1, CTSS, CX3CR1, Cxcl12, CYP1B1, ECT2, EFNB2, F2RL1, FGFR2, FLNB, FLT1, GATA2, GPR56, HEG1, HMOX1, HSPB1, IGF1, ITGA4, ITGB2, JUP, LGALS3, LTBP1, Meg3, MMP12, MMP9, OLR1, OPTC, PF4, PGK1, PLAUR, Prl2c2 (includes others), PTX3, SEMA3A, SERPIND1, SFRP2, SPP1, STAT1, STRA6, SULF1, SYK, TEK, TNNT2, VASH2, VIM, WNT5A	57
Cardiovascular System Development and Function	contraction	contraction of cardiac muscle	6,69E-07	ACTC1, KLK3, MYBPC3, MYL2, MYL3, MYL4, NOS1, RYR2, SLC8A1, TNNT2, TTN	12
Cardiovascular System Development and Function	contraction	contraction of heart	1,21E-06	ACTC1, ACTG2, AGRN, DES, HMOX1, HRC, KLK3, MYBPC3, MYH6, MYH7, MYL2, MYL3, MYL4, NOS1, RYR2, SLC8A1, SPP1, SRI, TNNT2, TTN	21
Cardiovascular System Development and Function	adhesion	adhesion of endothelial cells	7,17E-07	ADAM10, C1QA, CD44, COL18A1, CXCR2, FERMT2, FLT1, ITGA4, ITGAL, ITGAM, ITGB2, LGALS3, OLR1, PF4, PLAUR, PPARG, SERPING1, SPP1, VTN	19
Cardiovascular System Development and Function	adhesion	adhesion of vascular endothelial cells	2,15E-06	ADAM10, CD44, CXCR2, FERMT2, FLT1, ITGA4, ITGAL, ITGAM, ITGB2, LGALS3, PF4, PLAUR, PPARG, SPP1	14
Cardiovascular System Development and Function	heart rate	heart rate	1,47E-06	ACE2, ACTC1, ACTG2, ADRA2B, AGRN, CDH5, DES, EPHA3, FLT1, HMOX1, HRC, JUP, KCNA1, KLK3, MYBPC3, MYH6, MYH7, MYL2, MYL3, MYL4, NOS1, RYR2, SLC6A2, SLC8A1, SPP1, SRI, TNNT2, TTN	29
Cardiovascular System Development and Function	neovascularization	neovascularization	3,79E-06	C3, CD44, CDH5, COL18A1, EFNB2, FGD5, FLT1, IGF1, IRS1, ITGA4, ITGB2, LGALS3, MMP12, MMP9, NOS1, Prl2c2 (includes others), S100A4, SPP1	18
Cardiovascular System Development and Function	neovascularization	neovascularization of organ	2,07E-05	C3, COL18A1, EFNB2, FLT1, IGF1, IRS1, ITGB2, LGALS3, MMP9, NOS1, Prl2c2 (includes others), S100A4	12
Cardiovascular System Development and Function	neovascularization	neovascularization of eye	3,71E-05	C3, COL18A1, FLT1, IGF1, IRS1, ITGB2, LGALS3, MMP9, NOS1, Prl2c2 (includes others), S100A4	11
Cardiovascular System Development and Function	function	function of cardiovascular system	1,30E-05	CFP, COL15A1, DES, EPHA3, FXYD1, GATA3, HMOX1, KCNA1, KLK3, NOS1, SLC8A1, SPP1, TNNT2	13
Cardiovascular System Development and Function	proliferation	proliferation of endothelial cells	1,85E-05	ADRA2B, BMPR2, C3, CD44, COL18A1, COL4A1, CSF1R, Cxcl12, CXCR2, EFNB2, F2RL1, FABP4, FGFR2, FLT1, HMOX1, IGF1, KLK3, PF4, PLAUR, SEMA3A, SERPIND1, SLC8A1, STAT1, SULF1, TEK, TNFRSF11A, VASH2, WNT5A	28
Cardiovascular System Development and Function	vascularization	vascularization	3,00E-05	ADRA2B, C3, CD44, CDH5, COL18A1, CXCR2, EFNB2, FGD5, FLT1, IGF1, IRS1, ITGA4, ITGB2, LGALS3, MMP12, MMP9, NOS1, PPARG, Prl2c2 (includes others), RB1, S100A4, SPP1	22
Cardiovascular System Development and Function	vascularization	vascularization of eye	6,29E-05	C3, COL18A1, CXCR2, FLT1, IGF1, IRS1, ITGB2, LGALS3, MMP9, NOS1, Prl2c2 (includes others), S100A4	12

Cardiovascular System Development and Function	vascularization	vascularization of cornea	1,26E-04	COL18A1, CXCR2, FLT1, ITGB2, LGALS3, MMP9, Prl2c2 (includes others), S100A4	8
Cardiovascular System Development and Function	fractional shortening	fractional shortening of cardiomyocytes	4,62E-05	FABP3, FABP4, NOS1	3
Cardiovascular System Development and Function	fractional shortening	fractional shortening of heart	4,92E-04	FABP3, FABP4, FLT1, NOS1, RYR2, TNNI3	6
Cardiovascular System Development and Function	mass	mass of heart	1,13E-04	ACE2, FABP3, FXYD1, H19, IGF1, IRS1, KLK3, MYBPC3, MYH6, NOS1, PAPP2, PLAGL1, SPP1, TTN	14
Cardiovascular System Development and Function	binding	binding of endothelial tissue	1,80E-04	ITGAM, OLR1, VTN	3
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of heart ventricle	2,63E-04	ACE2, ADRA2B, CITED2, Clu, DES, H19, HMOX1, MYBPC3, MYH6, RB1CC1, SEMA3A, SLCO2A1, TTN, TXNIP	14
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of vasculature	3,73E-04	BMPR2, CDH5, CITED1, COL18A1, COL4A1, DLX3, FGFR2, GJB2, ITGB2, PPARG, PROM1, SLC8A1, SPINT1, SYK, TNFRSF21, TNNI3	16
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of atrium	8,22E-04	CITED2, EPHA3, HEG1, IRX4, JUP, MYBPC3, SEMA3A, SLC8A1	8
Cardiovascular System Development and Function	diastolic function	diastolic function of heart	2,91E-04	MYBPC3, MYH7, TNNI3, TNNT2	4
Cardiovascular System Development and Function	systole	systole	4,50E-04	MYBPC3, MYH7, SPP1, TNNI3, TNNT2	5
Cardiovascular System Development and Function	blood pressure	blood pressure	5,71E-04	ABCC9, ACE2, ACTC1, ADRA2B, BGN, BMPR2, C3AR1, CD44, F2RL1, HLF, HMOX1, IGF1, IL1R1, IRS1, MYH6, NOS1, NPR3, PLAUR, PPARG, SCNN1A, SLC6A2, SLC8A1, SPP1, TNNI3, TTN	25
Cardiovascular System Development and Function	relaxation	relaxation of heart	6,41E-04	ACTC1, ACTG2, DES, MYBPC3, NOS1, SLC8A1, TNNI3, TNNT2	8
Cardiovascular System Development and Function	diastolic pressure	diastolic pressure	7,27E-04	ABCC9, IGF1, IRS1, MYH6, NOS1, PPARG, SLC8A1, TTN	8

Table S6

Category	Function	Function Annotation	p-value	Molecules	# Molecules
Cardiovascular System Development and Function	morphology	morphology of cardiovascular system	1,54E-19	ACTA2, ACTC1, ADAM12, ADRA2B, ANGPT1, APOB, ARHGDIA, AXL, BMP1, CD44, CDKN1A, CDO1, CDON, CFLAR, COL2A1, DLX5, EDNRA, EPHA3, ERVFRD-1, GATA1, GATA3, GBE1, GHR, GJB2, Gypa, H19, HBZ, HEG1, HPGD, HSPB8, IGF2, ITGB2, ITGB3, KDR, KLF1, L1CAM, LAMA4, LCP2, LPL, LTBP1, MEF2C, MEIS1, MYBPC3, MYC, MYH6, MYL2, MYOCD, NCF1, NCKAP1L, NFATC4, NFE2, PDGFA, PDLIM5, POSTN, PPARG, PPARGC1A, PPP1R15B, RBP4, RGS2, RYR2, SEMA3A, SHH, SIN3B, SLC8A1, SMYD1, SPINT1, TAL1, TEK, TFRC, TGFB3, TNNT2, TRIM55, TSPAN33, TTN, TXNIP, VWF, WT1, XIRP1, ZEB1, ZFPM2	80
Cardiovascular System Development and Function	morphology	morphology of heart	3,23E-10	ACTC1, ADAM12, ADRA2B, APOB, CFLAR, COL2A1, EDNRA, EPHA3, GBE1, H19, HEG1, HSPB8, IGF2, LAMA4, LTBP1, MEF2C, MYBPC3, MYC, MYH6, MYL2, NCF1, NFATC4, PDGFA, PDLIM5, POSTN, PPARGC1A, RBP4, RYR2, SEMA3A, SHH, SLC8A1, SMYD1, TEK, TGFB3, TNNT2, TRIM55, TTN, TXNIP, WT1, ZFPM2	40
Cardiovascular System Development and Function	morphology	morphology of heart ventricle	5,30E-06	ADAM12, ADRA2B, APOB, CFLAR, H19, HSPB8, IGF2, LAMA4, MYBPC3, MYH6, NCF1, NFATC4, PDGFA, PDLIM5, PPARGC1A, RYR2, SEMA3A, TEK, TTN, TXNIP, ZFPM2	21
Cardiovascular System Development and Function	morphology	morphology of red blood cells	2,66E-05	GATA1, GATA3, Gypa, HBZ, KLF1, MYC, NCKAP1L, NFE2, PPP1R15B, SIN3B, TFRC, TSPAN33	12
Cardiovascular System Development and Function	morphology	morphology of blood vessel	1,37E-04	ACTA2, ANGPT1, ARHGDIA, AXL, BMP1, CDO1, CDON, DLX5, EDNRA, GHR, HPGD, L1CAM, LAMA4, LPL, LTBP1, MEF2C, MEIS1, MYC, MYOCD, NCF1, NFATC4, PPARG, TEK, WT1	24
Cardiovascular System Development and Function	morphology	morphology of left ventricle	1,42E-04	ADAM12, APOB, H19, IGF2, LAMA4, MYBPC3, NCF1, PDLIM5, PPARGC1A, TXNIP, ZFPM2	11
Cardiovascular System Development and Function	morphology	morphology of aortic valve	1,16E-03	ADAM12, APOB, H19, IGF2, ZFPM2	5
Cardiovascular System Development and Function	morphology	morphology of cardiovascular tissue	2,04E-03	ANGPT1, ARHGDIA, CD44, CDKN1A, HEG1, ITGB3, KLF1, TEK, ZEB1	9
Cardiovascular System Development and Function	morphology	morphology of blood platelets	2,45E-03	GATA1, LCP2, NFE2, VWF	4

Cardiovascular System Development and Function	development	development of cardiovascular system	2,55E-11	ACTC1, ADA, ADRA2B, ANGPT1, ANK1, ANXA3, AP1S2, APOA1, APOB, ARHGDIA, AXL, BCOR, C3AR1, CD44, CDKN1A, CFLAR, COL2A1, CSF1R, CX3CR1, EDNRA, EPHA3, F2RL1, FOXP1, GAS1, GATA1, GATA3, Hdac9, HEG1, HOXA10, HSPB1, IGF2, ITGB2, ITGB3, JPH2, KDR, KLF1, L1CAM, LAMA4, LGR4, LTBP1, MEF2C, Meg3, MEIS1, MYBPC3, MYC, MYH6, MYH7, MYL2, MYOCD, NFATC4, NFKBIB, OLR1, PBRM1, PDGFA, PDGFC, PF4, PIK3CG, PPARG, PPARGC1A, PTAFR, RASA3, RBP4, SEMA3A, SERPIND1, SERPINF1, SHH, SIN3B, SLC8A1, SMYD1, TAL1, TBX3, TDGF1, TEK, TGFB3, THBS4, TIPARP, TNNI1, TNNT2, TPT1, TTN, VCAN, VLDLR, WT1, XIRP1, ZEB1, ZFPM2	86
Cardiovascular System Development and Function	development	development of cardiovascular tissue	1,47E-08	ACTC1, ADRA2B, ANGPT1, APOA1, AXL, CD44, CDKN1A, CSF1R, F2RL1, HEG1, IGF2, ITGB3, KDR, L1CAM, LGR4, MEF2C, MYBPC3, MYC, MYH6, MYH7, MYL2, PDGFC, PF4, PIK3CG, RASA3, RBP4, SEMA3A, SERPIND1, SERPINF1, SIN3B, SLC8A1, TAL1, TEK, TGFB3, THBS4, TNNI1, TNNT2, TTN, VLDLR, ZFPM2	40
Cardiovascular System Development and Function	development	development of cardiac muscle	3,88E-07	ACTC1, MYBPC3, MYH6, MYH7, MYL2, RBP4, SIN3B, TGFB3, TNNI1, TNNT2, TTN, ZFPM2	12
Cardiovascular System Development and Function	development	development of blood vessel	1,66E-06	ADA, ADRA2B, ANGPT1, ANXA3, AP1S2, APOA1, APOB, ARHGDIA, AXL, C3AR1, CD44, CDKN1A, CSF1R, CX3CR1, EDNRA, F2RL1, GATA1, HEG1, HSPB1, IGF2, ITGB2, ITGB3, KDR, KLF1, L1CAM, LAMA4, LTBP1, MEF2C, Meg3, MEIS1, MYC, MYOCD, NFATC4, NFKBIB, OLR1, PDGFA, PDGFC, PF4, PIK3CG, PPARG, PTAFR, RASA3, SEMA3A, SERPIND1, SERPINF1, SHH, SLC8A1, TAL1, TBX3, TDGF1, TEK, TGFB3, THBS4, TIPARP, TPT1, VLDLR, WT1, ZEB1, ZFPM2	59
Cardiovascular System Development and Function	development	development of endothelial tissue	1,44E-04	ADRA2B, ANGPT1, APOA1, AXL, CD44, CDKN1A, CSF1R, F2RL1, HEG1, IGF2, ITGB3, KDR, L1CAM, LGR4, MEF2C, MYC, PDGFC, PF4, PIK3CG, RASA3, SEMA3A, SERPIND1, SERPINF1, SLC8A1, TAL1, TEK, THBS4, VLDLR	28
Cardiovascular System Development and Function	development	endothelial cell development	1,83E-04	ADRA2B, ANGPT1, APOA1, AXL, CD44, CDKN1A, CSF1R, F2RL1, HEG1, IGF2, ITGB3, KDR, L1CAM, MEF2C, MYC, PDGFC, PF4, PIK3CG, RASA3, SEMA3A, SERPIND1, SERPINF1, SLC8A1, TAL1, TEK, THBS4, VLDLR	27
Cardiovascular System Development and Function	cardiogenesis	cardiogenesis	4,35E-10	ACTC1, BCOR, CFLAR, COL2A1, EDNRA, EPHA3, FOXP1, GAS1, GATA3, Hdac9, HEG1, JPH2, MEF2C, MYBPC3, MYH6, MYH7, MYL2, MYOCD, NFATC4, PBRM1, PDGFA, PDGFC, PPARG, PPARGC1A, RBP4, SHH, SIN3B, SLC8A1, SMYD1, TBX3, TDGF1, TEK, TGFB3, TNNI1, TNNT2, TTN, VCAN, WT1, XIRP1, ZFPM2	40

Cardiovascular System Development and Function	heart rate	heart rate	5,41E-09	ACTC1, ACTG2, ADRA2B, ANK3, CACNA1G, CD47, EDNRA, EPHA3, FOXP1, HRC, ITGB3, JPH2, LAMA4, LPL, MRVI1, MYBPC3, MYH6, MYH7, MYL2, MYL4, PIK3CG, PPARGC1A, PTAFR, RGS2, RYR2, SLC8A1, SRL, SYNE1, TNNI1, TNNT2, TTN, ZFPM2	32
Cardiovascular System Development and Function	mass	mass of heart	8,46E-08	DEDD, FABP3, GHR, H19, Hdac9, HSPB8, IGF2, IGFBP2, ITGB3, MYBPC3, MYC, MYH6, PDLIM5, PLAGL1, PPARGC1A, TKT, TRIM55, TTN	18
Cardiovascular System Development and Function	contractility	contractility of heart	2,13E-07	ACTC1, ACTG2, APOA1, HSPB8, ITGB3, LAMA4, MEF2C, MYBPC3, MYH6, MYH7, MYL4, NCF1, PDLIM5, PIK3CG, PPARGC1A, RYR2, SLC8A1, SRL, TNNT2, TRIM55, TXNIP, XIRP1	22
Cardiovascular System Development and Function	contractility	contractility of cardiac muscle	4,68E-06	HSPB8, ITGB3, LAMA4, MEF2C, MYBPC3, MYH6, NCF1, PDLIM5, PIK3CG, PPARGC1A, SLC8A1, SRL, TNNT2, TRIM55, TXNIP, XIRP1	16
Cardiovascular System Development and Function	contractility	contractility of ventricular myocardium	1,66E-03	HSPB8, LAMA4, MEF2C, MYBPC3, PPARGC1A, SLC8A1, TXNIP	7
Cardiovascular System Development and Function	morphogenesis	morphogenesis of cardiac muscle	2,81E-07	ACTC1, MYBPC3, MYH6, MYH7, MYL2, TGFB3, TNNI1, TNNT2, TTN, ZFPM2	10
Cardiovascular System Development and Function	morphogenesis	morphogenesis of cardiovascular tissue	5,13E-07	ACTC1, LGR4, MYBPC3, MYH6, MYH7, MYL2, TGFB3, TNNI1, TNNT2, TTN, ZFPM2	11
Cardiovascular System Development and Function	morphogenesis	morphogenesis of cardiac muscle tissue in heart ventricle	1,53E-05	MYBPC3, MYH6, MYH7, MYL2, TGFB3, TNNI1, TNNT2	7
Cardiovascular System Development and Function	morphogenesis	morphogenesis of heart	2,23E-03	COL2A1, FOXP1, MEF2C, MYBPC3, MYL2, SHH, SLC8A1, TBX3, TTN, XIRP1	10
Cardiovascular System Development and Function	contraction	contraction of heart	1,20E-06	ACTC1, ACTG2, ANK3, EDNRA, HRC, LPL, MYBPC3, MYH6, MYH7, MYL2, MYL4, PIK3CG, PTAFR, RGS2, RYR2, SLC8A1, SRL, TNNI1, TNNT2, TTN	20
Cardiovascular System Development and Function	contraction	contraction of cardiac muscle	1,46E-05	ACTC1, MYBPC3, MYL2, MYL4, PIK3CG, RGS2, RYR2, SLC8A1, TNNT2, TTN	10
Cardiovascular System Development and Function	contraction	contraction of heart ventricle	6,52E-04	ACTC1, ACTG2, MYBPC3, MYH6	4
Cardiovascular System Development and Function	vasculogenesis	vasculogenesis	3,74E-06	ADA, ADRA2B, ANGPT1, AP1S2, APOA1, APOB, ARHGDIA, AXL, CD44, CDKN1A, CSF1R, CX3CR1, EDNRA, F2RL1, GATA1, HEG1, IGF2, ITGB2, ITGB3, KDR, KLF1, L1CAM, LTBP1, MEF2C, Meg3, MEIS1, MYC, MYOCD, NFATC4, NFKBIB, OLR1, PDGFA, PDGFC, PF4, PIK3CG, PPARG, PTAFR, RASA3, SEMA3A, SERPIND1, SERPINF1, SHH, SLC8A1, TAL1, TDGF1, TEK, TGFB3, THBS4, TIPARP, VLDLR, WT1, ZEB1, ZFPM2	53

Cardiovascular System Development and Function	relaxation	relaxation of cardiac muscle	2,31E-05	ITGB3, MYBPC3, PIK3CG, RGS2, SLC8A1, SRL	6
Cardiovascular System Development and Function	relaxation	relaxation of heart	5,98E-05	ACTC1, ACTG2, ITGB3, MYBPC3, PIK3CG, RGS2, SLC8A1, SRL, TNNT2	9
Cardiovascular System Development and Function	relaxation	relaxation of heart ventricle	1,12E-03	ACTC1, ACTG2, MYBPC3	3
Cardiovascular System Development and Function	function	function of cardiovascular system	2,66E-05	CACNA1G, CACNB2, EPHA3, GATA3, HSPB8, JPH2, NCF1, NFATC4, PDLIM5, SLC8A1, SRL, XIRP1	12
Cardiovascular System Development and Function	proliferation	proliferation of vessel	8,62E-05	ANGPT1, AXL, MYB, PF4, SERPIND1	5
Cardiovascular System Development and Function	proliferation	proliferation of blood vessel	1,28E-04	AXL, MYB, PF4, SERPIND1	4
Cardiovascular System Development and Function	proliferation	proliferation of endothelial cells	1,16E-03	ADRA2B, ANGPT1, APOA1, AXL, CD44, CDKN1A, CSF1R, F2RL1, IGF2, ITGB3, KDR, L1CAM, MYC, PDGFC, PF4, SEMA3A, SERPIND1, SERPINF1, SLC8A1, TEK, THBS4, VLDLR	22
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of heart ventricle	1,05E-04	ADRA2B, H19, IGF2, LAMA4, MYBPC3, MYH6, NCF1, NFATC4, PDLIM5, PPARGC1A, SEMA3A, TTN, TXNIP, ZFPM2	14
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of heart	1,53E-04	ACTC1, GBE1, HSPB8, IGF2, LAMA4, MYBPC3, MYC, NCF1, NFATC4, PDLIM5, POSTN, PPARGC1A, SHH, SMYD1, TNNT2, TRIM55, WT1, ZFPM2	18
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of red blood cells	7,66E-04	GATA1, GATA3, Gypa, HBZ, KLF1, PPP1R15B, SIN3B, TFRC, TSPAN33	9
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of pulmonary valve	1,18E-03	ADAM12, H19, IGF2, ZFPM2	4
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of blood vessel	1,66E-03	ACTA2, ARHGDIA, AXL, BMP1, CDO1, CDON, DLX5, EDNRA, GHR, HPGD, LAMA4, LPL, LTBP1, MEF2C, MYC, MYOCD, NCF1, NFATC4, TEK, WT1	20
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of artery	2,19E-03	ACTA2, BMP1, CDO1, DLX5, EDNRA, GHR, LTBP1, MEF2C, MYC, MYOCD, NCF1, TEK, WT1	13
Cardiovascular System Development and Function	abnormal morphology	abnormal morphology of atrium	2,30E-03	EDNRA, EPHA3, HEG1, MYBPC3, SEMA3A, SLC8A1, ZFPM2	7
Cardiovascular System Development and Function	hyperplasia	hyperplasia of artery	1,38E-04	AXL, MYB, SERPIND1	3

Cardiovascular System Development and Function	adhesion	adhesion of endothelial cells	2,30E-04	ANGPT1, AXL, CD44, F10, GP1BA, ITGB2, ITGB3, L1CAM, OLR1, PF4, PIK3CG, PPARG, PPBP, SERPING1	14
Cardiovascular System Development and Function	adhesion	adhesion of vascular endothelial cells	5,11E-04	ANGPT1, CD44, F10, ITGB2, ITGB3, L1CAM, PF4, PIK3CG, PPARG, PPBP	10
Cardiovascular System Development and Function	angiogenesis	angiogenesis	2,73E-04	ADA, ADRA2B, ANGPT1, ANXA3, AP1S2, APOB, ARHGDIA, AXL, C3AR1, CD44, CDKN1A, CX3CR1, EDNRA, F2RL1, GATA1, HEG1, HSPB1, IGF2, ITGB2, ITGB3, KDR, KLF1, LTBP1, MEF2C, Meg3, MEIS1, MYB, MYC, NCF1, NCL, NFATC4, NFKBIB, OLR1, PDGFA, PF4, PIK3CG, PTAFR, SEMA3A, SERPIND1, SERPINF1, SHH, TAL1, TEK, TGFB3, ZEB1	45
Cardiovascular System Development and Function	blood pressure	blood pressure	8,77E-04	ACTA2, ACTC1, ADRA2B, C3AR1, CD44, CD47, CDKN1C, EDNRA, F2RL1, GHR, HLF, HSPB8, ITGB3, MRVI1, MYH6, NCF1, PDLIM5, PPARG, RGS2, SGK1, SLC8A1, TAC3, TTN	23
Cardiovascular System Development and Function	migration	migration of endothelial cells	9,12E-04	ANGPT1, ANXA3, AXL, F2RL1, GATA1, GATA3, HSPB1, IGF2, ITGB2, ITGB3, KDR, MYC, NCL, OLR1, PF4, PIK3CG, SEMA3A, SEMA6D, SERPIND1, SERPINF1, SHH, TDGF1, TEK	23
Cardiovascular System Development and Function	formation	formation of blood vessel	9,51E-04	ANGPT1, GATA1, ITGB3, KDR, MEF2C, NFKBIB, OLR1, PF4, SERPINF1, TGFB3	10
Cardiovascular System Development and Function	attachment	attachment of endocardial cells	1,08E-03	ANGPT1, TEK	2
Cardiovascular System Development and Function	attachment	attachment of endothelial cells	1,18E-03	ANGPT1, ITGB2, ITGB3, TEK	4
Cardiovascular System Development and Function	intimal hyperplasia	intimal hyperplasia of femoral artery	1,08E-03	AXL, SERPIND1	2
Cardiovascular System Development and Function	diastolic pressure	diastolic pressure of left ventricle	1,12E-03	HSPB8, ITGB3, SLC8A1	3
Cardiovascular System Development and Function	diastolic pressure	diastolic pressure	2,07E-03	CD47, HSPB8, ITGB3, MYH6, PPARG, SLC8A1, TTN	7
Cardiovascular System Development and Function	systolic pressure	systolic pressure of left ventricle	1,53E-03	ITGB3, MYH6, PDLIM5, SLC8A1	4

Table S7

Genes involved in muscle contraction			8d		14d	
Symbol	Entrez Gene Name	Family	Fold Change	FDR	Fold Change	FDR
ACTC1	actin, alpha, cardiac muscle 1	structural component	-89.333	0.00E+00	-26.336	0.00E+00
ACTN2	actinin, alpha 2	transcription regulator	-5.427	3.26E-04	-5.461	6.60E-03
ADA	adenosine deaminase	enzyme	6.201	2.59E-02	3.073	2.51E-04
ADRA2B	adrenoceptor alpha 2B	G-protein coupled receptor	2.365	1.36E-02	6.249	0.00E+00
AGRN	agrin	other	-1.072	1.00E+00	1.739	1.29E-02
ALDOA	aldolase A, fructose-bisphosphate	enzyme	-1.558	8.99E-03	-1.619	8.20E-03
ANK3	ankyrin 3, node of Ranvier (ankyrin G)	other	-2.741	1.05E-06	-1.772	6.17E-02
ANO1	anoctamin 1, calcium activated chloride channel	ion channel	1.755	5.09E-01	4.783	1.07E-03
CALCRL	calcitonin receptor-like	G-protein coupled receptor	-1.756	6.66E-02	-2.693	1.20E-02
CALD1	caldesmon 1	other	1.468	1.73E-03	1.678	2.85E-04
CHRNA1	cholinergic receptor, nicotinic, beta 1 (muscle)	transmembrane receptor	1.298	1.00E+00	2.588	4.98E-02
DES	desmin	other	-1.516	4.33E-01	-1.915	3.77E-02
EDNRA	endothelin receptor type A	transmembrane receptor	-2.158	2.28E-02	-1.317	7.91E-01
FXR1	FXR domain containing ion transport regulator 1	ion channel	1.576	9.39E-01	-3.047	5.49E-03
IGF1	insulin-like growth factor 1 (somatomedin C)	growth factor	-1.285	7.25E-01	-2.242	1.26E-05
KLK1b22	kallikrein-related peptidase 3	peptidase	1.762	7.70E-01	3.308	2.20E-02
MRV1	murine retrovirus integration site 1 homolog	other	-2.121	1.43E-02	-1.244	8.95E-01
MYBPC3	myosin binding protein C, cardiac	other	-25.922	3.77E-08	-4.457	4.01E-02
MYH6	myosin, heavy chain 6, cardiac muscle, alpha	structural component	-147.582	0.00E+00	-22.513	0.00E+00
MYH7	myosin, heavy chain 7, cardiac muscle, beta	structural component	-119.203	0.00E+00	-18.012	0.00E+00
MYL2	myosin, light chain 2, regulatory, cardiac, slow	structural component	-31.073	3.00E-10	-13.758	7.32E-08
MYL3	myosin, light chain 3, alkali; ventricular, skeletal, slow	structural component	-INF	1.31E-08	-29.280	9.11E-06
MYL4	myosin, light chain 4, alkali; atrial, embryonic	structural component	-11.144	0.00E+00	-3.217	1.96E-02
MYOM1	myomesin 1	structural component	-3.779	9.33E-07	-5.431	5.90E-08
NCF1	neutrophil cytosolic factor 1	enzyme	-23.124	4.31E-05	-2.363	6.01E-02
NOS1	nitric oxide synthase 1 (neuronal)	enzyme	1.727	9.25E-01	4.288	8.72E-04
PGAM2	phosphoglycerate mutase 2 (muscle)	phosphatase	-0.579	9.25E-01	-12.643	4.21E-02
PIK3CG	phosphatidylinositol-4,5-bisphosphate 3-kinase, catalytic subunit gamma	kinase	-55.565	7.65E-05	-1.597	8.91E-01
RGS2	regulator of G-protein signaling 2	other	-3.633	1.09E-03	-1.526	4.70E-01
RYR2	ryanodine receptor 2 (cardiac)	ion channel	-5.349	0.00E+00	-2.630	3.16E-03
SLC8A1	solute carrier family 8 (sodium/calcium exchanger), member 1	transporter	-8.651	0.00E+00	-2.902	3.60E-07
SRI	sorcin	transporter	0.116	0.00E+00	1.647	9.95E-03
SRL	sarcalumenin	other	-2.565	3.20E-02	-2.006	3.72E-01
TAC2	tachykinin 2	structural component	-3.158	3.25E-02	-1.175	1.00E+00
TNNI1	troponin I type 1 (skeletal, slow)	structural component	-3.497	3.72E-03	-1.083	1.00E+00
TNNI2	troponin I type 2 (skeletal, fast)	structural component	-7.603	1.99E-02	-3.711	5.82E-02
TNNI3	troponin I type 3 (cardiac)	structural component	1.381	9.50E-01	-3.851	1.95E-02
TNNT2	troponin T type 2 (cardiac)	structural component	-10.676	0.00E+00	-2.084	3.26E-05
TTN	titin	kinase	-42.592	0.00E+00	-6.384	0.00E+00

Transcription factors			8d		14d	
Symbol	Entrez Gene Name	Family	Fold Change	FDR	Fold Change	FDR
MYOCD	myocardin	transcription regulator	-4.260	4.02E-05	1.867	4.76E-01
CCRN4L	CCR4 carbon catabolite repression 4-like (S. cerevisiae)	transcription regulator	1.247	7.60E-01	1.884	1.39E-03
CITED1	Cbp/p300-interacting transactivator, with Glu/Asp-rich carboxy-terminal domain, 1	transcription regulator	2.190	5.46E-02	2.749	5.10E-04
COPS5	COP9 signalosome subunit 5	transcription regulator	1.483	4.17E-02	1.528	4.42E-02
ELF3	E74-like factor 3 (ets domain transcription factor, epithelial-specific)	transcription regulator	42.651	3.41E-05	13.079	3.03E-05
GATA2	GATA binding protein 2	transcription regulator	4.012	1.45E-01	4.289	9.13E-03
HDAC4	histone deacetylase 4	transcription regulator	1.237	9.24E-01	2.358	4.33E-02
IRX4	iroquois homeobox 4	transcription regulator	9.363	9.86E-02	10.487	4.91E-02
MEF2C	myocyte enhancer factor 2C	transcription regulator	-2.418	1.30E-02	-2.029	2.03E-01

MYC	v-myc avian myelocytomatosis viral oncogene homolog	transcription regulator	2.167	5.58E-04	1.439	4.96E-01
NCOA2	nuclear receptor coactivator 2	transcription regulator	1.357	2.36E-01	1.703	3.33E-03
NFATC4	nuclear factor of activated T-cells, cytoplasmic, calcineurin-dependent 4	transcription regulator	2.310	3.52E-04	1.612	1.52E-01
NKX3-1	NK3 homeobox 1	transcription regulator	-5.889	1.55E-02	1.266	1.00E+00
PPARGC1A	peroxisome proliferator-activated receptor gamma, coactivator 1 alpha	transcription regulator	-7.685	6.77E-04	-1.101	1.00E+00
PTTG1	pituitary tumor-transforming 1	transcription regulator	1.554	2.54E-02	-1.153	9.48E-01
RB1	retinoblastoma 1	transcription regulator	1.154	9.39E-01	1.941	3.84E-02
SUPT16H	suppressor of Ty 16 homolog (S. cerevisiae)	transcription regulator	1.531	2.87E-03	1.198	7.40E-01
TFAP2C	transcription factor AP-2 gamma (activating enhancer binding protein 2 gamma)	transcription regulator	76.364	0.00E+00	4.997	0.00E+00
ZFPM2	zinc finger protein, FOG family member 2	transcription regulator	-2.440	6.51E-03	-1.626	9.32E-02