ORIGINAL RESEARCH

Systems Network Genomic Analysis Reveals Cardioprotective Effect of MURC/Cavin-4 Deletion Against Ischemia/Reperfusion Injury

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***Background*—**Ischemia/reperfusion (I/R) injury is a critical issue in the development of treatment strategies for ischemic heart disease. MURC (muscle-restricted coiled-coil protein)/Cavin-4 (caveolae-associated protein 4), which is a component of caveolae, is involved in the pathophysiology of dilated cardiomyopathy and cardiac hypertrophy. However, the role of MURC in cardiac I/R injury remains unknown.

***Methods and Results*—**The systems network genomic analysis based on PC-corr network inference on microarray data between wild-type and MURC knockout mouse hearts predicted a network of discriminating genes associated with reactive oxygen species. To demonstrate the prediction, we analyzed I/R-injured mouse hearts. MURC deletion decreased infarct size and preserved heart contraction with reactive oxygen species–related molecule EGR1 (early growth response protein 1) and DDIT4 (DNA-damage-inducible transcript 4) suppression in I/R-injured hearts. Because PC-corr network inference integrated with a protein–protein interaction network prediction also showed that MURC is involved in the apoptotic pathway, we confirmed the upregulation of STAT3 (signal transducer and activator of transcription 3) and BCL2 (B-cell lymphoma 2) and the inactivation of caspase 3 in I/R-injured hearts of MURC knockout mice compared with those of wild-type mice. STAT3 inhibitor canceled the cardioprotective effect of MURC deletion in I/R-injured hearts. In cardiomyocytes exposed to hydrogen peroxide, MURC overexpression promoted apoptosis and MURC knockdown inhibited apoptosis. STAT3 inhibitor canceled the antiapoptotic effect of MURC knockdown in cardiomyocytes.

***Conclusions*—**Our findings, obtained by prediction from systems network genomic analysis followed by experimental validation, suggested that MURC modulates cardiac I/R injury through the regulation of reactive oxygen species–induced cell death and STAT3-meditated antiapoptosis. Functional inhibition of MURC may be effective in reducing cardiac I/R injury. **(*J Am Heart Assoc*. 2019;8:e012047. DOI: 10.1161/JAHA.119.012047.)**

Key Words: apoptosis • caveolae • ischemia reperfusion injury • reactive oxygen species • systems biology

Coronary heart disease, a leading cause of death worldwide, places tremendous burden on individuals and society given its high rates of mortality and morbidity.[1] The severity of myocardial infarction depends in particular on delays in the initiation of treatment; therefore, early revascularization therapy is critical for survival and positive prognosis. Catheterization and thrombolytic therapy have improved the clinical scenario of myocardial infarction.[2,3] Although cardiac ischemia/reperfusion (I/R) is essential for cardiac-cell survival, it also increases infarct size, deteriorates cardiac contraction, and induces heart failure.[4–6] I/R injury produces oxidative damage, cell death, and aberrant immune response through the generation of mitochondrial reactive oxygen species (ROS).[7–9] Neutrophil NADPH oxidase around the infarct area, xanthine oxidase, and uncoupled

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Accompanying Tables S1 through S5 and Figure S1 through S11 are available at https://www.ahajournals.org/doi/suppl/10.1161/JAHA.119.012047

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Clinical Perspective

What Is New?

- This study reveals the intracellular signaling network related to MURC (muscle-restricted coiled-coil protein)/Cavin-4 (caveolae-associated protein 4) in cardiac ischemia/reperfusion (I/R) injury.
- MURC/Cavin-4 deletion has a cardioprotective effect against I/R injury through the inhibition of reactive oxygen species–induced cell death and the promotion of STAT3 (signal transducer and activator of transcription 3)–meditated antiapoptosis.
- The systems network genomic analysis, based on PC-corr network inference integrated with a protein–protein interaction network prediction followed by experimental validation, uncovers a crucial role of MURC/Cavin-4 in cardiac I/R injury.

What Are the Clinical Implications?

- This study elucidates the novel and comprehensive pathophysiological function of MURC/Cavin-4 in cardiac I/R injury.
- Functional inhibition of MURC/Cavin-4 may be effective in reducing cardiac I/R injury.

nitric oxide synthase also produce ROS.[10] Several clinical trials have been launched to assess treatments that overcome I/R injury. However, few effective treatments exist to prevent myocardial I/R injury.[5]

In myocardial infarction, cell death by apoptosis and necrosis occurs because of hypoxia and I/R injury after revascularization therapy. STAT3 (signal transducer and activator of transcription 3) plays a central role in the JAK (Janus kinase)/STAT signaling pathway to transmit the signal from the membrane to the nucleus.[11] JAK and STAT3 are essential components of some cytokine receptors. STAT3 regulates apoptosis by promoting the transcription of antiapoptotic molecules such as BCL2 (B-cell lymphoma 2),[12,13] which inhibits ROS-induced apoptosis.[14] In cardiovascular diseases, STAT3 functions as a transcription factor and is involved in myocardial infarction, oxidative damage, myocarditis, hypertrophy, and remodeling.[15] STAT3 activated in ischemic preconditioning has a cardioprotective effect for ischemic heart disease.[16] Activation of STAT3 protects against cardiac I/R injury by reducing infarct size in cardiac-specific transgenic mice expressing constitutively active STAT3.[17]

Caveolae are plasma membrane invaginations rich in cholesterol, glycosphingolipids, and lipid-anchored proteins.[18] Two distinct components, caveolins and cavins,[19,20] cooperate to form caveola structure and modulate its biogenesis and function.[21,22] Caveolin has 3 isoforms: Cav-1 (caveolin-1), Cav-2, and Cav-3.[23,24] Cavin has 4 isoforms: PTRF (polymerase 1 and transcript release factor)/Cavin-1, SDPR (serum deprivation protein response)/Cavin-2, SRBC (SDR-related gene product that binds to C kinase)/Cavin-3, and MURC (muscle-restricted coiled-coil protein)/Cavin-4.[25–27] MURC plays several roles in the pathophysiology of cardiovascular diseases[28–32] and is involved in myofibrillar organization, cardiac dysfunction, conduction disturbance, and atrial arrhythmia through the Rho-ROCK signaling pathway.[27] Gene mutations are observed in patients with dilated cardiomyopathy.[32] MURC deficiency attenuates α1-adrenergic receptor-induced ERK1/2 (extracellular signal-regulated kinase 1/2) activation, inhibits cardiomyocyte hypertrophy, and promotes the decrease of hypertrophy-related gene expression.[31] Moreover, hypoxia induces the synthesis of the MURC protein in the week after myocardial infarction in rat heart,[33] suggesting its important role in left ventricular (LV) remodeling after myocardial infarction. Nevertheless, its role in cardiac I/R injury remains unknown.

Omic science is developing rapidly to reveal the complex signaling network surrounding biosystems. An ever-increasing amount of omic data precipitated the development of the network inference method.[34] Principal component analysis (PCA) is widely used to explore differential patterns in omic data sets. *PC-corr* is an algorithm for unsupervised and parameter-free inference of a linear multivariate-discriminative correlation network based on the PCA loadings.[35] PC-corr enables creation of a discriminative correlation network directly (between-omics features), associated with the sample separation obtained by preliminary PCA analysis, and can be easily adapted for big data exploration in complex biosystems. In this study, separation is between wild-type (WT) and MURC knockout mouse samples. The protein–protein interaction network (PPIN) is a systematic protein network compiled by protein–protein interaction for the understanding of biological processes and protein function in the cell. Network inference from genomic profiles can be followed by a PPIN prediction to understand cell-signaling networks, and protein network–based prediction of novel candidate genes is used to suggest additional candidate genes.[36]

In this study, we elucidate the MURC-related intracellular signaling network in cardiac I/R injury using an integrated omic analysis. The systems network genomic analysis, based on PC-corr network inference integrated with a PPIN prediction followed by experimental validation, uncovers a crucial role of MURC in cardiac I/R injury and reveals that MURC deletion has a cardioprotective effect against I/R injury.

Methods

The authors declare that all supporting data are available within the article and its online supplementary files.

Microarray Analysis

To examine the gene expression of mouse hearts perturbed by MURC deficiency, we collected LV tissue from 10- to 13-week-old WT and MURC knockout (MURC KO) male mouse hearts. After euthanizing the mice, the hearts were excised by cervical dislocation and stored at −80°C. Total RNA was extracted from the tissue using TRIzol reagent (Invitrogen/Thermo Fisher Scientific), according to the manufacturer's instructions. The GeneChip Gene 1.0 ST Array System for Mouse (Affymetrix/Thermo Fisher Scientific) was used for gene expression profiling. The microarray gene-expression data set was normalized by log transformation (log[1+x], where x denotes the data matrix). The data discussed in this publication have been deposited in NCBI's Gene Expression Omnibus (GEO, http://www.ncbi.nlm.nih.gov/geo/) and are accessible through GEO Series accession number GSE125308.

PCA, PC-Corr Network Construction, and Enrichment Analysis

To disclose the similarity in multidimensional microarray compositions between WT and MURC KO mouse hearts, we analyzed the full microarray data set by PCA and subsequently applied PC-corr to elucidate the network of genes that predominantly contribute to the sample segregation obtained by PCA. The processing of the PCA result and the construction of the PC-corr network were performed as described previously.[35] MATLAB R2018a (MathWorks) was used for computational analyses. The PC-corr network was constructed with a cutoff of 0.6 and visually depicted in Cytoscape 3.6.1.[37] Enrichment analysis was conducted using DAVID 6.8 (Leidos Biomedical Research, https://david.ncifcrf.gov/)[38,39] for the extracted gene data set. Results of the enrichment analysis were obtained using the Benjamini multiple test correction.

PPIN and Enrichment Analysis

PPIN was used to suggest additional candidate genes by means of first-neighbor network interaction prediction. Ninety-one genes extracted from PC-corr at a cutoff of 0.6 were input into STRING 10.5 (https://string-db.org/),[40] and then we described a PPIN. We selected their first neighbors (261 proteins) in the PPIN. DAVID 6.8 was used for the enrichment analysis of the 261 proteins. We reorganized the PPIN by inputting the 46 proteins present in the enriched pathways of our interest to STRING.

Mouse Model of Cardiac I/R Injury

A mouse model of cardiac I/R injury was created as described previously with slight modifications.[41] The left anterior descending coronary arteries of 10-week-old C57BL/6 background male mice were ligated under 1.0% isoflurane anesthesia for 1 hour before reperfusion. Hearts were excised 30 minutes or 24 hours after reperfusion for analysis. Serum cardiac troponin I level was measured 24 hours after reperfusion by high-sensitivity mouse cardiac troponin I ELISA (Life Diagnostics), according to the manufacturer's instruction. MURC KO mice were generated as described previously.[31] Transgenic mice expressing MURC in the heart (Tg-MURC) were generated as described previously.[27] All animal use conformed with the *Guide for the Care and Use of Laboratory Animals* published by the US National Institutes of Health (NIH; Publication no. 85-23, revised 1996) and was approved by the institutional animal care and use committee of the Kyoto Prefectural University of Medicine.

Echocardiography and Triphenyltetrazolium Chloride Staining

Echocardiography was performed using a Vevo 2100 system (VisualSonics) equipped with a 30-MHz microprobe under isoflurane anesthesia 24 hours after I/R. Triphenyltetrazolium chloride staining was performed as described previously with slight modifications.[42] To determine the area at risk, 10% Evans blue dye (0.5 g/kg) was injected into the retro-orbital venous sinus after ligation of left anterior descending coronary arteries. Hearts were excised and stored at −80°C. Cross-sections of the hearts (1 mm) were immersed in 1.0% triphenyltetrazolium chloride in 0.9% saline at 24°C for 2 to 3 minutes. The vial was continuously agitated in a water bath at 37°C for 15 minutes, and then cross-sections were fixed in 10% neutral buffered formalin for 60 minutes. Sections were digitally photographed using a Leica MC120 HD microscope camera (Leica Microsystems). Infarct size and area at risk were quantified with ImageJ 1.49 software (NIH).

Dihydroethidium Staining

Dihydroethidium staining was performed as described previously with slight modifications.[43] Cross-sections through the left ventricles (1 mm) of freshly isolated mouse hearts were prepared and then equilibrated in Krebs buffer for 30 minutes at 37°C. Sections were then stained with 30 μmol/L dihydroethidium in fresh Krebs buffer and incubated in the dark for 30 minutes with gentle rotation. Dihydroethidium-stained LV sections were imaged using a

Carl Zeiss LSM 510 confocal microscope with a ×10 dry objective at 488 nm excitation. ZEN software (Carl Zeiss) was used to collect sequential Z-stacked confocal line scans of each section and to assemble 2.5-dimensional histogram plots of mean dihydroethidium intensity. Fluorescence intensity analysis of dihydroethidium was measured with ImageJ software.

Cell Culture

Neonatal rat cardiomyocytes (NRCMs) were prepared as described previously with slight modifications.[27] Cardiomyocytes isolated from 1- to 3-day-old Wistar rats were cultured in serum-containing medium (DMEM, 10% fetal bovine serum) for a total of 72 hours. Adult mouse cardiomyocytes were prepared as described previously with slight modifications.[44] Cardiomyocytes isolated from 10-week-old WT and MURC KO male mouse hearts were cultured in the culture medium and exposed to hydrogen peroxide after 24-hour incubation.

Gene Silencing and Transfer

Rat MURC and control small interfering RNA (siRNA) duplex oligonucleotides (Stealth RNAi siRNAs) were purchased from Invitrogen/Thermo Fisher Scientific. The siRNAs were transiently transfected into cardiomyocytes using Lipofectamine RNAiMAX reagent (Invitrogen/Thermo Fisher Scientific), according to the manufacturer's instructions. The medium was changed 24 hours after transfection. The siRNA sequences are provided in Table S1. Recombinant adenoviruses expressing FLAG-tagged human MURC/Cavin-4 (Ad-MURC) and β-galactosidase were described previously.[27] Twenty-four hours after seeding on a plate, the cardiomyocytes were infected with Ad-MURC and Ad-β-galactosidase diluted in culture media at a multiplicity of infection of 30 and incubated at 37°C for 1 hour. The viral suspension was removed, and the cardiomyocytes were cultured with fresh media.

Hypoxia/Reoxygenation of NRCMs and ROS Detection Assay

We examined ROS activity of cardiomyocytes exposed to hypoxia/reoxygenation. The ROS activity was evaluated using a CellROX detection kit (Invitrogen/Thermo Fisher Scientific) after serum deprivation for 12 hours under hypoxic conditions (1% O_2 and 5% CO_2, 37°C) followed by 3 hours of reoxygenation (21% O_2 and 5% CO_2, 37°C). The CellROX staining was performed according to the manufacturer's instructions; the CellROX reagent was added directly to the hypoxia/reoxygenation–challenged cardiomyocytes, and the mixture was incubated for 1 hour. The ROS intensity was measured using ImageJ software.

TUNEL Assay and Stimulation of Hydrogen Peroxide

Cultured NRCMs were exposed to 200 μmol/L hydrogen peroxide (H_2O_2) for 2 hours. A TUNEL (TdT-mediated dUTP nick-end labeling) assay was performed to detect apoptosis 6 hours after H_2O_2 exposure using the In Situ Cell Death Detection Kit, TMR red (Roche), according to the manufacturer's instructions. Cell death number was assessed by the percentage of TUNEL- and DAPI (40,6-diamidino-2–7 phenylindole)-positive cells.

STAT3 Cancellation Experiment

STAT3 inhibitor WP1066 (20 mg/kg; Santa Cruz Biotechnology) or an equal-volume vehicle (5% dimethyl sulfoxide) was administered intraperitoneally to mice daily for 3 days. The WP1066 dose was determined based on published toxicity and efficacy data in mice.[13,45] WP1066 (1 μmol/L) or an equal-volume vehicle 5% dimethyl sulfoxide was administered to NRCMs 1 hour before H_2O_2 exposure.

Western Blot Analysis

Cell lysates and tissue samples were extracted using a lysis buffer (50 mmol/L Tris-HCl [pH 7.5], 150 mmol/L NaCl, 50 mmol/L EDTA, 1% Triton X-100, and protease–phosphatase inhibitor mixture). Protein samples were subjected to SDS-PAGE and then transferred to membranes that were subsequently incubated with primary antibodies against STAT3, phosphorylated STAT3, ERK1/2, phosphorylated ERK1/2, Akt, phosphorylated Akt, cleaved caspase 3, DDIT4, GAPDH, β-actin, FLAG M2, EGR1, caveolin-1, caveolin-3, PTRF, SDPR, SRBC, BCL2, and MURC. Anti-MURC antibody was originally produced as described previously.[30] Horseradish peroxidase–conjugated antirabbit and antimouse IgGs were used as secondary antibodies.

Immunoprecipitation

NRCMs transfected with Ad-MURC were washed with ice-cold PBS and lysed with lysis buffer containing 50 mmol/L Tris-HCl (pH 7.5), 150 mmol/L NaCl, 50 mmol/L EDTA, 1% Triton X-100, and protease–phosphatase inhibitor mixture. Immunoprecipitation was carried out by incubating equal amounts of cell lysates with magnetic beads (Magnosphere MS300/Carboxyl; Cosmo Bio) coated with each antibody at 4°C overnight. Beads were washed with wash buffer (50 mmol/L Tris-HCl [pH 7.5], 150 mmol/L NaCl, 50 mmol/L EDTA, 1% Triton X-100, and protease–phosphatase inhibitor mixture) 5 times, and the precipitated proteins were separated by SDS-PAGE, transferred to polyvinylidene difluoride membranes, and probed with each antibody.

Reverse Transcription–Mediated Quantitative Polymerase Chain Reaction

Reverse transcription–mediated quantitative polymerase chain reaction was conducted as described previously.[27,29,31] Total RNA was extracted from cultured cells or tissues using TRIzol (Invitrogen/Thermo Fisher Scientific) and converted to cDNA using a High-Capacity cDNA Reverse Transcription Kit (Applied Biosystems/Thermo Fisher Scientific). Synthesized cDNA was analyzed by kinetic real-time polymerase chain reaction using Takara PCR Thermal Cycler Dice (Takara Bio) with Platinum SYBR Green qPCR Supermix (Invitrogen/Thermo Fisher Scientific). The primer sequences are provided in Table S2.

Statistical Analysis

Statistical analysis was done in R 3.3.2 (R Foundation for Statistical Computing).[46] The Shapiro–Wilk test was used for normality testing. All 2-group analysis used a 2-tailed Student *t* test. Comparisons of multiple groups with normal distribution were done with 1-way ANOVA followed by the Tukey post hoc test. The Kruskal–Wallis test was used as a nonparametric test, followed by the Dunn post hoc test. All data are displayed as mean±SEM. All in vitro experiments were performed at least 3 times. MATLAB R2018a was used for the computational analyses employing PC-corr. The PC-corr network was constructed with a cutoff of 0.6 (maximum is 1) because this value ensures that the connectivity links of the network have medium to high levels of correlation and discrimination simultaneously. Results of the enrichment analysis were obtained using Benjamini multiple test correction with the significance threshold of 0.05.

Results

Systems Network Genomic Analysis Based on PC-Corr Network Inference Reveals MURC Deficiency Is Involved in Response to ROS and Regulation of the Force of Heart Contraction

We performed microarray analysis for WT and MURC KO mouse hearts to examine the gene expression of mouse hearts perturbed by MURC deficiency. Heat mapping showed clear differentiation of gene expression between WT and MURC KO mouse hearts (Figure S1). PCA also showed clear segregation of gene expression between WT and MURC KO mouse hearts (Figure 1A).

PC-corr was used to enlighten the discriminative correlation network according to the weights of the links at a cutoff of 0.6 (Table S3), as both groups were clearly separated along the second principal component PC2. The genes obtained in the PC-corr network were input to DAVID for enrichment analysis (Figure 1B; Table S4). The genes involved in response to hypoxia, response to ROS, skeletal muscle cell differentiation, and regulation of the force of heart contraction and belonging to the top 10 pairs of enriched pathways were highlighted with the respective color circle in the PC-corr network. This reorganized network enabled us to determine that expression levels for the following specific pathway-related genes were markedly perturbed by MURC deficiency (Figure 1C): DDIT4, EGR1, and ACOT2 (acyl-CoA thioesterase 2) in response to hypoxia; DDIT4, EGR1, FOS (Fos proto-oncogene, AP-1 transcription factor subunit), and MPV17 (mitochondrial inner membrane protein MPV17) in response to ROS; EGR1, FOS and NR4A1 (nuclear receptor subfamily 4 group A member 1) in skeletal muscle cell differentiation; and GLRX3 (glutaredoxin 3) and MYL4 (myosin light chain 4) in regulation of the force of heart contraction.

MURC Deficiency Preserves Heart Contraction With Infarct Size Reduction After I/R

Because I/R injury induces cardiac damage along with ROS production,[7–9] we created a mouse model of I/R injury to demonstrate the relationship between ROS and MURC in the heart. By echocardiography, we evaluated cardiac function on WT and MURC KO mouse hearts after sham operation or 24 hours after I/R (Figure 2A and 2B). Fractional shortening and ejection fraction are representative indicators of LV systolic function. Although there was no difference in fractional shortening and ejection fraction between the WT and MURC KO groups of both sham-operated control groups, fractional shortening and ejection fraction were markedly preserved in MURC KO compared with WT mouse hearts after I/R. Mouse heart rate was equivalent between groups during echocardiography (Figure S2). We then evaluated the infarct size by triphenyltetrazolium chloride and Evans blue dual staining (Figure 2C). The area at risk assessed as the proportion of left ventricle was equal between the 2 groups (ie, the procedure was performed equally). The infarct size assessed as the proportion of the area at risk was significantly lower in MURC KO compared with WT mouse hearts after I/R (Figure 2D). Cardiac troponin I level was significantly lower in MURC KO than WT mouse serum (Figure 2E). Similarly, we performed echocardiography and measurement of infarct size on the hearts of adult transgenic mice expressing cardiac-specific MURC (Tg-MURC) 24 hours after I/R; however, we found no difference in fractional shortening, ejection fraction, and infarct size between WT and Tg-MURC mouse hearts (Figure S3A and S3B).

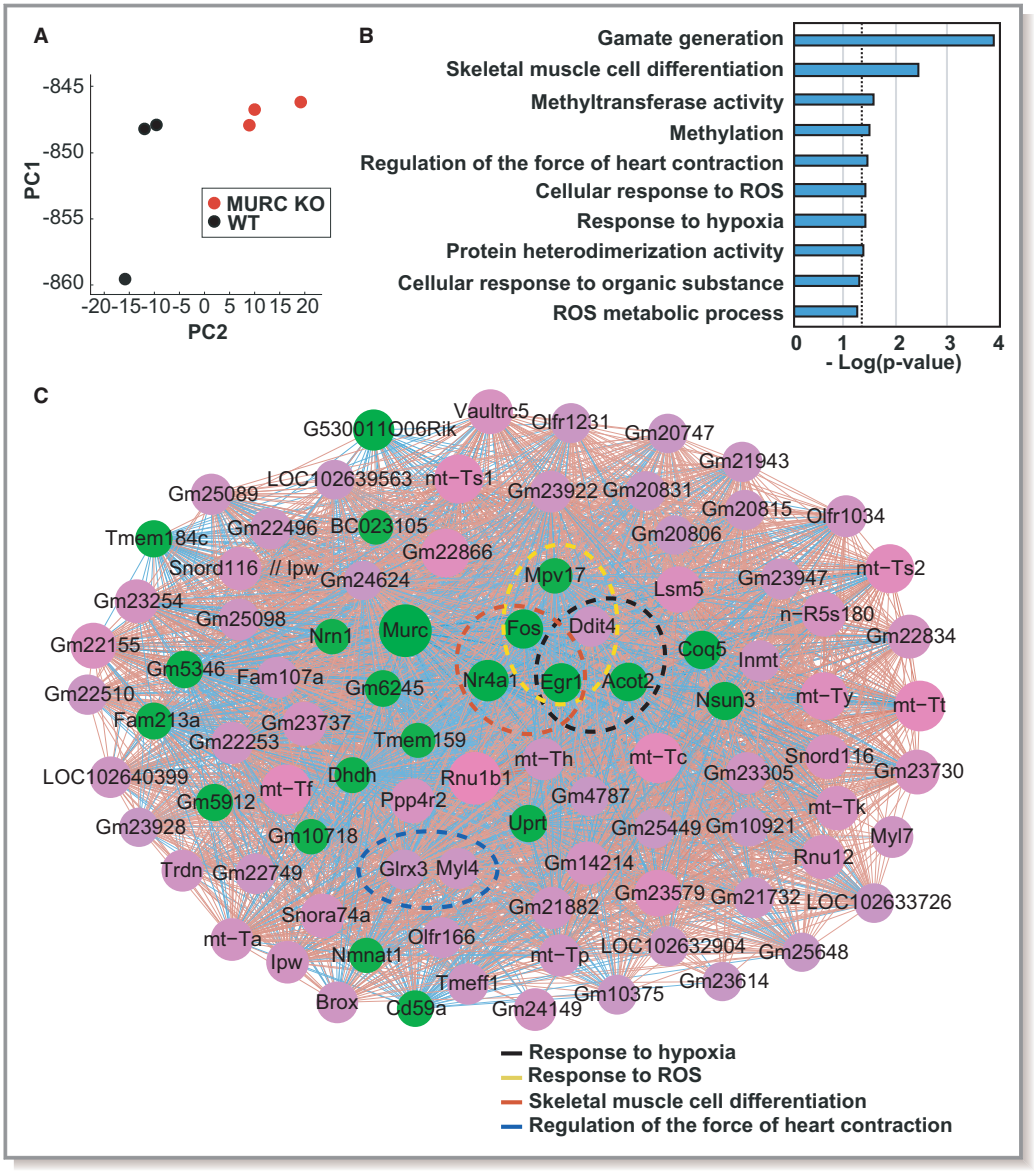

Figure 1. Microarray analysis of wild-type (WT) and MURC KO (muscle-restricted coiled-coil protein knockout) mouse hearts shows MURC deficiency is involved in response to hypoxia and reactive oxygen species (ROS). **A**, Principal component analysis. Red nodes indicate MURC KO, black nodes indicate WT. PC1, first principal component; PC2, second principal component. **B**, Enrichment analysis conducted by DAVID. Top 10 GO pathways are ranked by Benjamini-corrected *P* value and scaled according to the function −log10 (*P* value). The vertical dashed line indicates the threshold at 0.05. **C**, PC-corr network was constructed according to the loading of PC2 at a cutoff of 0.6. Magenta nodes indicate genes with higher expression in MURC KO; green nodes indicate genes with higher expression in WT mouse hearts. Node size is proportional to node degree. The color of interaction denotes the direction of the Pearson correlation between the features: red for positive Pearson correlation and blue for negative case. Nodes circled with a dotted line highlight specific pathways as follows: black, response to hypoxia; yellow, response to ROS; red, skeletal muscle cell differentiation; blue, regulation of the force of heart contraction. The network was depicted by Cytoscape. n=3 per group.

MURC Deficiency Ameliorates ROS Production in the Heart After I/R With Reduced EGR1 and DDIT4 mRNA Expression

We evaluated cardiac ROS production in WT and MURC KO mouse hearts 30 minutes after I/R by dihydroethidium of LV tissue from mouse hearts with confocal micrographs (Figure 3A). ROS production increased after I/R but was significantly lower in MURC KO compared with WT mouse hearts (Figure 3B). We also evaluated ROS production in NRCMs exposed to hypoxia/reoxygenation. ROS production was measured by CellROX staining in NRCMs transfected with

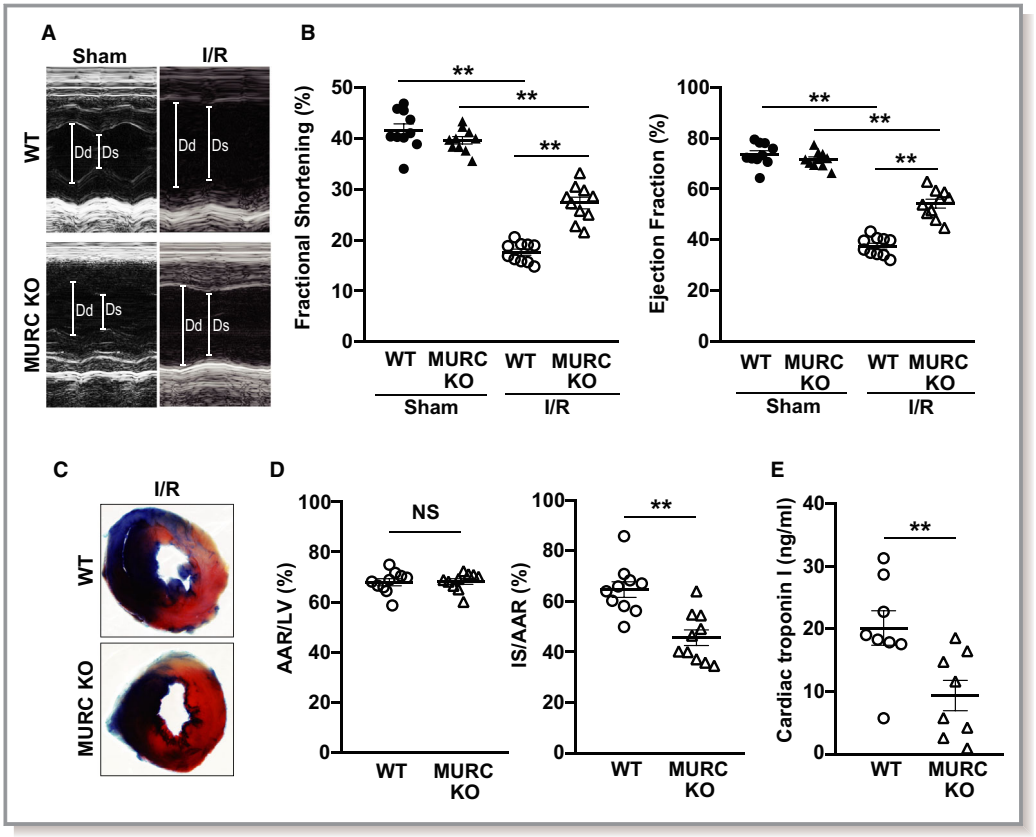

Figure 2. MURC (muscle-restricted coiled-coil protein) deficiency preserves left ventricular systolic function and infarct size in the heart after ischemia/reperfusion (I/R). Representative echocardiography (**A**) and quantification (**B**) of wild-type (WT) and MURC knockout (MURC KO) mouse hearts after sham operation or 24 hours after I/R; n=10 per group. Representative triphenyltetrazolium chloride and Evans blue staining (**C**) and quantification (**D**) of WT and MURC KO mouse hearts 24 hours after I/R. In panel C, blue, white, and red regions represent the nonischemic area, the infarct area, and the noninfarct area at risk, respectively. In panel D, the area at risk (AAR) was assessed as a proportion of the left ventricle (LV; left), and the infarct size (IS) was assessed as a proportion of the AAR (right); n=10 per group. **E**, Cardiac troponin I level of WT and MURC KO mouse serum 24 hours after I/R; n=8 per group. Data are presented as mean±SEM. ***P*<0.01. Dd indicates left ventricular internal dimension in diastole; Ds, left ventricular internal dimension in systole; NS, not significant.

control siRNA, MURC siRNA 1 or 2. MURC siRNAs had an induction of MURC knockdown in NRCMs (Figure S4A and S4B). ROS production increased after hypoxia/reoxygenation exposure but was significantly lower in NRCMs transfected with MURC siRNAs compared with control siRNA (Figure S5A and S5B).

Because ROS-related gene expression was perturbed in microarray analysis of mouse hearts (Figure 1C), we examined mRNA expression and protein level of EGR1 and DDIT4. EGR1 mRNA expression and protein level were elevated 24 hours after I/R but significantly lower in MURC KO compared with WT mouse hearts (Figure 3C and 3D). DDIT4 mRNA expression was also significantly lower in MURC KO compared with WT mouse hearts 24 hours after I/R, whereas protein level was not significantly different (Figure 3E and 3F). Although Nox (NADPH oxidase) family genes are involved in the pathophysiology of cardiac I/R injury,[47,48] Nox4 mRNA expression was reduced only in MURC KO compared with WT mouse hearts 24 hours after I/R (Figure S6).

Protein Network–Based Prediction of Novel Candidate Genes Reveals a Pivotal Role of Antiapoptotic Signaling With STAT3 Activation and Increased BCL2 Expression in MURC KO Mouse Hearts

Protein network–based prediction of novel candidate genes was conducted to explore additional pathways involved in MURC deficiency. PPIN was used to suggest additional candidate genes by means of first-neighbor network interaction prediction, as previously described.[36] Ninety-one genes extracted from PC-corr at a cutoff of 0.6 were input into the

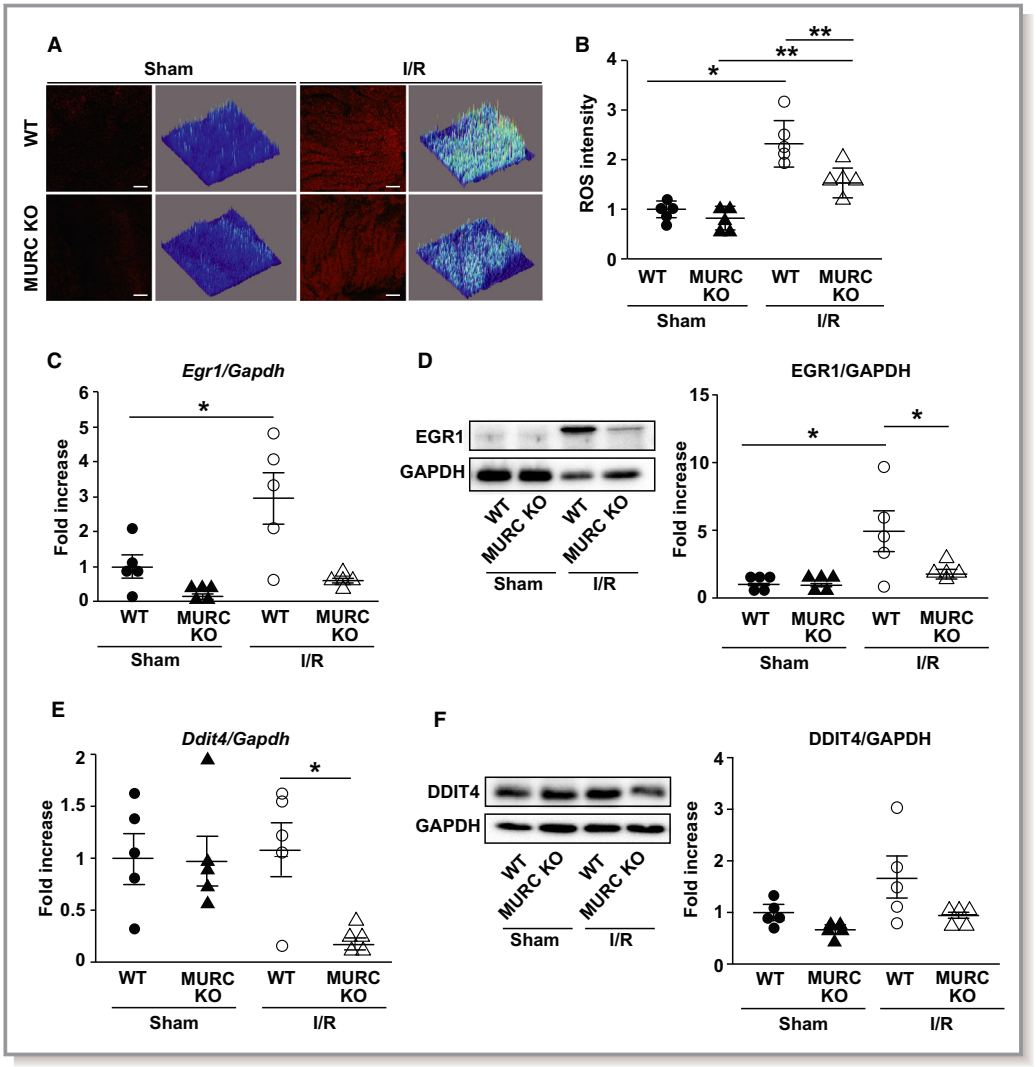

Figure 3. MURC (muscle-restricted coiled-coil protein) deficiency ameliorates reactive oxygen species (ROS) production in the heart after ischemia/reperfusion (I/R). **A** and **B**, Cardiac ROS production as measured by dihydroethidium staining of left ventricle tissue from mouse hearts with confocal micrographs and Z-stack–generated 2.5-dimensional reconstructions. Representative dihydroethidium staining (**A**) and quantification (**B**) of wild-type (WT) and MURC knockout (MURC KO) mouse hearts after sham operation or 30 minutes after I/R. Scale bar=100 μm. **C** through **F**, Measurement of mRNA expressions (**C** and **E**) and the protein levels (**D** and **F**) of EGR1 (early growth response protein 1) and DDIT4 (DNA-damage-inducible transcript 4) in WT and MURC KO mouse hearts after sham operation or 24 hours after I/R; n=5 per group. **P*<0.05, ***P*<0.01. Data are presented as mean±SEM.

STRING database to obtain their first neighbors (261 proteins) selected in the PPIN; we applied a biclustering algorithm to the matrix of 46 proteins present in the significant pathways of interest (Figure 4A). Then we reorganized the PPIN by inputting the 46 proteins into STRING. The pathways of regulation of apoptosis, response to ROS, response to hypoxia, and regulation of the force of heart contraction were interacted through several proteins in the MURC-deficient heart (Figure 4B). DAVID was used for enrichment analysis (Figure 4C; Table S5).

The PPIN reorganized by STRING implied the involvement of MURC in the apoptotic pathway, which includes BCL2, ROS-responsive molecule EGR1, and ROS-related molecule DDIT4. BCL2 and DDIT4 are involved in STAT3-mediated antiapoptosis. In I/R-injured hearts, mRNA expression and protein level of BCL2, which is a key molecule of STAT3-mediated antiapoptotic signaling, were significantly higher in MURC KO compared with WT mice (Figure 4D and 4E). STAT3 plays an important role in antiapoptotic signaling through inhibiting DDIT4 transcription.[49] DDIT4 mRNA expression was suppressed in I/R-injured hearts of MURC KO mice (Figure 3E). Consequently, we evaluated STAT3 activation in the hearts after I/R. The phosphorylation of STAT3 was significantly higher in MURC KO compared with WT mouse hearts

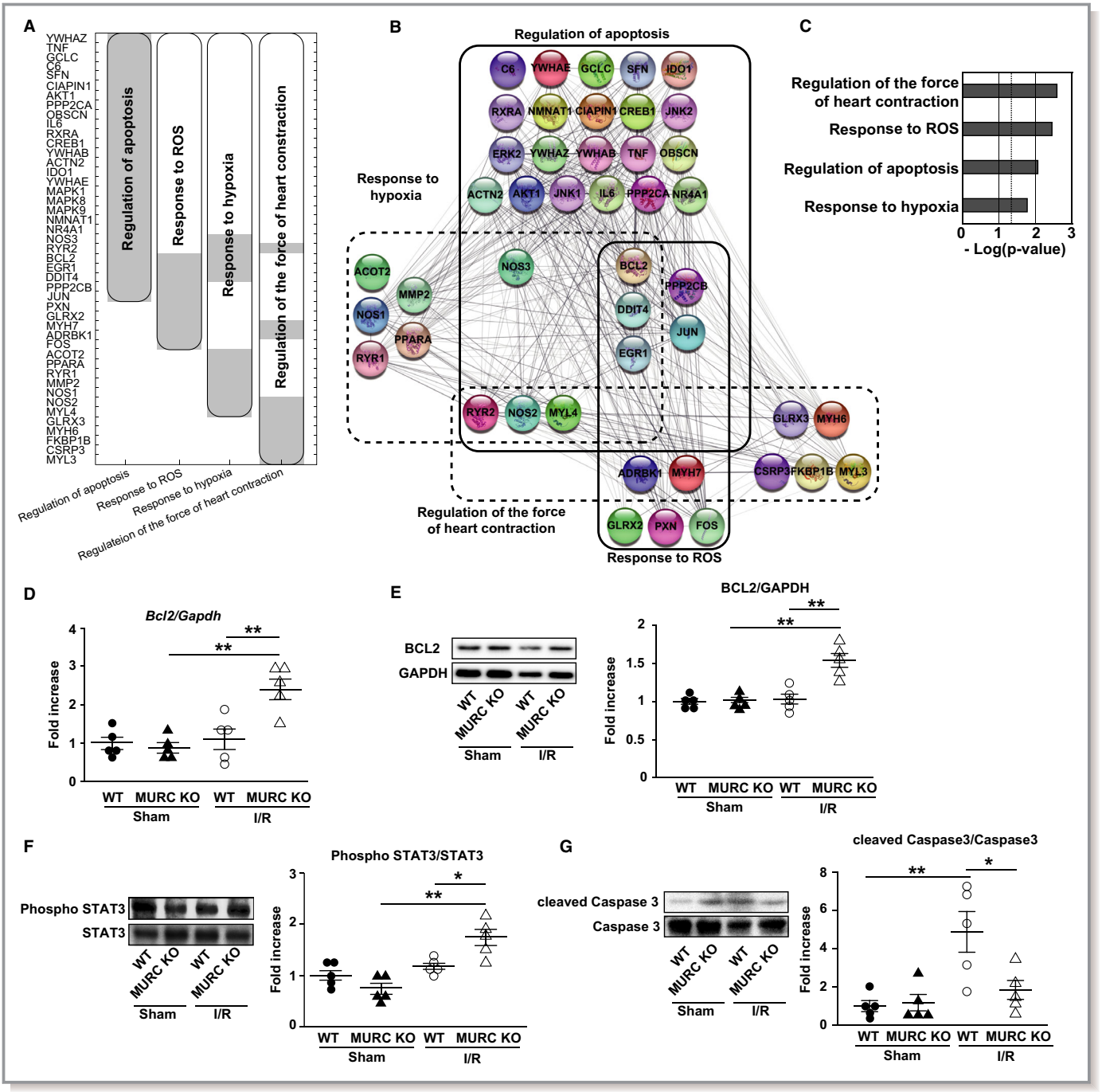

Figure 4. MURC (muscle-restricted coiled-coil protein) deficiency promotes antiapoptotic signaling with STAT3 (signal transducer and activator of transcription 3) activation in the heart after ischemia/reperfusion (I/R). **A** and **B**, Protein-network–based prediction of novel candidate genes. The protein–protein interaction network (PPIN) was used to suggest additional candidate genes by means of first-neighbor network interaction prediction. Gene data set extracted from PC-corr at a cutoff of 0.6 was input into STRING. **A**, Biclustering of the matrix of all proteins obtained by PPIN present in the significant pathways of interest. The matrix consists of 46 proteins (rows) and 4 enriched pathways (columns). The black lines indicate the modules corresponding to the clusters of interacting proteins in the respective pathways. **B**, PPIN reorganized by STRING. Full and dashed lines delimit the diverse overlapped protein pathway modules. **C**, Enrichment analysis conducted by DAVID for PPIN. Pathways of interest are ranked by Benjamini-corrected *P* value and scaled according to the function −log10 (*P* value). The vertical dashed line indicates the threshold at 0.05. Measurement of BCL2 (B-cell lymphoma 2) expression in wild-type (WT) and MURC knockout (MURC KO) mouse hearts after sham operation or 24 hours after I/R: mRNA expression (**D**) and representative Western blots (left) and quantification (right) of BCL2 (**E**). Representative Western blots (left) and quantification (right) of STAT3 phosphorylation (**F**) and cleaved caspase 3 (**G**) in WT and MURC KO mouse hearts after sham operation or 24 hours after I/R; n=5 per group. Data are presented as mean±SEM. **P*<0.05, ***P*<0.01. Phospho indicates phosphorylated.

24 hours after I/R (Figure 4F). The protein level of cleaved caspase 3 was significantly elevated 24 hours after I/R but significantly lower in MURC KO compared with WT mouse hearts (Figure 4G). Activation of other apoptosis-related proteins such as ERK, p38, and Akt were not different between WT and MURC KO mouse hearts 24 hours after I/R (Figure S7).

MURC Modulates Apoptosis in Cardiomyocytes and Cardiac Function in Mouse Hearts Through STAT3 Activation

To determine whether MURC modulates the apoptosis of cardiomyocytes, including STAT3-related antiapoptosis, we first performed TUNEL staining for NRCMs exposed to H_2O_2. Apoptosis induced by H_2O_2 was significantly inhibited in cardiomyocytes transfected with MURC siRNAs compared with control siRNA (Figure 5A and 5B). Similarly, H_2O_2-induced apoptosis was significantly inhibited in adult mouse cardiomyocytes of MURC KO mice compared with those of WT mice (Figure S8). In contrast, TUNEL staining for NRCMs infected with Ad-β-galactosidase or Ad-MURC showed that MURC overexpression significantly accelerated H_2O_2-induced cardiomyocyte apoptosis (Figure 5C and 5D). Next we evaluated the relationship between MURC and STAT3 in cardiac I/R injury and apoptotic signaling, after confirming WP1066, a STAT3 inhibitor, inhibited the phosphorylation of STAT3 in mouse hearts (Figure S9). WP1066 treatment abolished the effect of the preservation of LV systolic function and the reduction of infarct size in MURC KO mouse hearts 24 hours after I/R (Figure 6A and 6B). TUNEL staining for H_2O_2-exposed NRCMs also showed that WP1066 treatment abolished the MURC knockdown–induced antiapoptotic effect (Figure 6C). Consequently, STAT3 inhibition canceled the cardioprotective effect of MURC deficiency in mouse hearts after I/R. To investigate the direct association between MURC and STAT3, we performed immunoprecipitation of MURC and STAT3 in NRCMs transduced with β-galactosidase or FLAG-tagged human MURC. Unexpectedly, immunoprecipitation showed no direct protein interaction between MURC and STAT3 (Figure S10A and S10B).

Discussion

Systems network genomic analysis is a useful tool for predicting complex intracellular-signaling networks. In this study, we applied the systems network genomic analysis based on PC-corr network inference integrated with a PPIN prediction to assess the functional role of MURC in cardiac I/R injury. MURC is the muscle-restricted caveolar component expressed exclusively in myocytes.[27] It has been reported that MURC is involved in dilated cardiomyopathy,[32] cardiac hypertrophy,[31] hypoxia,[33] and skeletal muscle cell differentiation.[50] Caveolae are considered platforms for some receptors and signal components. Caveolins and cavins cooperatively form the caveola structure and modulate its biogenesis and function.[21,22] However, because caveolins and cavins including MURC are trafficking or adaptor proteins,[28] not enzymes, it is difficult to assess the function of these caveolae-related proteins by conventional kinase assays. The systems network genomic analysis of MURC KO mouse hearts predicted a comprehensive role for MURC in cardiac I/R injury.

MURC deletion reduced infarct size after cardiac I/R and preserved cardiac contraction with a decrease in ROS production and expression of EGR1 and DDIT4. PC-corr network inference on microarray data sets from WT and MURC KO mouse hearts predicted that MURC-related pathways included response to hypoxia and ROS, skeletal muscle cell differentiation, and regulation of the force of heart contraction. We confirmed the prediction with experimental validation using a mouse model of cardiac I/R injury. EGR1 acts as a ROS-sensitive transcription factor and promotes apoptosis and inflammation.[51–53] DDIT4 also promotes apoptosis and inflammation in a STAT3-dependent manner in response to various cellular stresses including ROS.[49,54,55] Although the findings from MURC KO mouse hearts suggested that MURC overexpression aggravated cardiac I/R injury, cardiac-specific Tg-MURC mice did not exhibit aggravated contraction and infarct size in I/R hearts. We reported that the hearts of Tg-MURC mice show cardiac hypertrophy at a young age and subsequently show cardiac enlargement and dysfunction.[27] The phenotype possessed by Tg-MURC mice may have shown a counteracting effect in cardiac I/R injury. PC-corr network inference contributed greatly in elucidating the comprehensive role of MURC in cardiac I/R injury. However, the results of EGR1 and DDIT4 expression in PC-corr network inference and the validation study were inconsistent. PC-corr network inference predicted that EGR1 would be poorly expressed and DDIT4 highly expressed in MURC KO mouse hearts; however, the expression of EGR1 or DDIT4 was not different between the sham-operated hearts of WT and MURC KO mice and decreased in I/R-injured hearts of MURC KO mice compared with those of WT mice. These discrepancies may be caused by the small sample size, which should be regarded as a limitation of this study.

PC-corr network inference integrated with a PPIN prediction also indicated the involvement of antiapoptotic signaling in cardioprotection by MURC deletion. The protein network–based prediction of novel candidate genes indicated that several pathways such as regulation of apoptosis, response to ROS, and response to hypoxia included not only EGR1 and DDIT4 but also BCL2. ROS modulates several apoptosis-

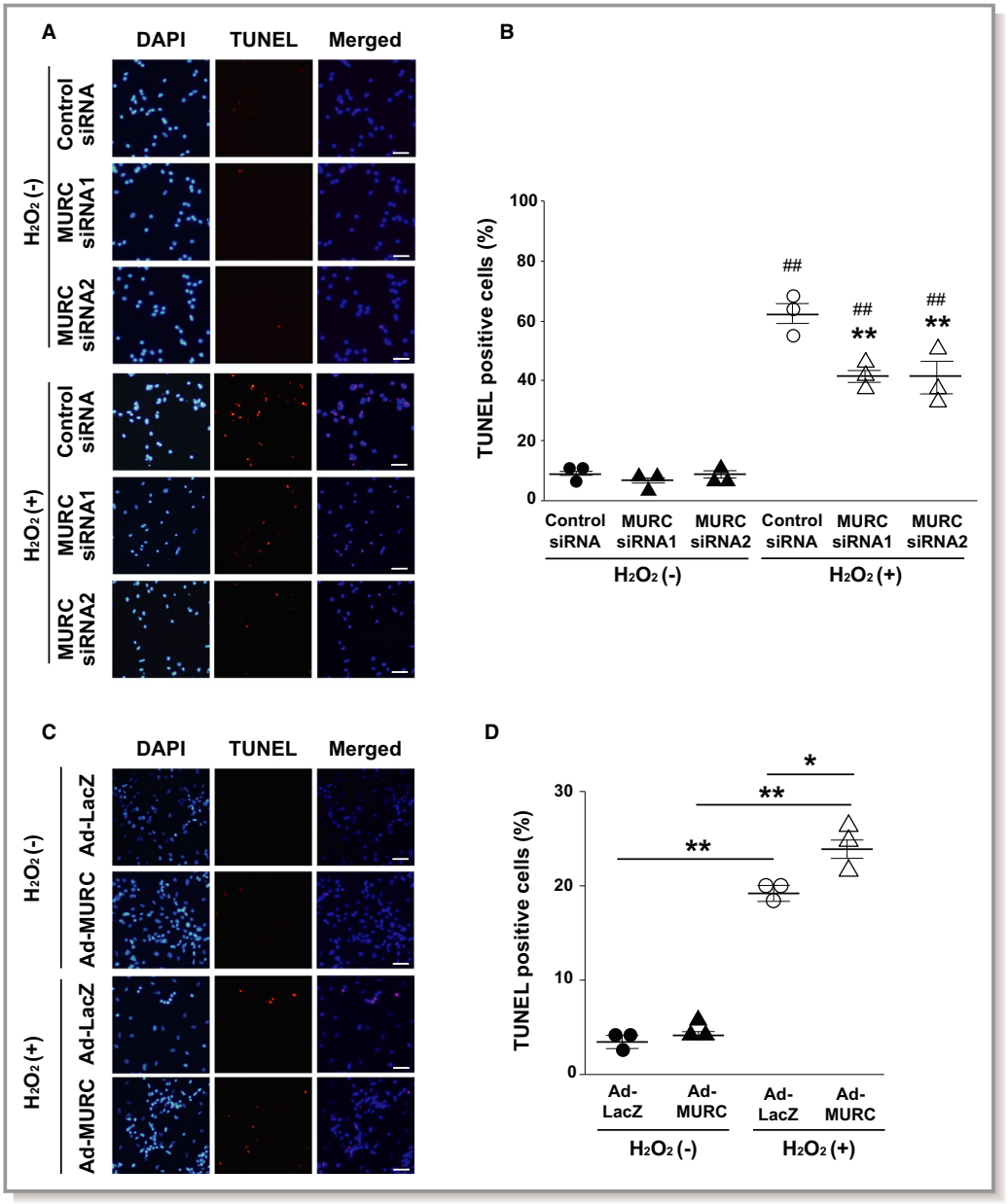

Figure 5. MURC (muscle-restricted coiled-coil protein) modulates apoptosis in neonatal rat cardiomyocytes (NRCMs). Representative TUNEL (TdT-mediated dUTP nick-end labeling) staining (**A**) and quantification (**B**) of NRCMs transfected with control small interfering RNA (siRNA), MURC siRNA 1, or MURC siRNA 2 before H_2O_2 exposure. $^{\#\#}P<0.01$ vs corresponding $H_2O_2(-)$ group; $^{**}P<0.01$ vs control siRNA in $H_2O_2(+)$ group. Representative TUNEL staining (**C**) and quantification (**D**) of NRCMs transduced with adenovirus-mediated β-galactosidase (Ad-LacZ) or MURC (Ad-MURC) before H_2O_2 exposure. $^{*}P<0.05$, $^{**}P<0.01$. Cell death number was assessed by the percentage of TUNEL- and DAPI (4′,6-diamidino-2-phenylindole)–positive cells; n=3 per group. Data are presented as mean±SEM. Scale bar=50 μm.

related signaling pathways, thereby controlling cell death in cardiac I/R injury.[8] In the validation study, BCL2 was significantly increased in the hearts of MURC KO mice compared with those of WT mice after I/R injury. BCL2 is a key regulator of antiapoptotic signaling and inhibits several apoptoses including ROS-induced apoptosis.[14] EGR1 and DDIT4 are also involved in ROS-related apoptosis.

MURC deletion promoted the activation of STAT3, which regulates apoptosis by facilitating BCL2 transcription,[12,13] and preserved cardiac function in cardiac I/R injury. MURC knockdown in cardiomyocytes promoted the antiapoptotic pathway via STAT3 activation. STAT3 is a pivotal regulator in various cardiovascular diseases; it acts as a transcription factor and is involved in myocardial infarction, oxidative

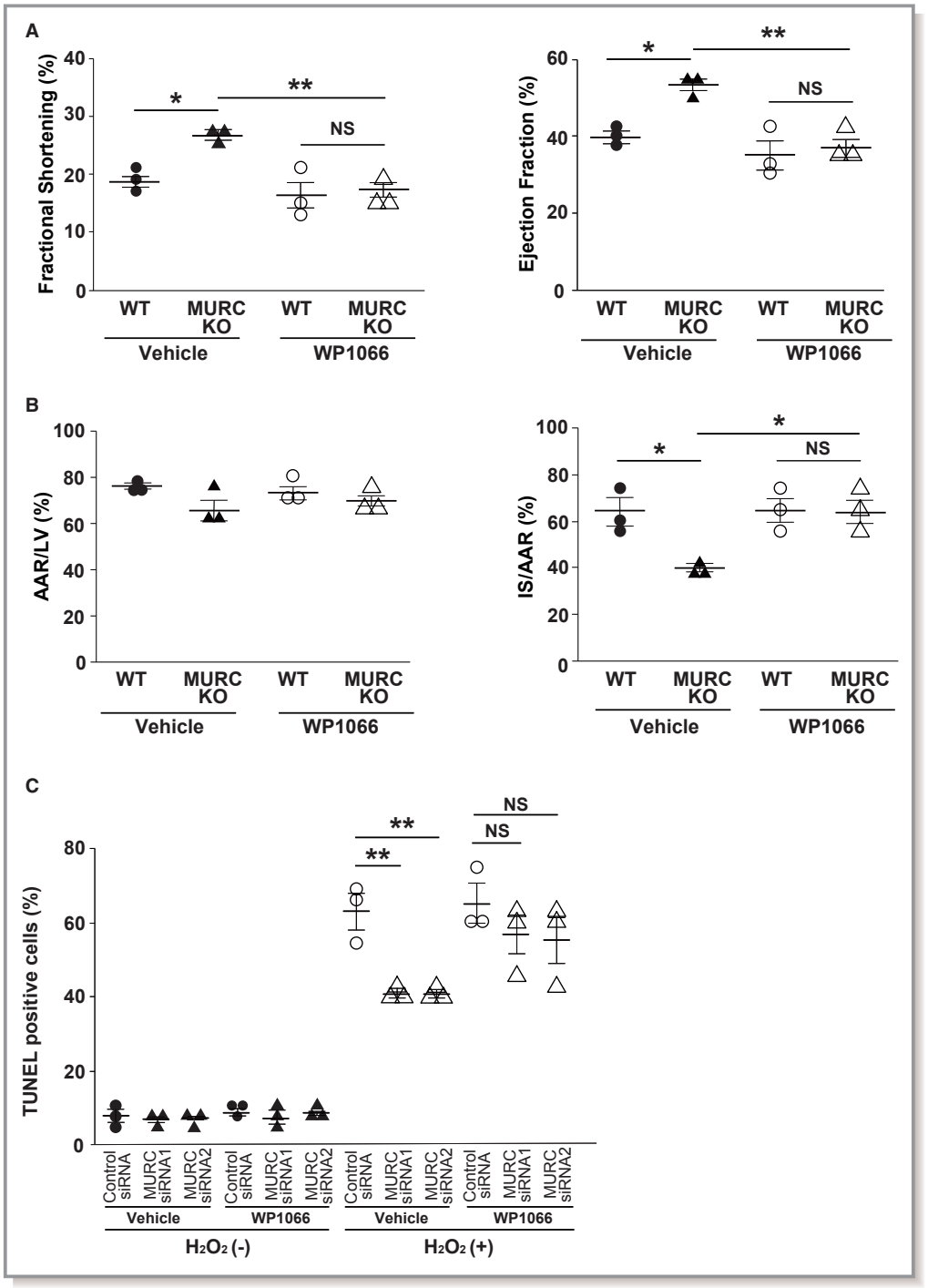

Figure 6. STAT3 (signal transducer and activator of transcription 3) inhibitor cancels the cardioprotective effect of MURC (muscle-restricted coiled-coil protein) deficiency. **A**, Left ventricle (LV) systolic function as measured by echocardiography of wild-type (WT) and MURC knockout (MURC KO) mouse hearts 24 hours after I/R. Vehicle (5% dimethyl sulfoxide) or WP1066 was injected in mice intraperitoneally for 3 consecutive days; n=3 per group. **B**, Infarct size as measured by triphenyltetrazolium chloride and Evans blue staining of LV tissue from mouse hearts 24 hours after ischemia/reperfusion. The area at risk (AAR) was assessed as a proportion of LV (left), and the infarct size (IS) was assessed as a proportion of the AAR (right); n=3 per group. **C**, Evaluation of TUNEL (TdT-mediated dUTP nick-end labeling) staining for NRCMs transfected with control small interfering RNA (siRNA), MURC siRNA 1, or MURC siRNA 2 after H_2O_2 exposure. Vehicle or WP1066 (a STAT3 inhibitor) was administered to cardiomyocytes; n=3 per group. **P*<0.05, ***P*<0.01. NS indicates not significant.

damage, myocarditis, hypertrophy, and remodeling.[15] STAT3 activation in ischemic preconditioning has a cardioprotective effect for ischemic heart disease.[16] Constitutive activation of STAT3 also protects cardiac I/R injury.[17] Although PC-corr network inference integrated with a PPIN prediction did not directly suggest the involvement of STAT3, STAT3 is a key molecule of BCL2-mediated antiapoptosis; therefore, we examined the STAT3-mediated antiapoptotic signal pathway. The phosphorylation of STAT3 was significantly higher in MURC KO compared with WT mouse hearts after I/R. A STAT3 inhibitor canceled a cardioprotective effect due to MURC deletion.

Immunoprecipitation analysis showed no direct association between MURC and STAT3 in cardiomyocytes. Our results suggests that MURC modulates apoptosis in cardiomyocytes and cardiac function in mouse hearts through STAT3 activation with indirect protein interaction. A recent study demonstrated that the phosphorylation of STAT3 is regulated by the interaction of Cavin-1 with SOCS3 (suppressor of cytokine signaling 3) in a shared signal-transducing receptor for a family of cytokines, gp130-mediated cytokine signaling.[56] Cavin-1 localizes SOCS3 in the caveolae at the plasma membrane and suppresses gp130/JAK/STAT3 signaling. MURC forms large complexes with other cavins and caveolins in caveolae and has a direct association with Cavin-1.[21] The mechanism by which MURC regulates STAT3 activation remains ambiguous in our study; it is unclear whether MURC inhibits JAK/STAT3 signaling in coordination with Cavin-1 or whether MURC has the same function as Cavin-1 in cardiomyocytes. MURC deletion may facilitate the phosphorylation of JAK in caveolae at the plasma membrane and subsequently induce the STAT3 transition from the cell membrane to the nucleus in coordination with activated JAK.

Protein network–based prediction of novel candidate genes indicates that MURC is highly relevant to ERK in mouse hearts; however, there was no difference in ERK phosphorylation between WT and MURC KO mouse hearts during I/R injury. MURC facilitates recruitment of ERK to caveolae and concentric cardiac hypertrophy.[31] Hypoxia induces MURC expression in cardiomyocytes during hypertrophy with ERK activation.[33] ERK is an apoptosis-related molecule in I/R injury. Its activity has been implicated in neurodegenerative diseases and brain injury following I/R in rodents.[57,58] Recently, Yu et al reported that the MAPK/ERK-CREB pathway promotes I/R-induced cardiomyocyte apoptosis by inhibiting FUNDC1 (FUN14 domain containing 1)–related mitophagy.[59] Accordingly, we tried to identify the relationship between MURC and ERK activities in I/R-induced cardiomyocyte apoptosis. MURC, however, showed no association with ERK phosphorylation 24 hours after I/R.

MURC interacts with caveolin-3 at the plasma membrane.[29,60] Cardiac-specific caveolin-3 overexpression increases

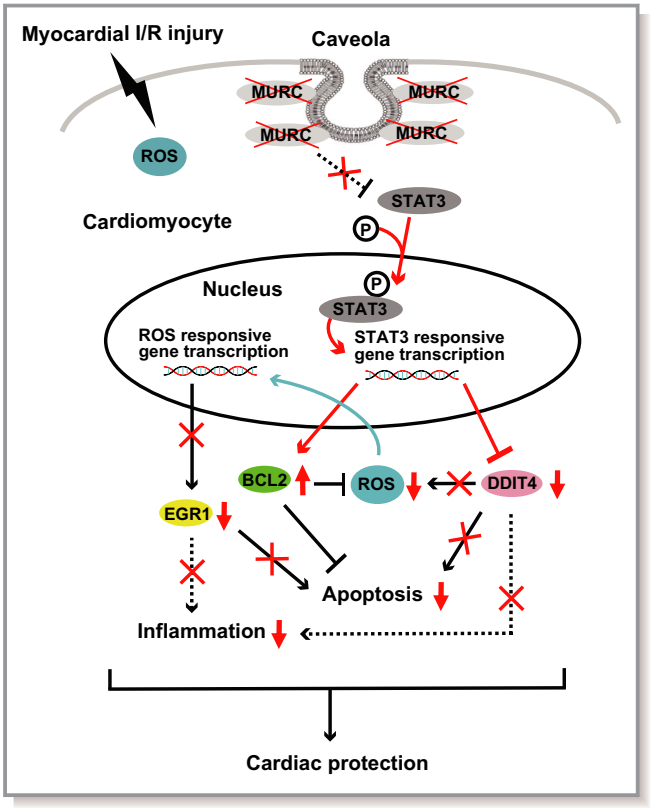

Figure 7. Schematic illustration of the cardioprotective effect of MURC (muscle-restricted coiled-coil protein) deficiency in myocardial ischemia/reperfusion (I/R) injury. Intracellular signaling network including reactive oxygen species (ROS) reduction and activated antiapoptotic signaling with STAT3 (signal transducer and activator of transcription 3) phosphorylation leads to the cardioprotective effect in cardiomyocytes of MURC deficiency after I/R. Intracellular signaling modified by MURC deletion is highlighted (red). BCL2 indicates B-cell lymphoma 2; EGR1, early growth response protein 1; DDIT4, DNA-damage-inducible transcript 4.

the formation of caveolae and induces cardiac protection against I/R injury.[61] In contrast, caveolin-3 knockout mice show no isoflurane-induced cardiac protection against I/R injury.[62] In the present study, there was no significant change in caveolin-1 and other caveolae-related protein levels except for MURC/Cavin-4 between WT and MURC KO mouse hearts (Figure S11A–S11F). Mouse left anterior descending coronary arteries were ligated for 60 minutes during ischemia according to the previous report.[63] The long period of ischemia might have affected the cardioprotective effect of isoflurane in MURC KO mouse hearts. We previously reported that there was no reduction or deformation of caveolae in MURC/Cavin-4 KO mouse hearts.[31] Therefore, the cardioprotective effect of MURC/Cavin-4 deletion is not derived from the caveolae formation.

In our study, we mimic a cardiac I/R model by hydrogen peroxide exposure or a hypoxia/reoxygenation model in vitro. The in vitro assay reflects only ROS or hypoxia, not the

changes in glucose availability and pH. The discrepancy between in vivo conditions and the in vitro model should be considered a study limitation.

In conclusion, our study applied systems network genomic analysis based on PC-corr network inference integrated with a PPIN prediction to identify a previously undescribed function of MURC in the underlying pathogenetic mechanism of cardiac I/R injury (Figure 7). MURC deletion reduced infarct size and preserved heart contraction through the inhibition of ROS-induced cell death and the promotion of STAT3-mediated antiapoptotic signaling in cardiac I/R injury. Functional inhibition of MURC may be effective for reducing cardiac I/R injury.

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Disclosures

None.

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SUPPLEMENTAL MATERIAL

Table S1. siRNA sequences.

Name	Sequence (5’ to 3’)
MURC siRNA-1 sense	GCCCAUCCAUGAGUUCCACUCUGAU
MURC siRNA-1 antisense	AUCAGAGUGGAACUCAUGGAUGGGC
MURC siRNA-2 sense	GVAAAGAGCACAUCGAUCAUAUUAA
MURC siRNA-2 antisense	UUAAUAUGAUCGAUGUGCUCUUUGC

Table S2. Quantitative RT-qPCR primers.

Name	Sequence (5' to 3')
mouse *Bcl2*_F	CTCGTCGCTACCGTCGTGACTTCG
mouse *Bcl2*_R	CAGATGCCGGTTCAGGTACTCAGTC
mouse *Egr1*_F	ATGAGCACCTGACCACAGAGTC
mouse *Egr1*_R	GAGAAGCGGCCAGTATAGGTG
mouse *Ddit4*_F	TCGTCCTCGTCTCGAACTCC
mouse *Ddit4*_R	CCATCCAGGTATGAGGAGTCTTCC
mouse *MURC*_F	ACAGTCACACAGCAATACGGGCTA
mouse *MURC*_R	TTCTCGGGCAGGCTTCTGTCTTTA
rat *MURC*_F	ACTGAAGATGAAGACCAGGACGCA
rat *MURC*_R	TGTTAACAACGTAGCCCGTGTTGC
mouse *Gapdh*_F	TTGTGATGGGTGTGAACCACGAGA
mouse *Gapdh*_R	CATGAGCCCTTCCACAATGCCAAA
rat *Gapdh*_F	ATGGGAAGCTGGTCATCAAC
rat *Gapdh*_R	GTGGTTCACACCCATCACAA
mouse *Nox1*_F	CTGACAAGTACTATTACACCG
mouse *Nox1*_R	CTGACAAGTACTATTACACGAGAG
mouse *Nox2*_F	CATATATGCCACCAGCTTATGGAAG
mouse *Nox2*_R	GTTCTCATTGTCACCGATGTCAG
mouse *Nox3*_F	ACCCCTAACGAGAGCTACCTCAA
mouse *Nox3*_R	GACCGGTGACGCCTGCTAT
mouse *Nox4*_F	TGAGGAGTCACTGAACTATGAAGTTA
mouse *Nox4*_R	TGACTGAGGTACAGCTGGAATGTTCACA
mouse *p22phox*_F	CAATGGCCAAGCAGACGGTC
mouse *p22phox*_R	GTCCACCATGGAGCGATGTG
mouse *p67phox*_F	GCAGTGGCCTACTTCCAGAG
mouse *p67phox*_R	CTTCATGTTGGTTGCCAATG
mouse *Rac1*_F	GTCCCAATACTCCTATCATCCTC
mouse *Rac1*_R	GAGCACTCCAGGTATTTGACAG

Table S3. PC-corr network nodes and links.

PC-corr network nodes weights and labels at cut-off 0.6

#	Node	Colour	PC-corr Normalized Loading (V)
1	n-R5s180	Black	-0.721354661
2	Gm22496	Black	-0.649040256
3	Gm23579	Black	-0.772801792
4	Gm14214	Black	-0.695256046
5	Gm23614	Black	-0.603048538
6	Gm23254	Black	-0.706045559
7	Gm22834	Black	-0.706677831
8	LOC102632904	Black	-0.624550714
9	Myl7	Black	-0.66021109
10	Gm10921	Black	-0.600872277
11	Gm22253	Black	-0.669850712
12	Gm25648	Black	-0.600369722
13	Gm23737	Black	-0.71365871
14	Gm23922	Black	-0.658574808
15	Lsm5	Black	-0.761220816
16	Gm25098	Black	-0.656646706
17	Gm25449	Black	-0.616392987
18	Gm21732	Black	-0.644501631
19	Gm25089	Black	-0.64846379
20	Gm21882	Black	-0.666405984
21	Gm23730	Black	-0.726798019
22	Gm23305	Black	-0.664243567
23	mt-Tt	Black	-0.859660173
24	Gm20831	Black	-0.613856901
25	Snord116	Black	-0.725166274
26	mt-Tc	Black	-0.847530386
27	Olfr166	Black	-0.63478488
28	Snord116 // Ipw	Black	-0.695183163
29	Gm22510	Black	-0.625509447
30	Rnu1b1	Black	-0.904937482
31	Myl4	Black	-0.642387625
32	Gm22155	Black	-0.753346542
33	Olfr1231	Black	-0.618922514
34	Gm4787	Black	-0.605277579
35	Gm20806	Black	-0.603370638
36	Ipw	Black	-0.679543558
37	Olfr1034	Black	-0.662686071
38	Gm21943	Black	-0.62432152
39	LOC102640399	Black	-0.653001706
40	Gm10375	Black	-0.616879434
41	mt-Tf	Black	-0.843977183
42	Gm23947	Black	-0.642276287
43	Gm20815	Black	-0.624089122

44	mt-Ts1	Black	-0.823514957
45	mt-Ty	Black	-0.792687001
46	Gm24624	Black	-0.601008593
47	LOC102633726	Black	-0.610520962
48	Gm20747	Black	-0.607448307
49	Trdn	Black	-0.662913558
50	Snora74a	Black	-0.716709874
51	mt-Ts2	Black	-0.822093546
52	Gm22866	Black	-0.810797753
53	Rnu12	Black	-0.714196988
54	Ppp4r2	Black	-0.725777902
55	Gm22749	Black	-0.634337211
56	Gm24149	Black	-0.679383005
57	Tmeff1	Black	-0.65030418
58	Gm23928	Black	-0.602562509
59	LOC102639563	Black	-0.612052689
60	Vaultrc5	Black	-0.728238836
61	Inmt	Black	-0.646471019
62	Fam107a	Black	-0.645410606
63	mt-Tk	Black	-0.720414242
64	Brox	Black	-0.657411274
65	Glrx3	Black	-0.616971069
66	mt-Th	Black	-0.66178471
67	Ddit4	Black	-0.63226978
68	mt-Tp	Black	-0.667405111
69	mt-Ta	Black	-0.680121023
70	Mpv17	Red	0.61068715
71	Gm6245	Red	0.638394295
72	Cd59a	Red	0.637322477
73	Tmem159	Red	0.60103159
74	Acot2	Red	0.679628534
75	Dhdh	Red	0.622508261
76	Fam213a	Red	0.643220229
77	Nmnat1	Red	0.605873152
78	Coq5	Red	0.677305385
79	Tmem184c	Red	0.651508083
80	Nrn1	Red	0.610300306
81	Uprt	Red	0.651921824
82	Nsun3	Red	0.673017501
83	Gm10718	Red	0.609800071
84	Nr4a1	Red	0.747000222
85	BC023105	Red	0.605373598
86	Egr1	Red	0.704399843
87	Fos	Red	0.695614744
88	G530011O06Rik	Red	0.740456125
89	Gm5346	Red	0.657448885

90	Gm5912	Red	0.651967258
91	Murc	Red	1

PC-corr network links weights and labels at cut-off 0.6

#	Node i	Node j	PC-corr(i,j)
1	n-R5s180	Gm22496	0.649040256
2	n-R5s180	Gm23579	0.721354661
3	n-R5s180	Gm14214	0.695256046
4	n-R5s180	Gm23254	0.706045559
5	n-R5s180	Gm22834	0.706677831
6	n-R5s180	LOC102632904	0.624550714
7	n-R5s180	Gm10921	0.600872277
8	n-R5s180	Gm22253	0.669850712
9	n-R5s180	Gm25648	0.600369722
10	n-R5s180	Gm23737	0.710045012
11	n-R5s180	Gm23922	0.658574808
12	n-R5s180	Lsm5	0.721354661
13	n-R5s180	Gm25098	0.656646706
14	n-R5s180	Gm25449	0.616392987
15	n-R5s180	Gm21732	0.644501631
16	n-R5s180	Gm25089	0.64846379
17	n-R5s180	Gm21882	0.666405984
18	n-R5s180	Gm23730	0.721354661
19	n-R5s180	Gm23305	0.664243567
20	n-R5s180	mt-Tt	0.721354661
21	n-R5s180	Gm20831	0.613856901
22	n-R5s180	Snord116	0.721354661
23	n-R5s180	mt-Tc	0.721354661
24	n-R5s180	Olfr166	0.63478488
25	n-R5s180	Snord116 // Ipw	0.695183163
26	n-R5s180	Gm22510	0.625509447
27	n-R5s180	Rnu1b1	0.721354661
28	n-R5s180	Gm22155	0.721354661
29	n-R5s180	Olfr1231	0.618922514
30	n-R5s180	Gm4787	0.605277579
31	n-R5s180	Gm20806	0.603370638
32	n-R5s180	Ipw	0.679543558
33	n-R5s180	Olfr1034	0.662686071
34	n-R5s180	Gm21943	0.62432152
35	n-R5s180	LOC102640399	0.653001706
36	n-R5s180	Gm10375	0.616879434
37	n-R5s180	mt-Tf	0.721354661
38	n-R5s180	Gm23947	0.642276287
39	n-R5s180	Gm20815	0.624089122
40	n-R5s180	mt-Ts1	0.721354661
41	n-R5s180	mt-Ty	0.721354661
42	n-R5s180	Gm24624	0.601008593

43	n-R5s180	LOC102633726	0.610520962
44	n-R5s180	Gm20747	0.607448307
45	n-R5s180	Trdn	0.662913558
46	n-R5s180	Snora74a	0.716709874
47	n-R5s180	mt-Ts2	0.721354661
48	n-R5s180	Gm22866	0.721354661
49	n-R5s180	Rnu12	0.714196988
50	n-R5s180	Ppp4r2	0.721354661
51	n-R5s180	Tmeff1	0.65030418
52	n-R5s180	Gm23928	0.602562509
53	n-R5s180	LOC102639563	0.612052689
54	n-R5s180	Vaultrc5	0.721354661
55	n-R5s180	Inmt	0.646471019
56	n-R5s180	Fam107a	0.645410606
57	n-R5s180	mt-Tk	0.720414242
58	n-R5s180	Brox	0.657411274
59	n-R5s180	Glrx3	0.616971069
60	n-R5s180	mt-Th	0.66178471
61	n-R5s180	Ddit4	0.63226978
62	n-R5s180	mt-Tp	0.667405111
63	n-R5s180	mt-Ta	0.680121023
64	n-R5s180	Mpv17	-0.61068715
65	n-R5s180	Gm6245	-0.638394295
66	n-R5s180	Cd59a	-0.637322477
67	n-R5s180	Tmem159	-0.60103159
68	n-R5s180	Acot2	-0.679628534
69	n-R5s180	Dhdh	-0.622508261
70	n-R5s180	Fam213a	-0.643220229
71	n-R5s180	Nmnat1	-0.605873152
72	n-R5s180	Coq5	-0.677305385
73	n-R5s180	Tmem184c	-0.651508083
74	n-R5s180	Nrn1	-0.610300306
75	n-R5s180	Uprt	-0.651921824
76	n-R5s180	Nsun3	-0.673017501
77	n-R5s180	Gm10718	-0.609800071
78	n-R5s180	Nr4a1	-0.721354661
79	n-R5s180	Egr1	-0.704399843
80	n-R5s180	Fos	-0.695614744
81	n-R5s180	G530011O06Rik	-0.721354661
82	n-R5s180	Gm5346	-0.657448885
83	n-R5s180	Gm5912	-0.651967258
84	n-R5s180	Murc	-0.721354661
85	Gm22496	Gm23579	0.649040256
86	Gm22496	Gm14214	0.649040256
87	Gm22496	Gm23254	0.649040256
88	Gm22496	Gm22834	0.649040256

89	Gm22496	LOC102632904	0.624550714
90	Gm22496	Gm10921	0.600872277
91	Gm22496	Gm22253	0.649040256
92	Gm22496	Gm25648	0.600369722
93	Gm22496	Gm23737	0.649040256
94	Gm22496	Gm23922	0.649040256
95	Gm22496	Lsm5	0.649040256
96	Gm22496	Gm25098	0.649040256
97	Gm22496	Gm25449	0.616392987
98	Gm22496	Gm21732	0.644501631
99	Gm22496	Gm25089	0.64846379
100	Gm22496	Gm21882	0.649040256
101	Gm22496	Gm23730	0.649040256
102	Gm22496	Gm23305	0.649040256
103	Gm22496	mt-Tt	0.649040256
104	Gm22496	Gm20831	0.613856901
105	Gm22496	Snord116	0.649040256
106	Gm22496	mt-Tc	0.649040256
107	Gm22496	Olfr166	0.63478488
108	Gm22496	Snord116 // Ipw	0.649040256
109	Gm22496	Gm22510	0.625509447
110	Gm22496	Rnu1b1	0.649040256
111	Gm22496	Gm22155	0.649040256
112	Gm22496	Olfr1231	0.618922514
113	Gm22496	Gm20806	0.603370638
114	Gm22496	Ipw	0.649040256
115	Gm22496	Olfr1034	0.649040256
116	Gm22496	Gm21943	0.62432152
117	Gm22496	LOC102640399	0.649040256
118	Gm22496	mt-Tf	0.649040256
119	Gm22496	Gm20815	0.624089122
120	Gm22496	mt-Ts1	0.649040256
121	Gm22496	mt-Ty	0.649040256
122	Gm22496	Gm24624	0.601008593
123	Gm22496	LOC102633726	0.610520962
124	Gm22496	Gm20747	0.607448307
125	Gm22496	Snora74a	0.649040256
126	Gm22496	mt-Ts2	0.649040256
127	Gm22496	Gm22866	0.649040256
128	Gm22496	Rnu12	0.649040256
129	Gm22496	Tmeff1	0.649040256
130	Gm22496	Gm23928	0.602562509
131	Gm22496	LOC102639563	0.612052689
132	Gm22496	Vaultrc5	0.649040256
133	Gm22496	Inmt	0.646471019
134	Gm22496	Fam107a	0.645410606

135	Gm22496	mt-Tk	0.649040256
136	Gm22496	Glrx3	0.616971069
137	Gm22496	mt-Th	0.649040256
138	Gm22496	Ddit4	0.63226978
139	Gm22496	mt-Tp	0.649040256
140	Gm22496	mt-Ta	0.649040256
141	Gm22496	Mpv17	-0.61068715
142	Gm22496	Gm6245	-0.638394295
143	Gm22496	Cd59a	-0.637322477
144	Gm22496	Tmem159	-0.60103159
145	Gm22496	Acot2	-0.649040256
146	Gm22496	Dhdh	-0.622508261
147	Gm22496	Fam213a	-0.643220229
148	Gm22496	Nmnat1	-0.605873152
149	Gm22496	Coq5	-0.649040256
150	Gm22496	Tmem184c	-0.649040256
151	Gm22496	Nrn1	-0.610300306
152	Gm22496	Uprt	-0.649040256
153	Gm22496	Nsun3	-0.649040256
154	Gm22496	Gm10718	-0.609800071
155	Gm22496	Nr4a1	-0.649040256
156	Gm22496	Egr1	-0.649040256
157	Gm22496	Fos	-0.649040256
158	Gm22496	Gm5912	-0.649040256
159	Gm22496	Murc	-0.649040256
160	Gm23579	Gm14214	0.695256046
161	Gm23579	Gm23254	0.706045559
162	Gm23579	Gm22834	0.706677831
163	Gm23579	LOC102632904	0.624550714
164	Gm23579	Gm10921	0.600872277
165	Gm23579	Gm22253	0.669850712
166	Gm23579	Gm25648	0.600369722
167	Gm23579	Gm23737	0.71365871
168	Gm23579	Gm23922	0.658574808
169	Gm23579	Lsm5	0.712042989
170	Gm23579	Gm25098	0.656646706
171	Gm23579	Gm25449	0.616392987
172	Gm23579	Gm21732	0.644501631
173	Gm23579	Gm25089	0.64846379
174	Gm23579	Gm21882	0.666405984
175	Gm23579	Gm23730	0.726798019
176	Gm23579	Gm23305	0.664243567
177	Gm23579	mt-Tt	0.772801792
178	Gm23579	Gm20831	0.613856901
179	Gm23579	Snord116	0.725166274
180	Gm23579	mt-Tc	0.772801792

181	Gm23579	Olfr166	0.63478488
182	Gm23579	Snord116 // Ipw	0.695183163
183	Gm23579	Gm22510	0.625509447
184	Gm23579	Rnu1b1	0.772801792
185	Gm23579	Gm22155	0.753346542
186	Gm23579	Olfr1231	0.618922514
187	Gm23579	Gm20806	0.603370638
188	Gm23579	Ipw	0.679543558
189	Gm23579	Olfr1034	0.662686071
190	Gm23579	Gm21943	0.62432152
191	Gm23579	LOC102640399	0.653001706
192	Gm23579	mt-Tf	0.772801792
193	Gm23579	Gm23947	0.603435569
194	Gm23579	Gm20815	0.624089122
195	Gm23579	mt-Ts1	0.772801792
196	Gm23579	mt-Ty	0.772801792
197	Gm23579	Gm24624	0.601008593
198	Gm23579	LOC102633726	0.610520962
199	Gm23579	Gm20747	0.607448307
200	Gm23579	Snora74a	0.716709874
201	Gm23579	mt-Ts2	0.772801792
202	Gm23579	Gm22866	0.772801792
203	Gm23579	Rnu12	0.714196988
204	Gm23579	Tmeff1	0.65030418
205	Gm23579	Gm23928	0.602562509
206	Gm23579	LOC102639563	0.612052689
207	Gm23579	Vaultrc5	0.728238836
208	Gm23579	Inmt	0.646471019
209	Gm23579	Fam107a	0.645410606
210	Gm23579	mt-Tk	0.720414242
211	Gm23579	Glrx3	0.616971069
212	Gm23579	mt-Th	0.66178471
213	Gm23579	Ddit4	0.63226978
214	Gm23579	mt-Tp	0.667405111
215	Gm23579	mt-Ta	0.680121023
216	Gm23579	Mpv17	-0.61068715
217	Gm23579	Gm6245	-0.638394295
218	Gm23579	Cd59a	-0.637322477
219	Gm23579	Tmem159	-0.60103159
220	Gm23579	Acot2	-0.679628534
221	Gm23579	Dhdh	-0.622508261
222	Gm23579	Fam213a	-0.643220229
223	Gm23579	Nmnat1	-0.605873152
224	Gm23579	Coq5	-0.677305385
225	Gm23579	Tmem184c	-0.651508083
226	Gm23579	Nrn1	-0.610300306

227	Gm23579	Uprt	-0.651921824
228	Gm23579	Nsun3	-0.673017501
229	Gm23579	Gm10718	-0.609800071
230	Gm23579	Nr4a1	-0.747000222
231	Gm23579	BC023105	-0.604280515
232	Gm23579	Egr1	-0.675938407
233	Gm23579	Fos	-0.695614744
234	Gm23579	G530011O06Rik	-0.647570736
235	Gm23579	Gm5346	-0.641654659
236	Gm23579	Gm5912	-0.651967258
237	Gm23579	Murc	-0.772801792
238	Gm14214	Gm23614	0.603048538
239	Gm14214	Gm23254	0.695256046
240	Gm14214	Gm22834	0.695256046
241	Gm14214	LOC102632904	0.624550714
242	Gm14214	Gm10921	0.600872277
243	Gm14214	Gm22253	0.669850712
244	Gm14214	Gm25648	0.600369722
245	Gm14214	Gm23737	0.695256046
246	Gm14214	Gm23922	0.658574808
247	Gm14214	Gm25098	0.656646706
248	Gm14214	Gm25449	0.616392987
249	Gm14214	Gm21732	0.644501631
250	Gm14214	Gm25089	0.64846379
251	Gm14214	Gm21882	0.666405984
252	Gm14214	Gm23730	0.695256046
253	Gm14214	Gm23305	0.664243567
254	Gm14214	mt-Tt	0.695256046
255	Gm14214	Gm20831	0.613856901
256	Gm14214	Snord116	0.695256046
257	Gm14214	mt-Tc	0.695256046
258	Gm14214	Olfr166	0.619866273
259	Gm14214	Snord116 // Ipw	0.695183163
260	Gm14214	Rnu1b1	0.695256046
261	Gm14214	Gm22155	0.695256046
262	Gm14214	Olfr1231	0.618922514
263	Gm14214	Gm4787	0.605277579
264	Gm14214	Gm20806	0.603370638
265	Gm14214	Ipw	0.679543558
266	Gm14214	Olfr1034	0.662686071
267	Gm14214	Gm21943	0.62432152
268	Gm14214	LOC102640399	0.653001706
269	Gm14214	Gm10375	0.616879434
270	Gm14214	mt-Tf	0.695256046
271	Gm14214	Gm23947	0.642276287
272	Gm14214	Gm20815	0.624089122

273	Gm14214	mt-Ts1	0.695256046
274	Gm14214	mt-Ty	0.695256046
275	Gm14214	Gm24624	0.601008593
276	Gm14214	LOC102633726	0.610520962
277	Gm14214	Gm20747	0.607448307
278	Gm14214	Trdn	0.662913558
279	Gm14214	Snora74a	0.695256046
280	Gm14214	mt-Ts2	0.695256046
281	Gm14214	Gm22866	0.695256046
282	Gm14214	Rnu12	0.695256046
283	Gm14214	Ppp4r2	0.680706606
284	Gm14214	Gm22749	0.634337211
285	Gm14214	Tmeff1	0.65030418
286	Gm14214	Gm23928	0.602562509
287	Gm14214	LOC102639563	0.612052689
288	Gm14214	Vaultrc5	0.695256046
289	Gm14214	Inmt	0.646471019
290	Gm14214	mt-Tk	0.695256046
291	Gm14214	Brox	0.657411274
292	Gm14214	Glrx3	0.616971069
293	Gm14214	mt-Th	0.66178471
294	Gm14214	mt-Tp	0.667405111
295	Gm14214	mt-Ta	0.680121023
296	Gm14214	Mpv17	-0.61068715
297	Gm14214	Gm6245	-0.638394295
298	Gm14214	Cd59a	-0.637322477
299	Gm14214	Tmem159	-0.60103159
300	Gm14214	Acot2	-0.679628534
301	Gm14214	Dhdh	-0.622508261
302	Gm14214	Fam213a	-0.643220229
303	Gm14214	Nmnat1	-0.605873152
304	Gm14214	Coq5	-0.677305385
305	Gm14214	Tmem184c	-0.651508083
306	Gm14214	Nrn1	-0.610300306
307	Gm14214	Uprt	-0.651921824
308	Gm14214	Nsun3	-0.673017501
309	Gm14214	Gm10718	-0.609800071
310	Gm14214	BC023105	-0.605373598
311	Gm14214	Gm5346	-0.657448885
312	Gm14214	Gm5912	-0.651967258
313	Gm14214	Murc	-0.695256046
314	Gm23614	LOC102632904	0.603048538
315	Gm23614	Myl7	0.603048538
316	Gm23614	Gm22253	0.603048538
317	Gm23614	Gm25098	0.603048538
318	Gm23614	Gm21732	0.603048538

319	Gm23614	Gm25089	0.603048538
320	Gm23614	Gm21882	0.603048538
321	Gm23614	Gm23305	0.603048538
322	Gm23614	Myl4	0.603048538
323	Gm23614	Gm20806	0.603048538
324	Gm23614	Gm21943	0.603048538
325	Gm23614	Gm23947	0.603048538
326	Gm23614	Gm20815	0.603048538
327	Gm23614	Gm20747	0.603048538
328	Gm23614	Tmeff1	0.603048538
329	Gm23614	Cd59a	-0.603048538
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331	Gm23254	Gm22834	0.706045559
332	Gm23254	LOC102632904	0.624550714
333	Gm23254	Gm10921	0.600872277
334	Gm23254	Gm22253	0.669850712
335	Gm23254	Gm25648	0.600369722
336	Gm23254	Gm23737	0.706045559
337	Gm23254	Gm23922	0.658574808
338	Gm23254	Lsm5	0.626818399
339	Gm23254	Gm25098	0.656646706
340	Gm23254	Gm25449	0.616392987
341	Gm23254	Gm21732	0.644501631
342	Gm23254	Gm25089	0.64846379
343	Gm23254	Gm21882	0.666405984
344	Gm23254	Gm23730	0.706045559
345	Gm23254	Gm23305	0.664243567
346	Gm23254	mt-Tt	0.706045559
347	Gm23254	Gm20831	0.613856901
348	Gm23254	Snord116	0.706045559
349	Gm23254	mt-Tc	0.706045559
350	Gm23254	Olfr166	0.63478488
351	Gm23254	Snord116 // Ipw	0.695183163
352	Gm23254	Gm22510	0.625509447
353	Gm23254	Rnu1b1	0.706045559
354	Gm23254	Gm22155	0.706045559
355	Gm23254	Olfr1231	0.618922514
356	Gm23254	Gm20806	0.603370638
357	Gm23254	Ipw	0.679543558
358	Gm23254	Olfr1034	0.662686071
359	Gm23254	Gm21943	0.62432152
360	Gm23254	LOC102640399	0.653001706
361	Gm23254	mt-Tf	0.706045559
362	Gm23254	Gm23947	0.642046792
363	Gm23254	Gm20815	0.624089122
364	Gm23254	mt-Ts1	0.706045559

365	Gm23254	mt-Ty	0.706045559
366	Gm23254	Gm24624	0.601008593
367	Gm23254	LOC102633726	0.610520962
368	Gm23254	Gm20747	0.607448307
369	Gm23254	Snora74a	0.706045559
370	Gm23254	mt-Ts2	0.706045559
371	Gm23254	Gm22866	0.706045559
372	Gm23254	Rnu12	0.706045559
373	Gm23254	Tmeff1	0.65030418
374	Gm23254	Gm23928	0.602562509
375	Gm23254	LOC102639563	0.612052689
376	Gm23254	Vaultrc5	0.706045559
377	Gm23254	Inmt	0.646471019
378	Gm23254	Fam107a	0.645410606
379	Gm23254	mt-Tk	0.706045559
380	Gm23254	Glrx3	0.616971069
381	Gm23254	mt-Th	0.66178471
382	Gm23254	Ddit4	0.63226978
383	Gm23254	mt-Tp	0.667405111
384	Gm23254	mt-Ta	0.680121023
385	Gm23254	Mpv17	-0.61068715
386	Gm23254	Gm6245	-0.638394295
387	Gm23254	Cd59a	-0.637322477
388	Gm23254	Tmem159	-0.60103159
389	Gm23254	Acot2	-0.679628534
390	Gm23254	Dhdh	-0.622508261
391	Gm23254	Fam213a	-0.643220229
392	Gm23254	Nmnat1	-0.605873152
393	Gm23254	Coq5	-0.677305385
394	Gm23254	Tmem184c	-0.651508083
395	Gm23254	Nrn1	-0.610300306
396	Gm23254	Uprt	-0.651921824
397	Gm23254	Nsun3	-0.673017501
398	Gm23254	Gm10718	-0.609800071
399	Gm23254	Nr4a1	-0.706045559
400	Gm23254	BC023105	-0.605373598
401	Gm23254	Egr1	-0.601654027
402	Gm23254	Fos	-0.642685168
403	Gm23254	Gm5912	-0.651967258
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405	Gm22834	LOC102632904	0.624550714
406	Gm22834	Gm10921	0.600872277
407	Gm22834	Gm22253	0.669850712
408	Gm22834	Gm25648	0.600369722
409	Gm22834	Gm23737	0.706677831
410	Gm22834	Gm23922	0.658574808

411	Gm22834	Lsm5	0.671102514
412	Gm22834	Gm25098	0.656646706
413	Gm22834	Gm25449	0.616392987
414	Gm22834	Gm21732	0.644501631
415	Gm22834	Gm25089	0.64846379
416	Gm22834	Gm21882	0.666405984
417	Gm22834	Gm23730	0.706677831
418	Gm22834	Gm23305	0.664243567
419	Gm22834	mt-Tt	0.706677831
420	Gm22834	Gm20831	0.613856901
421	Gm22834	Snord116	0.706677831
422	Gm22834	mt-Tc	0.706677831
423	Gm22834	Olfr166	0.63478488
424	Gm22834	Snord116 // Ipw	0.695183163
425	Gm22834	Gm22510	0.625509447
426	Gm22834	Rnu1b1	0.706677831
427	Gm22834	Gm22155	0.706677831
428	Gm22834	Olfr1231	0.618922514
429	Gm22834	Gm20806	0.603370638
430	Gm22834	Ipw	0.679543558
431	Gm22834	Olfr1034	0.662686071
432	Gm22834	Gm21943	0.62432152
433	Gm22834	LOC102640399	0.653001706
434	Gm22834	mt-Tf	0.706677831
435	Gm22834	Gm20815	0.624089122
436	Gm22834	mt-Ts1	0.706677831
437	Gm22834	mt-Ty	0.706677831
438	Gm22834	Gm24624	0.601008593
439	Gm22834	LOC102633726	0.610520962
440	Gm22834	Gm20747	0.607448307
441	Gm22834	Snora74a	0.706677831
442	Gm22834	mt-Ts2	0.706677831
443	Gm22834	Gm22866	0.706677831
444	Gm22834	Rnu12	0.706677831
445	Gm22834	Tmeff1	0.65030418
446	Gm22834	Gm23928	0.602562509
447	Gm22834	LOC102639563	0.612052689
448	Gm22834	Vaultrc5	0.706677831
449	Gm22834	Inmt	0.646471019
450	Gm22834	Fam107a	0.606896022
451	Gm22834	mt-Tk	0.706677831
452	Gm22834	Glrx3	0.616971069
453	Gm22834	mt-Th	0.66178471
454	Gm22834	Ddit4	0.63226978
455	Gm22834	mt-Tp	0.667405111
456	Gm22834	mt-Ta	0.680121023

457	Gm22834	Mpv17	-0.61068715
458	Gm22834	Gm6245	-0.638394295
459	Gm22834	Cd59a	-0.637322477
460	Gm22834	Tmem159	-0.60103159
461	Gm22834	Acot2	-0.679628534
462	Gm22834	Dhdh	-0.622508261
463	Gm22834	Fam213a	-0.643220229
464	Gm22834	Nmnat1	-0.605873152
465	Gm22834	Coq5	-0.677305385
466	Gm22834	Tmem184c	-0.602643594
467	Gm22834	Nrn1	-0.610300306
468	Gm22834	Uprt	-0.651921824
469	Gm22834	Nsun3	-0.673017501
470	Gm22834	Gm10718	-0.609800071
471	Gm22834	Nr4a1	-0.694049455
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474	Gm22834	Fos	-0.642161087
475	Gm22834	Gm5912	-0.651967258
476	Gm22834	Murc	-0.706677831
477	LOC102632904	Myl7	0.624550714
478	LOC102632904	Gm10921	0.600872277
479	LOC102632904	Gm22253	0.624550714
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481	LOC102632904	Gm23737	0.624550714
482	LOC102632904	Gm23922	0.624550714
483	LOC102632904	Gm25098	0.624550714
484	LOC102632904	Gm25449	0.616392987
485	LOC102632904	Gm21732	0.624550714
486	LOC102632904	Gm25089	0.624550714
487	LOC102632904	Gm21882	0.624550714
488	LOC102632904	Gm23730	0.624550714
489	LOC102632904	Gm23305	0.624550714
490	LOC102632904	mt-Tt	0.624550714
491	LOC102632904	Gm20831	0.613856901
492	LOC102632904	Snord116	0.624550714
493	LOC102632904	mt-Tc	0.624550714
494	LOC102632904	Olfr166	0.624550714
495	LOC102632904	Snord116 // Ipw	0.624550714
496	LOC102632904	Gm22510	0.624550714
497	LOC102632904	Rnu1b1	0.624550714
498	LOC102632904	Gm22155	0.624550714
499	LOC102632904	Olfr1231	0.618922514
500	LOC102632904	Gm20806	0.603370638
501	LOC102632904	Ipw	0.624550714
502	LOC102632904	Olfr1034	0.624550714

503	LOC102632904	Gm21943	0.62432152
504	LOC102632904	LOC102640399	0.624550714
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507	LOC102632904	Gm20815	0.624089122
508	LOC102632904	mt-Ts1	0.624550714
509	LOC102632904	mt-Ty	0.624550714
510	LOC102632904	Gm24624	0.601008593
511	LOC102632904	LOC102633726	0.610520962
512	LOC102632904	Gm20747	0.607448307
513	LOC102632904	Snora74a	0.624550714
514	LOC102632904	mt-Ts2	0.624550714
515	LOC102632904	Gm22866	0.624550714
516	LOC102632904	Rnu12	0.624550714
517	LOC102632904	Tmeff1	0.624550714
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519	LOC102632904	LOC102639563	0.612052689
520	LOC102632904	Vaultrc5	0.624550714
521	LOC102632904	Inmt	0.624550714
522	LOC102632904	mt-Tk	0.624550714
523	LOC102632904	Glrx3	0.616971069
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526	LOC102632904	mt-Tp	0.624550714
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528	LOC102632904	Mpv17	-0.61068715
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533	LOC102632904	Dhdh	-0.622508261
534	LOC102632904	Fam213a	-0.624550714
535	LOC102632904	Nmnat1	-0.605873152
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547	Myl7	Gm25449	0.616392987
548	Myl7	Gm21732	0.644501631

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556	Gm10921	Gm22253	0.600872277
557	Gm10921	Gm25648	0.600369722
558	Gm10921	Gm23737	0.600872277
559	Gm10921	Gm23922	0.600872277
560	Gm10921	Lsm5	0.600872277
561	Gm10921	Gm25098	0.600872277
562	Gm10921	Gm25449	0.600872277
563	Gm10921	Gm21732	0.600872277
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565	Gm10921	Gm21882	0.600872277
566	Gm10921	Gm23730	0.600872277
567	Gm10921	Gm23305	0.600872277
568	Gm10921	mt-Tt	0.600872277
569	Gm10921	Gm20831	0.600872277
570	Gm10921	Snord116	0.600872277
571	Gm10921	mt-Tc	0.600872277
572	Gm10921	Olfr166	0.600872277
573	Gm10921	Snord116 // Ipw	0.600872277
574	Gm10921	Gm22510	0.600872277
575	Gm10921	Rnu1b1	0.600872277
576	Gm10921	Gm22155	0.600872277
577	Gm10921	Olfr1231	0.600872277
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582	Gm10921	Gm21943	0.600872277
583	Gm10921	LOC102640399	0.600872277
584	Gm10921	Gm10375	0.600872277
585	Gm10921	mt-Tf	0.600872277
586	Gm10921	Gm23947	0.600872277
587	Gm10921	Gm20815	0.600872277
588	Gm10921	mt-Ts1	0.600872277
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591	Gm10921	LOC102633726	0.600872277
592	Gm10921	Gm20747	0.600872277
593	Gm10921	Trdn	0.600872277
594	Gm10921	Snora74a	0.600872277

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602	Gm10921	Inmt	0.600872277
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604	Gm10921	mt-Tk	0.600872277
605	Gm10921	Brox	0.600872277
606	Gm10921	Glrx3	0.600872277
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608	Gm10921	Ddit4	0.600872277
609	Gm10921	mt-Tp	0.600872277
610	Gm10921	mt-Ta	0.600872277
611	Gm10921	Mpv17	-0.600872277
612	Gm10921	Gm6245	-0.600872277
613	Gm10921	Cd59a	-0.600872277
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626	Gm10921	BC023105	-0.600872277
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633	Gm22253	Gm25648	0.600369722
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635	Gm22253	Gm23922	0.658574808
636	Gm22253	Lsm5	0.669850712
637	Gm22253	Gm25098	0.656646706
638	Gm22253	Gm25449	0.616392987
639	Gm22253	Gm21732	0.644501631
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641	Gm22253	Gm21882	0.666405984
642	Gm22253	Gm23730	0.669850712
643	Gm22253	Gm23305	0.664243567
644	Gm22253	mt-Tt	0.669850712
645	Gm22253	Gm20831	0.613856901
646	Gm22253	Snord116	0.669850712
647	Gm22253	mt-Tc	0.669850712
648	Gm22253	Olfr166	0.63478488
649	Gm22253	Snord116 // Ipw	0.669850712
650	Gm22253	Gm22510	0.625509447
651	Gm22253	Rnu1b1	0.669850712
652	Gm22253	Gm22155	0.669850712
653	Gm22253	Olfr1231	0.618922514
654	Gm22253	Gm4787	0.605277579
655	Gm22253	Gm20806	0.603370638
656	Gm22253	Ipw	0.669850712
657	Gm22253	Olfr1034	0.662686071
658	Gm22253	Gm21943	0.62432152
659	Gm22253	LOC102640399	0.653001706
660	Gm22253	Gm10375	0.616879434
661	Gm22253	mt-Tf	0.669850712
662	Gm22253	Gm23947	0.642276287
663	Gm22253	Gm20815	0.624089122
664	Gm22253	mt-Ts1	0.669850712
665	Gm22253	mt-Ty	0.669850712
666	Gm22253	Gm24624	0.601008593
667	Gm22253	LOC102633726	0.610520962
668	Gm22253	Gm20747	0.607448307
669	Gm22253	Trdn	0.662913558
670	Gm22253	Snora74a	0.669850712
671	Gm22253	mt-Ts2	0.669850712
672	Gm22253	Gm22866	0.669850712
673	Gm22253	Rnu12	0.669850712
674	Gm22253	Tmeff1	0.65030418
675	Gm22253	Gm23928	0.602562509
676	Gm22253	LOC102639563	0.612052689
677	Gm22253	Vaultrc5	0.669850712
678	Gm22253	Inmt	0.646471019
679	Gm22253	Fam107a	0.645410606
680	Gm22253	mt-Tk	0.669850712
681	Gm22253	Brox	0.657411274
682	Gm22253	Glrx3	0.616971069
683	Gm22253	mt-Th	0.66178471
684	Gm22253	Ddit4	0.63226978
685	Gm22253	mt-Tp	0.667405111
686	Gm22253	mt-Ta	0.669850712

687	Gm22253	Mpv17	-0.61068715
688	Gm22253	Gm6245	-0.638394295
689	Gm22253	Cd59a	-0.637322477
690	Gm22253	Tmem159	-0.60103159
691	Gm22253	Acot2	-0.669850712
692	Gm22253	Dhdh	-0.622508261
693	Gm22253	Fam213a	-0.643220229
694	Gm22253	Nmnat1	-0.605873152
695	Gm22253	Coq5	-0.669850712
696	Gm22253	Tmem184c	-0.651508083
697	Gm22253	Nrn1	-0.610300306
698	Gm22253	Uprt	-0.651921824
699	Gm22253	Nsun3	-0.669850712
700	Gm22253	Gm10718	-0.609800071
701	Gm22253	Nr4a1	-0.669850712
702	Gm22253	BC023105	-0.605373598
703	Gm22253	Egr1	-0.669850712
704	Gm22253	Fos	-0.669850712
705	Gm22253	Gm5346	-0.657448885
706	Gm22253	Gm5912	-0.651967258
707	Gm22253	Murc	-0.669850712
708	Gm25648	Gm23922	0.600369722
709	Gm25648	Lsm5	0.600369722
710	Gm25648	Gm25098	0.600369722
711	Gm25648	Gm25449	0.600369722
712	Gm25648	Gm21732	0.600369722
713	Gm25648	Gm25089	0.600369722
714	Gm25648	Gm21882	0.600369722
715	Gm25648	Gm23730	0.600369722
716	Gm25648	Gm23305	0.600369722
717	Gm25648	mt-Tt	0.600369722
718	Gm25648	Gm20831	0.600369722
719	Gm25648	Snord116	0.600369722
720	Gm25648	mt-Tc	0.600369722
721	Gm25648	Olfr166	0.600369722
722	Gm25648	Snord116 // Ipw	0.600369722
723	Gm25648	Gm22510	0.600369722
724	Gm25648	Rnu1b1	0.600369722
725	Gm25648	Myl4	0.600369722
726	Gm25648	Gm22155	0.600369722
727	Gm25648	Olfr1231	0.600369722
728	Gm25648	Gm4787	0.600369722
729	Gm25648	Gm20806	0.600369722
730	Gm25648	Ipw	0.600369722
731	Gm25648	Olfr1034	0.600369722
732	Gm25648	Gm21943	0.600369722

733	Gm25648	LOC102640399	0.600369722
734	Gm25648	mt-Tf	0.600369722
735	Gm25648	Gm20815	0.600369722
736	Gm25648	mt-Ts1	0.600369722
737	Gm25648	mt-Ty	0.600369722
738	Gm25648	Gm24624	0.600369722
739	Gm25648	LOC102633726	0.600369722
740	Gm25648	Gm20747	0.600369722
741	Gm25648	Trdn	0.600369722
742	Gm25648	Snora74a	0.600369722
743	Gm25648	mt-Ts2	0.600369722
744	Gm25648	Gm22866	0.600369722
745	Gm25648	Rnu12	0.600369722
746	Gm25648	Ppp4r2	0.600369722
747	Gm25648	Tmeff1	0.600369722
748	Gm25648	LOC102639563	0.600369722
749	Gm25648	Vaultrc5	0.600369722
750	Gm25648	Inmt	0.600369722
751	Gm25648	Fam107a	0.600369722
752	Gm25648	mt-Tk	0.600369722
753	Gm25648	Brox	0.600369722
754	Gm25648	Glrx3	0.600369722
755	Gm25648	mt-Th	0.600369722
756	Gm25648	Ddit4	0.600369722
757	Gm25648	mt-Tp	0.600369722
758	Gm25648	mt-Ta	0.600369722
759	Gm25648	Mpv17	-0.600369722
760	Gm25648	Gm6245	-0.600369722
761	Gm25648	Cd59a	-0.600369722
762	Gm25648	Tmem159	-0.600369722
763	Gm25648	Acot2	-0.600369722
764	Gm25648	Dhdh	-0.600369722
765	Gm25648	Fam213a	-0.600369722
766	Gm25648	Nmnat1	-0.600369722
767	Gm25648	Coq5	-0.600369722
768	Gm25648	Nrn1	-0.600369722
769	Gm25648	Uprt	-0.600369722
770	Gm25648	Nsun3	-0.600369722
771	Gm25648	Gm10718	-0.600369722
772	Gm25648	Nr4a1	-0.600369722
773	Gm25648	Egr1	-0.600369722
774	Gm25648	Fos	-0.600369722
775	Gm25648	G530011O06Rik	-0.600369722
776	Gm25648	Gm5346	-0.600369722
777	Gm25648	Gm5912	-0.600369722
778	Gm25648	Murc	-0.600369722

779	Gm23737	Gm23922	0.658574808
780	Gm23737	Gm25098	0.656646706
781	Gm23737	Gm25449	0.616392987
782	Gm23737	Gm21732	0.644501631
783	Gm23737	Gm25089	0.607305416
784	Gm23737	Gm21882	0.666405984
785	Gm23737	Gm23730	0.71365871
786	Gm23737	Gm23305	0.664243567
787	Gm23737	mt-Tt	0.71365871
788	Gm23737	Gm20831	0.613856901
789	Gm23737	Snord116	0.71365871
790	Gm23737	mt-Tc	0.71365871
791	Gm23737	Olfr166	0.63478488
792	Gm23737	Snord116 // Ipw	0.695183163
793	Gm23737	Rnu1b1	0.71365871
794	Gm23737	Gm22155	0.71365871
795	Gm23737	Olfr1231	0.618922514
796	Gm23737	Gm20806	0.603370638
797	Gm23737	Ipw	0.679543558
798	Gm23737	Olfr1034	0.662686071
799	Gm23737	Gm21943	0.62432152
800	Gm23737	LOC102640399	0.653001706
801	Gm23737	mt-Tf	0.71365871
802	Gm23737	Gm23947	0.642276287
803	Gm23737	Gm20815	0.624089122
804	Gm23737	mt-Ts1	0.71365871
805	Gm23737	mt-Ty	0.71365871
806	Gm23737	Gm24624	0.601008593
807	Gm23737	LOC102633726	0.610520962
808	Gm23737	Gm20747	0.607448307
809	Gm23737	Snora74a	0.71365871
810	Gm23737	mt-Ts2	0.71365871
811	Gm23737	Gm22866	0.71365871
812	Gm23737	Rnu12	0.71365871
813	Gm23737	Gm22749	0.634337211
814	Gm23737	Tmeff1	0.65030418
815	Gm23737	Gm23928	0.602562509
816	Gm23737	LOC102639563	0.612052689
817	Gm23737	Vaultrc5	0.71365871
818	Gm23737	Inmt	0.646471019
819	Gm23737	Fam107a	0.645410606
820	Gm23737	mt-Tk	0.71365871
821	Gm23737	Glrx3	0.616971069
822	Gm23737	mt-Th	0.66178471
823	Gm23737	Ddit4	0.63226978
824	Gm23737	mt-Tp	0.667405111

825	Gm23737	mt-Ta	0.680121023
826	Gm23737	Mpv17	-0.61068715
827	Gm23737	Gm6245	-0.638394295
828	Gm23737	Cd59a	-0.637322477
829	Gm23737	Tmem159	-0.60103159
830	Gm23737	Acot2	-0.679628534
831	Gm23737	Dhdh	-0.622508261
832	Gm23737	Fam213a	-0.643220229
833	Gm23737	Nmnat1	-0.605873152
834	Gm23737	Coq5	-0.677305385
835	Gm23737	Tmem184c	-0.651508083
836	Gm23737	Nrn1	-0.610300306
837	Gm23737	Uprt	-0.651921824
838	Gm23737	Nsun3	-0.673017501
839	Gm23737	BC023105	-0.605373598
840	Gm23737	Murc	-0.71365871
841	Gm23922	Lsm5	0.658574808
842	Gm23922	Gm25098	0.656646706
843	Gm23922	Gm25449	0.616392987
844	Gm23922	Gm21732	0.644501631
845	Gm23922	Gm25089	0.64846379
846	Gm23922	Gm21882	0.658574808
847	Gm23922	Gm23730	0.658574808
848	Gm23922	Gm23305	0.658574808
849	Gm23922	mt-Tt	0.658574808
850	Gm23922	Gm20831	0.613856901
851	Gm23922	Snord116	0.658574808
852	Gm23922	mt-Tc	0.658574808
853	Gm23922	Olfr166	0.63478488
854	Gm23922	Snord116 // Ipw	0.658574808
855	Gm23922	Gm22510	0.625509447
856	Gm23922	Rnu1b1	0.658574808
857	Gm23922	Myl4	0.628830995
858	Gm23922	Gm22155	0.658574808
859	Gm23922	Olfr1231	0.618922514
860	Gm23922	Gm4787	0.605277579
861	Gm23922	Gm20806	0.603370638
862	Gm23922	Ipw	0.658574808
863	Gm23922	Olfr1034	0.658574808
864	Gm23922	Gm21943	0.62432152
865	Gm23922	LOC102640399	0.653001706
866	Gm23922	mt-Tf	0.658574808
867	Gm23922	Gm20815	0.624089122
868	Gm23922	mt-Ts1	0.658574808
869	Gm23922	mt-Ty	0.658574808
870	Gm23922	Gm24624	0.601008593

871	Gm23922	LOC102633726	0.610520962
872	Gm23922	Gm20747	0.607448307
873	Gm23922	Trdn	0.608574234
874	Gm23922	Snora74a	0.658574808
875	Gm23922	mt-Ts2	0.658574808
876	Gm23922	Gm22866	0.658574808
877	Gm23922	Rnu12	0.658574808
878	Gm23922	Tmeff1	0.65030418
879	Gm23922	Gm23928	0.602562509
880	Gm23922	LOC102639563	0.612052689
881	Gm23922	Vaultrc5	0.658574808
882	Gm23922	Inmt	0.646471019
883	Gm23922	Fam107a	0.645410606
884	Gm23922	mt-Tk	0.658574808
885	Gm23922	Glrx3	0.616971069
886	Gm23922	mt-Th	0.658574808
887	Gm23922	Ddit4	0.63226978
888	Gm23922	mt-Tp	0.658574808
889	Gm23922	mt-Ta	0.658574808
890	Gm23922	Mpv17	-0.61068715
891	Gm23922	Gm6245	-0.638394295
892	Gm23922	Cd59a	-0.637322477
893	Gm23922	Tmem159	-0.60103159
894	Gm23922	Acot2	-0.658574808
895	Gm23922	Dhdh	-0.622508261
896	Gm23922	Fam213a	-0.643220229
897	Gm23922	Nmnat1	-0.605873152
898	Gm23922	Coq5	-0.658574808
899	Gm23922	Tmem184c	-0.640680762
900	Gm23922	Nrn1	-0.610300306
901	Gm23922	Uprt	-0.651921824
902	Gm23922	Nsun3	-0.658574808
903	Gm23922	Gm10718	-0.609800071
904	Gm23922	Nr4a1	-0.658574808
905	Gm23922	BC023105	-0.605373598
906	Gm23922	Egr1	-0.658574808
907	Gm23922	Fos	-0.658574808
908	Gm23922	Gm5346	-0.654263032
909	Gm23922	Gm5912	-0.651967258
910	Gm23922	Murc	-0.658574808
911	Lsm5	Gm25098	0.642283769
912	Lsm5	Gm25449	0.616392987
913	Lsm5	Gm25089	0.64846379
914	Lsm5	Gm23730	0.70095173
915	Lsm5	Gm23305	0.664243567
916	Lsm5	mt-Tt	0.64601116

917	Lsm5	Gm20831	0.613856901
918	Lsm5	Snord116	0.725166274
919	Lsm5	mt-Tc	0.61096251
920	Lsm5	Olfr166	0.63478488
921	Lsm5	Snord116 // Ipw	0.665435345
922	Lsm5	Gm22510	0.625509447
923	Lsm5	Olfr1231	0.606451907
924	Lsm5	Gm4787	0.605277579
925	Lsm5	Gm20806	0.603370638
926	Lsm5	Ipw	0.679543558
927	Lsm5	Olfr1034	0.662686071
928	Lsm5	Gm21943	0.62432152
929	Lsm5	LOC102640399	0.653001706
930	Lsm5	Gm10375	0.616879434
931	Lsm5	mt-Tf	0.720624646
932	Lsm5	Gm20815	0.624089122
933	Lsm5	mt-Ts1	0.624454726
934	Lsm5	mt-Ty	0.713642853
935	Lsm5	LOC102633726	0.610520962
936	Lsm5	Gm20747	0.607448307
937	Lsm5	Trdn	0.662913558
938	Lsm5	Rnu12	0.603442777
939	Lsm5	Ppp4r2	0.725777902
940	Lsm5	Tmeff1	0.65030418
941	Lsm5	LOC102639563	0.612052689
942	Lsm5	Inmt	0.646471019
943	Lsm5	Fam107a	0.645410606
944	Lsm5	mt-Tk	0.716985592
945	Lsm5	Brox	0.657411274
946	Lsm5	Glrx3	0.616971069
947	Lsm5	mt-Th	0.66178471
948	Lsm5	Ddit4	0.63226978
949	Lsm5	mt-Tp	0.665011816
950	Lsm5	mt-Ta	0.634771368
951	Lsm5	Mpv17	-0.61068715
952	Lsm5	Gm6245	-0.631869125
953	Lsm5	Tmem159	-0.60103159
954	Lsm5	Fam213a	-0.643220229
955	Lsm5	Uprt	-0.648469299
956	Lsm5	Gm10718	-0.609800071
957	Lsm5	Nr4a1	-0.747000222
958	Lsm5	Egr1	-0.704399843
959	Lsm5	Fos	-0.695614744
960	Lsm5	G530011O06Rik	-0.740456125
961	Lsm5	Gm5346	-0.657448885
962	Lsm5	Gm5912	-0.651967258

963	Lsm5	Murc	-0.761220816
964	Gm25098	Gm25449	0.616392987
965	Gm25098	Gm21732	0.644501631
966	Gm25098	Gm25089	0.64846379
967	Gm25098	Gm21882	0.656646706
968	Gm25098	Gm23730	0.656646706
969	Gm25098	Gm23305	0.656646706
970	Gm25098	mt-Tt	0.656646706
971	Gm25098	Gm20831	0.613856901
972	Gm25098	Snord116	0.656646706
973	Gm25098	mt-Tc	0.656646706
974	Gm25098	Olfr166	0.63478488
975	Gm25098	Snord116 // Ipw	0.656646706
976	Gm25098	Gm22510	0.625509447
977	Gm25098	Rnu1b1	0.656646706
978	Gm25098	Gm22155	0.656646706
979	Gm25098	Olfr1231	0.618922514
980	Gm25098	Gm20806	0.603370638
981	Gm25098	Ipw	0.656646706
982	Gm25098	Olfr1034	0.656646706
983	Gm25098	Gm21943	0.62432152
984	Gm25098	LOC102640399	0.653001706
985	Gm25098	mt-Tf	0.656646706
986	Gm25098	Gm23947	0.642276287
987	Gm25098	Gm20815	0.624089122
988	Gm25098	mt-Ts1	0.656646706
989	Gm25098	mt-Ty	0.656646706
990	Gm25098	Gm24624	0.601008593
991	Gm25098	LOC102633726	0.610520962
992	Gm25098	Gm20747	0.607448307
993	Gm25098	Snora74a	0.656646706
994	Gm25098	mt-Ts2	0.656646706
995	Gm25098	Gm22866	0.656646706
996	Gm25098	Rnu12	0.656646706
997	Gm25098	Tmeff1	0.65030418
998	Gm25098	Gm23928	0.602562509
999	Gm25098	LOC102639563	0.612052689
1000	Gm25098	Vaultrc5	0.656646706
1001	Gm25098	Inmt	0.646471019
1002	Gm25098	Fam107a	0.626498046
1003	Gm25098	mt-Tk	0.656646706
1004	Gm25098	Glrx3	0.616971069
1005	Gm25098	mt-Th	0.656646706
1006	Gm25098	Ddit4	0.63226978
1007	Gm25098	mt-Tp	0.656646706
1008	Gm25098	mt-Ta	0.656646706

1009	Gm25098	Mpv17	-0.61068715
1010	Gm25098	Gm6245	-0.638394295
1011	Gm25098	Cd59a	-0.637322477
1012	Gm25098	Tmem159	-0.60103159
1013	Gm25098	Acot2	-0.656646706
1014	Gm25098	Dhdh	-0.622508261
1015	Gm25098	Fam213a	-0.643220229
1016	Gm25098	Nmnat1	-0.605873152
1017	Gm25098	Coq5	-0.656646706
1018	Gm25098	Tmem184c	-0.651508083
1019	Gm25098	Nrn1	-0.610300306
1020	Gm25098	Uprt	-0.651921824
1021	Gm25098	Nsun3	-0.656646706
1022	Gm25098	Gm10718	-0.609800071
1023	Gm25098	Nr4a1	-0.656646706
1024	Gm25098	BC023105	-0.605373598
1025	Gm25098	Fos	-0.620396953
1026	Gm25098	Gm5912	-0.651967258
1027	Gm25098	Murc	-0.656646706
1028	Gm25449	Gm21732	0.616392987
1029	Gm25449	Gm25089	0.616392987
1030	Gm25449	Gm21882	0.616392987
1031	Gm25449	Gm23730	0.616392987
1032	Gm25449	Gm23305	0.616392987
1033	Gm25449	mt-Tt	0.616392987
1034	Gm25449	Gm20831	0.613856901
1035	Gm25449	Snord116	0.616392987
1036	Gm25449	mt-Tc	0.616392987
1037	Gm25449	Olfr166	0.616392987
1038	Gm25449	Snord116 // Ipw	0.616392987
1039	Gm25449	Gm22510	0.616392987
1040	Gm25449	Rnu1b1	0.616392987
1041	Gm25449	Myl4	0.616392987
1042	Gm25449	Gm22155	0.616392987
1043	Gm25449	Olfr1231	0.616392987
1044	Gm25449	Gm4787	0.605277579
1045	Gm25449	Gm20806	0.603370638
1046	Gm25449	Ipw	0.616392987
1047	Gm25449	Olfr1034	0.616392987
1048	Gm25449	Gm21943	0.616392987
1049	Gm25449	LOC102640399	0.616392987
1050	Gm25449	mt-Tf	0.616392987
1051	Gm25449	Gm20815	0.616392987
1052	Gm25449	mt-Ts1	0.616392987
1053	Gm25449	mt-Ty	0.616392987
1054	Gm25449	Gm24624	0.601008593

1055	Gm25449	LOC102633726	0.610520962
1056	Gm25449	Gm20747	0.607448307
1057	Gm25449	Trdn	0.616392987
1058	Gm25449	Snora74a	0.616392987
1059	Gm25449	mt-Ts2	0.616392987
1060	Gm25449	Gm22866	0.616392987
1061	Gm25449	Rnu12	0.616392987
1062	Gm25449	Ppp4r2	0.614158295
1063	Gm25449	Tmeff1	0.616392987
1064	Gm25449	LOC102639563	0.612052689
1065	Gm25449	Vaultrc5	0.616392987
1066	Gm25449	Inmt	0.616392987
1067	Gm25449	Fam107a	0.616392987
1068	Gm25449	mt-Tk	0.616392987
1069	Gm25449	Brox	0.616392987
1070	Gm25449	Glrx3	0.616392987
1071	Gm25449	mt-Th	0.616392987
1072	Gm25449	Ddit4	0.616392987
1073	Gm25449	mt-Tp	0.616392987
1074	Gm25449	mt-Ta	0.616392987
1075	Gm25449	Mpv17	-0.61068715
1076	Gm25449	Gm6245	-0.616392987
1077	Gm25449	Cd59a	-0.616392987
1078	Gm25449	Tmem159	-0.60103159
1079	Gm25449	Acot2	-0.616392987
1080	Gm25449	Dhdh	-0.616392987
1081	Gm25449	Fam213a	-0.616392987
1082	Gm25449	Nmnat1	-0.605873152
1083	Gm25449	Coq5	-0.616392987
1084	Gm25449	Nrn1	-0.610300306
1085	Gm25449	Uprt	-0.616392987
1086	Gm25449	Nsun3	-0.616392987
1087	Gm25449	Gm10718	-0.609800071
1088	Gm25449	Nr4a1	-0.616392987
1089	Gm25449	Egr1	-0.616392987
1090	Gm25449	Fos	-0.616392987
1091	Gm25449	Gm5346	-0.616392987
1092	Gm25449	Gm5912	-0.616392987
1093	Gm25449	Murc	-0.616392987
1094	Gm21732	Gm25089	0.644501631
1095	Gm21732	Gm21882	0.644501631
1096	Gm21732	Gm23730	0.644501631
1097	Gm21732	Gm23305	0.644501631
1098	Gm21732	mt-Tt	0.644501631
1099	Gm21732	Gm20831	0.613856901
1100	Gm21732	Snord116	0.644501631

1101	Gm21732	mt-Tc	0.644501631
1102	Gm21732	Olfr166	0.63478488
1103	Gm21732	Snord116 // Ipw	0.644501631
1104	Gm21732	Gm22510	0.625509447
1105	Gm21732	Rnu1b1	0.644501631
1106	Gm21732	Myl4	0.642387625
1107	Gm21732	Gm22155	0.644501631
1108	Gm21732	Olfr1231	0.618389416
1109	Gm21732	Gm20806	0.603370638
1110	Gm21732	Ipw	0.644501631
1111	Gm21732	Olfr1034	0.644501631
1112	Gm21732	Gm21943	0.62432152
1113	Gm21732	LOC102640399	0.644501631
1114	Gm21732	mt-Tf	0.644501631
1115	Gm21732	Gm20815	0.624089122
1116	Gm21732	mt-Ts1	0.644501631
1117	Gm21732	mt-Ty	0.644501631
1118	Gm21732	Gm24624	0.601008593
1119	Gm21732	LOC102633726	0.610520962
1120	Gm21732	Gm20747	0.607448307
1121	Gm21732	Snora74a	0.636646912
1122	Gm21732	mt-Ts2	0.644501631
1123	Gm21732	Gm22866	0.644501631
1124	Gm21732	Rnu12	0.644501631
1125	Gm21732	Tmeff1	0.644501631
1126	Gm21732	LOC102639563	0.612052689
1127	Gm21732	Vaultrc5	0.644501631
1128	Gm21732	Inmt	0.603800407
1129	Gm21732	mt-Tk	0.644501631
1130	Gm21732	Glrx3	0.616971069
1131	Gm21732	mt-Th	0.644501631
1132	Gm21732	Ddit4	0.608171217
1133	Gm21732	mt-Tp	0.644501631
1134	Gm21732	mt-Ta	0.644501631
1135	Gm21732	Mpv17	-0.61068715
1136	Gm21732	Gm6245	-0.638394295
1137	Gm21732	Cd59a	-0.637322477
1138	Gm21732	Tmem159	-0.60103159
1139	Gm21732	Acot2	-0.644501631
1140	Gm21732	Dhdh	-0.622508261
1141	Gm21732	Fam213a	-0.643220229
1142	Gm21732	Nmnat1	-0.605873152
1143	Gm21732	Coq5	-0.644501631
1144	Gm21732	Uprt	-0.644501631
1145	Gm21732	Nsun3	-0.644501631
1146	Gm21732	Gm10718	-0.609800071

1147	Gm21732	BC023105	-0.605373598
1148	Gm21732	Gm5912	-0.644501631
1149	Gm21732	Murc	-0.644501631
1150	Gm25089	Gm21882	0.64846379
1151	Gm25089	Gm23730	0.64846379
1152	Gm25089	Gm23305	0.64846379
1153	Gm25089	mt-Tt	0.626492121
1154	Gm25089	Gm20831	0.613856901
1155	Gm25089	Snord116	0.64846379
1156	Gm25089	mt-Tc	0.64846379
1157	Gm25089	Olfr166	0.63478488
1158	Gm25089	Snord116 // Ipw	0.64846379
1159	Gm25089	Gm22510	0.625509447
1160	Gm25089	Rnu1b1	0.64846379
1161	Gm25089	Myl4	0.642387625
1162	Gm25089	Olfr1231	0.614302373
1163	Gm25089	Gm4787	0.605277579
1164	Gm25089	Gm20806	0.603370638
1165	Gm25089	Ipw	0.64846379
1166	Gm25089	Olfr1034	0.64846379
1167	Gm25089	Gm21943	0.62432152
1168	Gm25089	LOC102640399	0.64846379
1169	Gm25089	mt-Tf	0.64846379
1170	Gm25089	Gm20815	0.624089122
1171	Gm25089	mt-Ts1	0.64846379
1172	Gm25089	mt-Ty	0.64846379
1173	Gm25089	Gm24624	0.601008593
1174	Gm25089	LOC102633726	0.610520962
1175	Gm25089	Gm20747	0.607448307
1176	Gm25089	mt-Ts2	0.64846379
1177	Gm25089	Gm22866	0.64846379
1178	Gm25089	Rnu12	0.645183951
1179	Gm25089	Tmeff1	0.64846379
1180	Gm25089	LOC102639563	0.612052689
1181	Gm25089	Vaultrc5	0.64846379
1182	Gm25089	mt-Tk	0.64846379
1183	Gm25089	Glrx3	0.616971069
1184	Gm25089	mt-Th	0.64846379
1185	Gm25089	Ddit4	0.631360489
1186	Gm25089	mt-Tp	0.64846379
1187	Gm25089	mt-Ta	0.64846379
1188	Gm25089	Mpv17	-0.61068715
1189	Gm25089	Gm6245	-0.638394295
1190	Gm25089	Cd59a	-0.637322477
1191	Gm25089	Tmem159	-0.60103159
1192	Gm25089	Acot2	-0.64846379

1193	Gm25089	Dhdh	-0.622508261
1194	Gm25089	Fam213a	-0.643220229
1195	Gm25089	Nmnat1	-0.605873152
1196	Gm25089	Coq5	-0.64846379
1197	Gm25089	Uprt	-0.64846379
1198	Gm25089	Nsun3	-0.639296357
1199	Gm25089	Gm10718	-0.609800071
1200	Gm25089	BC023105	-0.605373598
1201	Gm25089	Egr1	-0.609483998
1202	Gm25089	Fos	-0.610218063
1203	Gm25089	Gm5912	-0.64846379
1204	Gm25089	Murc	-0.64846379
1205	Gm21882	Gm23730	0.666405984
1206	Gm21882	Gm23305	0.664243567
1207	Gm21882	mt-Tt	0.666405984
1208	Gm21882	Gm20831	0.613856901
1209	Gm21882	Snord116	0.666405984
1210	Gm21882	mt-Tc	0.666405984
1211	Gm21882	Olfr166	0.63478488
1212	Gm21882	Snord116 // Ipw	0.666405984
1213	Gm21882	Gm22510	0.625509447
1214	Gm21882	Rnu1b1	0.666405984
1215	Gm21882	Myl4	0.614114394
1216	Gm21882	Gm22155	0.666405984
1217	Gm21882	Olfr1231	0.618922514
1218	Gm21882	Gm20806	0.603370638
1219	Gm21882	Ipw	0.666405984
1220	Gm21882	Olfr1034	0.662686071
1221	Gm21882	Gm21943	0.62432152
1222	Gm21882	LOC102640399	0.653001706
1223	Gm21882	mt-Tf	0.666405984
1224	Gm21882	Gm23947	0.642276287
1225	Gm21882	Gm20815	0.624089122
1226	Gm21882	mt-Ts1	0.666405984
1227	Gm21882	mt-Ty	0.666405984
1228	Gm21882	Gm24624	0.601008593
1229	Gm21882	LOC102633726	0.610520962
1230	Gm21882	Gm20747	0.607448307
1231	Gm21882	Snora74a	0.666405984
1232	Gm21882	mt-Ts2	0.666405984
1233	Gm21882	Gm22866	0.666405984
1234	Gm21882	Rnu12	0.666405984
1235	Gm21882	Tmeff1	0.65030418
1236	Gm21882	LOC102639563	0.612052689
1237	Gm21882	Vaultrc5	0.666405984
1238	Gm21882	Inmt	0.646471019

1239	Gm21882	Fam107a	0.621684412
1240	Gm21882	mt-Tk	0.666405984
1241	Gm21882	Glrx3	0.616971069
1242	Gm21882	mt-Th	0.66178471
1243	Gm21882	Ddit4	0.63226978
1244	Gm21882	mt-Tp	0.666405984
1245	Gm21882	mt-Ta	0.666405984
1246	Gm21882	Mpv17	-0.61068715
1247	Gm21882	Gm6245	-0.638394295
1248	Gm21882	Cd59a	-0.637322477
1249	Gm21882	Tmem159	-0.60103159
1250	Gm21882	Acot2	-0.666405984
1251	Gm21882	Dhdh	-0.622508261
1252	Gm21882	Fam213a	-0.643220229
1253	Gm21882	Nmnat1	-0.605873152
1254	Gm21882	Coq5	-0.666405984
1255	Gm21882	Tmem184c	-0.650602006
1256	Gm21882	Nrn1	-0.610300306
1257	Gm21882	Uprt	-0.651921824
1258	Gm21882	Nsun3	-0.666405984
1259	Gm21882	Gm10718	-0.609800071
1260	Gm21882	BC023105	-0.605373598
1261	Gm21882	Gm5912	-0.630204077
1262	Gm21882	Murc	-0.666405984
1263	Gm23730	Gm23305	0.664243567
1264	Gm23730	mt-Tt	0.726798019
1265	Gm23730	Gm20831	0.613856901
1266	Gm23730	Snord116	0.725166274
1267	Gm23730	mt-Tc	0.726798019
1268	Gm23730	Olfr166	0.63478488
1269	Gm23730	Snord116 // Ipw	0.695183163
1270	Gm23730	Gm22510	0.620136599
1271	Gm23730	Rnu1b1	0.726798019
1272	Gm23730	Gm22155	0.726798019
1273	Gm23730	Olfr1231	0.618922514
1274	Gm23730	Gm4787	0.605277579
1275	Gm23730	Gm20806	0.603370638
1276	Gm23730	Ipw	0.679543558
1277	Gm23730	Olfr1034	0.662686071
1278	Gm23730	Gm21943	0.62432152
1279	Gm23730	LOC102640399	0.653001706
1280	Gm23730	Gm10375	0.616879434
1281	Gm23730	mt-Tf	0.726798019
1282	Gm23730	Gm23947	0.642276287
1283	Gm23730	Gm20815	0.624089122
1284	Gm23730	mt-Ts1	0.726798019

1285	Gm23730	mt-Ty	0.726798019
1286	Gm23730	Gm24624	0.601008593
1287	Gm23730	LOC102633726	0.610520962
1288	Gm23730	Gm20747	0.607448307
1289	Gm23730	Trdn	0.662913558
1290	Gm23730	Snora74a	0.716709874
1291	Gm23730	mt-Ts2	0.726798019
1292	Gm23730	Gm22866	0.726798019
1293	Gm23730	Rnu12	0.714196988
1294	Gm23730	Ppp4r2	0.725777902
1295	Gm23730	Gm22749	0.634337211
1296	Gm23730	Tmeff1	0.65030418
1297	Gm23730	Gm23928	0.602562509
1298	Gm23730	LOC102639563	0.612052689
1299	Gm23730	Vaultrc5	0.726798019
1300	Gm23730	Inmt	0.646471019
1301	Gm23730	Fam107a	0.645410606
1302	Gm23730	mt-Tk	0.720414242
1303	Gm23730	Brox	0.657411274
1304	Gm23730	Glrx3	0.616971069
1305	Gm23730	mt-Th	0.66178471
1306	Gm23730	Ddit4	0.63226978
1307	Gm23730	mt-Tp	0.667405111
1308	Gm23730	mt-Ta	0.680121023
1309	Gm23730	Mpv17	-0.61068715
1310	Gm23730	Gm6245	-0.638394295
1311	Gm23730	Cd59a	-0.637322477
1312	Gm23730	Tmem159	-0.60103159
1313	Gm23730	Acot2	-0.679628534
1314	Gm23730	Dhdh	-0.622508261
1315	Gm23730	Fam213a	-0.643220229
1316	Gm23730	Nmnat1	-0.605873152
1317	Gm23730	Coq5	-0.677305385
1318	Gm23730	Tmem184c	-0.651508083
1319	Gm23730	Nrn1	-0.610300306
1320	Gm23730	Uprt	-0.651921824
1321	Gm23730	Nsun3	-0.673017501
1322	Gm23730	Gm10718	-0.609800071
1323	Gm23730	Nr4a1	-0.623776868
1324	Gm23730	BC023105	-0.605373598
1325	Gm23730	Fos	-0.623812344
1326	Gm23730	Gm5346	-0.657448885
1327	Gm23730	Gm5912	-0.651967258
1328	Gm23730	Murc	-0.726798019
1329	Gm23305	mt-Tt	0.664243567
1330	Gm23305	Gm20831	0.613856901

1331	Gm23305	Snord116	0.664243567
1332	Gm23305	mt-Tc	0.664243567
1333	Gm23305	Olfr166	0.63478488
1334	Gm23305	Snord116 // Ipw	0.664243567
1335	Gm23305	Gm22510	0.625509447
1336	Gm23305	Rnu1b1	0.664243567
1337	Gm23305	Gm22155	0.664243567
1338	Gm23305	Olfr1231	0.618922514
1339	Gm23305	Gm4787	0.605277579
1340	Gm23305	Gm20806	0.603370638
1341	Gm23305	Ipw	0.664243567
1342	Gm23305	Olfr1034	0.662686071
1343	Gm23305	Gm21943	0.62432152
1344	Gm23305	LOC102640399	0.653001706
1345	Gm23305	Gm10375	0.604081696
1346	Gm23305	mt-Tf	0.664243567
1347	Gm23305	Gm23947	0.642276287
1348	Gm23305	Gm20815	0.624089122
1349	Gm23305	mt-Ts1	0.664243567
1350	Gm23305	mt-Ty	0.664243567
1351	Gm23305	Gm24624	0.601008593
1352	Gm23305	LOC102633726	0.610520962
1353	Gm23305	Gm20747	0.607448307
1354	Gm23305	Trdn	0.662913558
1355	Gm23305	Snora74a	0.664243567
1356	Gm23305	mt-Ts2	0.664243567
1357	Gm23305	Gm22866	0.664243567
1358	Gm23305	Rnu12	0.664243567
1359	Gm23305	Tmeff1	0.65030418
1360	Gm23305	Gm23928	0.602562509
1361	Gm23305	LOC102639563	0.612052689
1362	Gm23305	Vaultrc5	0.664243567
1363	Gm23305	Inmt	0.646471019
1364	Gm23305	Fam107a	0.645410606
1365	Gm23305	mt-Tk	0.664243567
1366	Gm23305	Brox	0.614858096
1367	Gm23305	Glrx3	0.616971069
1368	Gm23305	mt-Th	0.66178471
1369	Gm23305	Ddit4	0.63226978
1370	Gm23305	mt-Tp	0.664243567
1371	Gm23305	mt-Ta	0.664243567
1372	Gm23305	Mpv17	-0.61068715
1373	Gm23305	Gm6245	-0.638394295
1374	Gm23305	Cd59a	-0.637322477
1375	Gm23305	Tmem159	-0.60103159
1376	Gm23305	Acot2	-0.664243567

1377	Gm23305	Dhdh	-0.622508261
1378	Gm23305	Fam213a	-0.643220229
1379	Gm23305	Nmnat1	-0.605873152
1380	Gm23305	Coq5	-0.664243567
1381	Gm23305	Tmem184c	-0.651508083
1382	Gm23305	Nrn1	-0.610300306
1383	Gm23305	Uprt	-0.651921824
1384	Gm23305	Nsun3	-0.664243567
1385	Gm23305	Gm10718	-0.609800071
1386	Gm23305	Nr4a1	-0.664243567
1387	Gm23305	BC023105	-0.605373598
1388	Gm23305	Egr1	-0.664243567
1389	Gm23305	Fos	-0.664243567
1390	Gm23305	Gm5346	-0.657448885
1391	Gm23305	Gm5912	-0.651967258
1392	Gm23305	Murc	-0.664243567
1393	mt-Tt	Gm20831	0.613856901
1394	mt-Tt	Snord116	0.725166274
1395	mt-Tt	mt-Tc	0.847530386
1396	mt-Tt	Olfr166	0.63478488
1397	mt-Tt	Snord116 // Ipw	0.695183163
1398	mt-Tt	Gm22510	0.625509447
1399	mt-Tt	Rnu1b1	0.859660173
1400	mt-Tt	Gm22155	0.753346542
1401	mt-Tt	Olfr1231	0.618922514
1402	mt-Tt	Gm4787	0.605277579
1403	mt-Tt	Gm20806	0.603370638
1404	mt-Tt	Ipw	0.679543558
1405	mt-Tt	Olfr1034	0.662686071
1406	mt-Tt	Gm21943	0.62432152
1407	mt-Tt	LOC102640399	0.653001706
1408	mt-Tt	mt-Tf	0.843977183
1409	mt-Tt	Gm23947	0.642276287
1410	mt-Tt	Gm20815	0.624089122
1411	mt-Tt	mt-Ts1	0.823514957
1412	mt-Tt	mt-Ty	0.792687001
1413	mt-Tt	Gm24624	0.601008593
1414	mt-Tt	LOC102633726	0.610520962
1415	mt-Tt	Gm20747	0.607448307
1416	mt-Tt	Trdn	0.634569329
1417	mt-Tt	Snora74a	0.716709874
1418	mt-Tt	mt-Ts2	0.822093546
1419	mt-Tt	Gm22866	0.810797753
1420	mt-Tt	Rnu12	0.714196988
1421	mt-Tt	Gm22749	0.601767939
1422	mt-Tt	Tmeff1	0.65030418

1423	mt-Tt	Gm23928	0.602562509
1424	mt-Tt	LOC102639563	0.612052689
1425	mt-Tt	Vaultrc5	0.728238836
1426	mt-Tt	Inmt	0.646471019
1427	mt-Tt	Fam107a	0.645410606
1428	mt-Tt	mt-Tk	0.720414242
1429	mt-Tt	Brox	0.657411274
1430	mt-Tt	Glrx3	0.616971069
1431	mt-Tt	mt-Th	0.66178471
1432	mt-Tt	Ddit4	0.63226978
1433	mt-Tt	mt-Tp	0.667405111
1434	mt-Tt	mt-Ta	0.680121023
1435	mt-Tt	Mpv17	-0.61068715
1436	mt-Tt	Gm6245	-0.638394295
1437	mt-Tt	Cd59a	-0.637322477
1438	mt-Tt	Tmem159	-0.60103159
1439	mt-Tt	Acot2	-0.679628534
1440	mt-Tt	Dhdh	-0.622508261
1441	mt-Tt	Fam213a	-0.643220229
1442	mt-Tt	Nmnat1	-0.605873152
1443	mt-Tt	Coq5	-0.677305385
1444	mt-Tt	Tmem184c	-0.651508083
1445	mt-Tt	Nrn1	-0.610300306
1446	mt-Tt	Uprt	-0.651921824
1447	mt-Tt	Nsun3	-0.673017501
1448	mt-Tt	Nr4a1	-0.747000222
1449	mt-Tt	BC023105	-0.605373598
1450	mt-Tt	Egr1	-0.687631153
1451	mt-Tt	Fos	-0.695614744
1452	mt-Tt	G530011O06Rik	-0.740456125
1453	mt-Tt	Gm5346	-0.657448885
1454	mt-Tt	Gm5912	-0.651967258
1455	mt-Tt	Murc	-0.859660173
1456	Gm20831	Snord116	0.613856901
1457	Gm20831	mt-Tc	0.613856901
1458	Gm20831	Olfr166	0.613856901
1459	Gm20831	Snord116 // Ipw	0.613856901
1460	Gm20831	Gm22510	0.613856901
1461	Gm20831	Rnu1b1	0.613856901
1462	Gm20831	Gm22155	0.613856901
1463	Gm20831	Olfr1231	0.613856901
1464	Gm20831	Gm4787	0.605277579
1465	Gm20831	Gm20806	0.603370638
1466	Gm20831	Ipw	0.613856901
1467	Gm20831	Olfr1034	0.613856901
1468	Gm20831	Gm21943	0.613856901

1469	Gm20831	LOC102640399	0.613856901
1470	Gm20831	mt-Tf	0.613856901
1471	Gm20831	Gm20815	0.613856901
1472	Gm20831	mt-Ts1	0.613856901
1473	Gm20831	mt-Ty	0.613856901
1474	Gm20831	Gm24624	0.601008593
1475	Gm20831	LOC102633726	0.610520962
1476	Gm20831	Gm20747	0.607448307
1477	Gm20831	Trdn	0.613856901
1478	Gm20831	Snora74a	0.613856901
1479	Gm20831	mt-Ts2	0.613856901
1480	Gm20831	Gm22866	0.613856901
1481	Gm20831	Rnu12	0.613856901
1482	Gm20831	Tmeff1	0.613856901
1483	Gm20831	Gm23928	0.602562509
1484	Gm20831	LOC102639563	0.612052689
1485	Gm20831	Vaultrc5	0.613856901
1486	Gm20831	Inmt	0.613856901
1487	Gm20831	Fam107a	0.613856901
1488	Gm20831	mt-Tk	0.613856901
1489	Gm20831	Brox	0.613856901
1490	Gm20831	Glrx3	0.613856901
1491	Gm20831	mt-Th	0.613856901
1492	Gm20831	Ddit4	0.613856901
1493	Gm20831	mt-Tp	0.613856901
1494	Gm20831	mt-Ta	0.613856901
1495	Gm20831	Mpv17	-0.61068715
1496	Gm20831	Gm6245	-0.613856901
1497	Gm20831	Cd59a	-0.613856901
1498	Gm20831	Tmem159	-0.60103159
1499	Gm20831	Acot2	-0.613856901
1500	Gm20831	Dhdh	-0.613856901
1501	Gm20831	Fam213a	-0.613856901
1502	Gm20831	Nmnat1	-0.605873152
1503	Gm20831	Coq5	-0.613856901
1504	Gm20831	Tmem184c	-0.613856901
1505	Gm20831	Nrn1	-0.610300306
1506	Gm20831	Uprt	-0.613856901
1507	Gm20831	Nsun3	-0.613856901
1508	Gm20831	Gm10718	-0.609800071
1509	Gm20831	Nr4a1	-0.613856901
1510	Gm20831	Egr1	-0.613856901
1511	Gm20831	Fos	-0.613856901
1512	Gm20831	G530011O06Rik	-0.613856901
1513	Gm20831	Gm5346	-0.613856901
1514	Gm20831	Gm5912	-0.613856901

1515	Gm20831	Murc	-0.613856901
1516	Snord116	mt-Tc	0.725166274
1517	Snord116	Olfr166	0.63478488
1518	Snord116	Snord116 // Ipw	0.695183163
1519	Snord116	Gm22510	0.625509447
1520	Snord116	Rnu1b1	0.725166274
1521	Snord116	Gm22155	0.725166274
1522	Snord116	Olfr1231	0.618922514
1523	Snord116	Gm4787	0.605277579
1524	Snord116	Gm20806	0.603370638
1525	Snord116	Ipw	0.679543558
1526	Snord116	Olfr1034	0.662686071
1527	Snord116	Gm21943	0.62432152
1528	Snord116	LOC102640399	0.653001706
1529	Snord116	Gm10375	0.616879434
1530	Snord116	mt-Tf	0.725166274
1531	Snord116	Gm23947	0.642276287
1532	Snord116	Gm20815	0.624089122
1533	Snord116	mt-Ts1	0.725166274
1534	Snord116	mt-Ty	0.725166274
1535	Snord116	Gm24624	0.601008593
1536	Snord116	LOC102633726	0.610520962
1537	Snord116	Gm20747	0.607448307
1538	Snord116	Trdn	0.662913558
1539	Snord116	Snora74a	0.716709874
1540	Snord116	mt-Ts2	0.725166274
1541	Snord116	Gm22866	0.725166274
1542	Snord116	Rnu12	0.714196988
1543	Snord116	Tmeff1	0.65030418
1544	Snord116	Gm23928	0.602562509
1545	Snord116	LOC102639563	0.612052689
1546	Snord116	Vaultrc5	0.725166274
1547	Snord116	Inmt	0.646471019
1548	Snord116	Fam107a	0.645410606
1549	Snord116	mt-Tk	0.720414242
1550	Snord116	Brox	0.657411274
1551	Snord116	Glrx3	0.616971069
1552	Snord116	mt-Th	0.66178471
1553	Snord116	Ddit4	0.63226978
1554	Snord116	mt-Tp	0.667405111
1555	Snord116	mt-Ta	0.680121023
1556	Snord116	Mpv17	-0.61068715
1557	Snord116	Gm6245	-0.638394295
1558	Snord116	Cd59a	-0.637322477
1559	Snord116	Tmem159	-0.60103159
1560	Snord116	Acot2	-0.679628534

1561	Snord116	Dhdh	-0.622508261
1562	Snord116	Fam213a	-0.643220229
1563	Snord116	Nmnat1	-0.605873152
1564	Snord116	Coq5	-0.677305385
1565	Snord116	Tmem184c	-0.651508083
1566	Snord116	Nrn1	-0.610300306
1567	Snord116	Uprt	-0.651921824
1568	Snord116	Nsun3	-0.673017501
1569	Snord116	Gm10718	-0.609800071
1570	Snord116	Nr4a1	-0.725166274
1571	Snord116	BC023105	-0.605373598
1572	Snord116	Egr1	-0.704399843
1573	Snord116	Fos	-0.695614744
1574	Snord116	G530011O06Rik	-0.716249925
1575	Snord116	Gm5346	-0.657448885
1576	Snord116	Gm5912	-0.651967258
1577	Snord116	Murc	-0.725166274
1578	mt-Tc	Olfr166	0.63478488
1579	mt-Tc	Snord116 // Ipw	0.695183163
1580	mt-Tc	Gm22510	0.625509447
1581	mt-Tc	Rnu1b1	0.847530386
1582	mt-Tc	Gm22155	0.753346542
1583	mt-Tc	Olfr1231	0.618922514
1584	mt-Tc	Gm4787	0.605277579
1585	mt-Tc	Gm20806	0.603370638
1586	mt-Tc	Ipw	0.679543558
1587	mt-Tc	Olfr1034	0.662686071
1588	mt-Tc	Gm21943	0.62432152
1589	mt-Tc	LOC102640399	0.653001706
1590	mt-Tc	mt-Tf	0.843977183
1591	mt-Tc	Gm23947	0.642276287
1592	mt-Tc	Gm20815	0.624089122
1593	mt-Tc	mt-Ts1	0.823514957
1594	mt-Tc	mt-Ty	0.792687001
1595	mt-Tc	Gm24624	0.601008593
1596	mt-Tc	LOC102633726	0.610520962
1597	mt-Tc	Gm20747	0.607448307
1598	mt-Tc	Trdn	0.662913558
1599	mt-Tc	Snora74a	0.716709874
1600	mt-Tc	mt-Ts2	0.822093546
1601	mt-Tc	Gm22866	0.810797753
1602	mt-Tc	Rnu12	0.714196988
1603	mt-Tc	Gm22749	0.634337211
1604	mt-Tc	Tmeff1	0.65030418
1605	mt-Tc	Gm23928	0.602562509
1606	mt-Tc	LOC102639563	0.612052689

1607	mt-Tc	Vaultrc5	0.728238836
1608	mt-Tc	Inmt	0.646471019
1609	mt-Tc	Fam107a	0.645410606
1610	mt-Tc	mt-Tk	0.720414242
1611	mt-Tc	Brox	0.644665592
1612	mt-Tc	Glrx3	0.616971069
1613	mt-Tc	mt-Th	0.66178471
1614	mt-Tc	Ddit4	0.63226978
1615	mt-Tc	mt-Tp	0.667405111
1616	mt-Tc	mt-Ta	0.680121023
1617	mt-Tc	Mpv17	-0.61068715
1618	mt-Tc	Gm6245	-0.638394295
1619	mt-Tc	Cd59a	-0.637322477
1620	mt-Tc	Tmem159	-0.60103159
1621	mt-Tc	Acot2	-0.679628534
1622	mt-Tc	Dhdh	-0.622508261
1623	mt-Tc	Fam213a	-0.643220229
1624	mt-Tc	Nmnat1	-0.605873152
1625	mt-Tc	Coq5	-0.677305385
1626	mt-Tc	Tmem184c	-0.651508083
1627	mt-Tc	Nrn1	-0.610300306
1628	mt-Tc	Uprt	-0.651921824
1629	mt-Tc	Nsun3	-0.673017501
1630	mt-Tc	Nr4a1	-0.747000222
1631	mt-Tc	BC023105	-0.605373598
1632	mt-Tc	Egr1	-0.614853621
1633	mt-Tc	Fos	-0.658077623
1634	mt-Tc	G530011O06Rik	-0.663459858
1635	mt-Tc	Gm5346	-0.657448885
1636	mt-Tc	Gm5912	-0.651967258
1637	mt-Tc	Murc	-0.847530386
1638	Olfr166	Snord116 // Ipw	0.63478488
1639	Olfr166	Gm22510	0.625509447
1640	Olfr166	Rnu1b1	0.63478488
1641	Olfr166	Gm22155	0.63478488
1642	Olfr166	Olfr1231	0.618922514
1643	Olfr166	Gm4787	0.605277579
1644	Olfr166	Gm20806	0.603370638
1645	Olfr166	Ipw	0.63478488
1646	Olfr166	Olfr1034	0.63478488
1647	Olfr166	Gm21943	0.62432152
1648	Olfr166	LOC102640399	0.63478488
1649	Olfr166	Gm10375	0.616879434
1650	Olfr166	mt-Tf	0.63478488
1651	Olfr166	Gm20815	0.624089122
1652	Olfr166	mt-Ts1	0.63478488

1653	Olfr166	mt-Ty	0.63478488
1654	Olfr166	Gm24624	0.601008593
1655	Olfr166	LOC102633726	0.610520962
1656	Olfr166	Gm20747	0.607448307
1657	Olfr166	mt-Ts2	0.63478488
1658	Olfr166	Gm22866	0.63478488
1659	Olfr166	Rnu12	0.63478488
1660	Olfr166	Ppp4r2	0.63478488
1661	Olfr166	Tmeff1	0.63478488
1662	Olfr166	Gm23928	0.602562509
1663	Olfr166	LOC102639563	0.612052689
1664	Olfr166	Vaultrc5	0.63478488
1665	Olfr166	Inmt	0.63478488
1666	Olfr166	Fam107a	0.63478488
1667	Olfr166	mt-Tk	0.63478488
1668	Olfr166	Brox	0.63478488
1669	Olfr166	Glrx3	0.616971069
1670	Olfr166	mt-Th	0.63478488
1671	Olfr166	Ddit4	0.63226978
1672	Olfr166	mt-Tp	0.63478488
1673	Olfr166	mt-Ta	0.63478488
1674	Olfr166	Mpv17	-0.61068715
1675	Olfr166	Gm6245	-0.63478488
1676	Olfr166	Cd59a	-0.63478488
1677	Olfr166	Tmem159	-0.60103159
1678	Olfr166	Acot2	-0.63478488
1679	Olfr166	Dhdh	-0.622508261
1680	Olfr166	Fam213a	-0.63478488
1681	Olfr166	Nmnat1	-0.605873152
1682	Olfr166	Coq5	-0.63478488
1683	Olfr166	Tmem184c	-0.63478488
1684	Olfr166	Nrn1	-0.610300306
1685	Olfr166	Uprt	-0.63478488
1686	Olfr166	Nsun3	-0.63478488
1687	Olfr166	Gm10718	-0.609800071
1688	Olfr166	Nr4a1	-0.63478488
1689	Olfr166	Egr1	-0.63478488
1690	Olfr166	Fos	-0.63478488
1691	Olfr166	G530011O06Rik	-0.63478488
1692	Olfr166	Gm5346	-0.63478488
1693	Olfr166	Murc	-0.63478488
1694	Snord116 // Ipw	Gm22510	0.625509447
1695	Snord116 // Ipw	Rnu1b1	0.695183163
1696	Snord116 // Ipw	Gm22155	0.695183163
1697	Snord116 // Ipw	Olfr1231	0.618922514
1698	Snord116 // Ipw	Gm4787	0.605277579

1699	Snord116 // Ipw	Gm20806	0.603370638
1700	Snord116 // Ipw	Ipw	0.679543558
1701	Snord116 // Ipw	Olfr1034	0.662686071
1702	Snord116 // Ipw	Gm21943	0.62432152
1703	Snord116 // Ipw	LOC102640399	0.653001706
1704	Snord116 // Ipw	mt-Tf	0.695183163
1705	Snord116 // Ipw	Gm23947	0.642276287
1706	Snord116 // Ipw	Gm20815	0.624089122
1707	Snord116 // Ipw	mt-Ts1	0.695183163
1708	Snord116 // Ipw	mt-Ty	0.695183163
1709	Snord116 // Ipw	Gm24624	0.601008593
1710	Snord116 // Ipw	LOC102633726	0.610520962
1711	Snord116 // Ipw	Gm20747	0.607448307
1712	Snord116 // Ipw	Snora74a	0.695183163
1713	Snord116 // Ipw	mt-Ts2	0.695183163
1714	Snord116 // Ipw	Gm22866	0.695183163
1715	Snord116 // Ipw	Rnu12	0.695183163
1716	Snord116 // Ipw	Tmeff1	0.65030418
1717	Snord116 // Ipw	Gm23928	0.602562509
1718	Snord116 // Ipw	LOC102639563	0.612052689
1719	Snord116 // Ipw	Vaultrc5	0.695183163
1720	Snord116 // Ipw	Inmt	0.646471019
1721	Snord116 // Ipw	Fam107a	0.645410606
1722	Snord116 // Ipw	mt-Tk	0.695183163
1723	Snord116 // Ipw	Glrx3	0.616971069
1724	Snord116 // Ipw	mt-Th	0.66178471
1725	Snord116 // Ipw	Ddit4	0.63226978
1726	Snord116 // Ipw	mt-Tp	0.667405111
1727	Snord116 // Ipw	mt-Ta	0.680121023
1728	Snord116 // Ipw	Mpv17	-0.61068715
1729	Snord116 // Ipw	Gm6245	-0.638394295
1730	Snord116 // Ipw	Cd59a	-0.637322477
1731	Snord116 // Ipw	Tmem159	-0.60103159
1732	Snord116 // Ipw	Acot2	-0.679628534
1733	Snord116 // Ipw	Dhdh	-0.622508261
1734	Snord116 // Ipw	Fam213a	-0.643220229
1735	Snord116 // Ipw	Nmnat1	-0.605873152
1736	Snord116 // Ipw	Coq5	-0.677305385
1737	Snord116 // Ipw	Tmem184c	-0.651508083
1738	Snord116 // Ipw	Nrn1	-0.610300306
1739	Snord116 // Ipw	Uprt	-0.651921824
1740	Snord116 // Ipw	Nsun3	-0.673017501
1741	Snord116 // Ipw	Gm10718	-0.609800071
1742	Snord116 // Ipw	Nr4a1	-0.695183163
1743	Snord116 // Ipw	BC023105	-0.605373598
1744	Snord116 // Ipw	Egr1	-0.695183163

1745	Snord116 // Ipw	Fos	-0.695183163
1746	Snord116 // Ipw	Gm5346	-0.6243902
1747	Snord116 // Ipw	Gm5912	-0.651967258
1748	Snord116 // Ipw	Murc	-0.695183163
1749	Gm22510	Rnu1b1	0.625509447
1750	Gm22510	Myl4	0.625509447
1751	Gm22510	Gm22155	0.625509447
1752	Gm22510	Gm20806	0.603370638
1753	Gm22510	Ipw	0.625509447
1754	Gm22510	Olfr1034	0.625509447
1755	Gm22510	Gm21943	0.62432152
1756	Gm22510	LOC102640399	0.625509447
1757	Gm22510	mt-Tf	0.625509447
1758	Gm22510	Gm20815	0.624089122
1759	Gm22510	mt-Ts1	0.625509447
1760	Gm22510	mt-Ty	0.625509447
1761	Gm22510	Gm24624	0.601008593
1762	Gm22510	LOC102633726	0.610520962
1763	Gm22510	Gm20747	0.607448307
1764	Gm22510	mt-Ts2	0.625509447
1765	Gm22510	Gm22866	0.625509447
1766	Gm22510	Rnu12	0.625509447
1767	Gm22510	Tmeff1	0.625509447
1768	Gm22510	LOC102639563	0.612052689
1769	Gm22510	mt-Tk	0.625509447
1770	Gm22510	Glrx3	0.616971069
1771	Gm22510	mt-Th	0.625509447
1772	Gm22510	Ddit4	0.625509447
1773	Gm22510	mt-Tp	0.625509447
1774	Gm22510	mt-Ta	0.625509447
1775	Gm22510	Gm6245	-0.617235028
1776	Gm22510	Tmem159	-0.60103159
1777	Gm22510	Fam213a	-0.625509447
1778	Gm22510	Nmnat1	-0.605873152
1779	Gm22510	Coq5	-0.625509447
1780	Gm22510	Uprt	-0.625509447
1781	Gm22510	Gm10718	-0.609800071
1782	Gm22510	Nr4a1	-0.625509447
1783	Gm22510	Egr1	-0.625509447
1784	Gm22510	Fos	-0.625509447
1785	Gm22510	Gm5912	-0.625509447
1786	Gm22510	Murc	-0.625509447
1787	Rnu1b1	Gm22155	0.753346542
1788	Rnu1b1	Olfr1231	0.618922514
1789	Rnu1b1	Gm4787	0.605277579
1790	Rnu1b1	Gm20806	0.603370638

1791	Rnu1b1	Ipw	0.679543558
1792	Rnu1b1	Olfr1034	0.662686071
1793	Rnu1b1	Gm21943	0.62432152
1794	Rnu1b1	LOC102640399	0.653001706
1795	Rnu1b1	mt-Tf	0.843977183
1796	Rnu1b1	Gm23947	0.642276287
1797	Rnu1b1	Gm20815	0.624089122
1798	Rnu1b1	mt-Ts1	0.823514957
1799	Rnu1b1	mt-Ty	0.792687001
1800	Rnu1b1	Gm24624	0.601008593
1801	Rnu1b1	LOC102633726	0.610520962
1802	Rnu1b1	Gm20747	0.607448307
1803	Rnu1b1	Trdn	0.64121884
1804	Rnu1b1	Snora74a	0.716709874
1805	Rnu1b1	mt-Ts2	0.822093546
1806	Rnu1b1	Gm22866	0.810797753
1807	Rnu1b1	Rnu12	0.714196988
1808	Rnu1b1	Gm22749	0.612863749
1809	Rnu1b1	Tmeff1	0.65030418
1810	Rnu1b1	Gm23928	0.602562509
1811	Rnu1b1	LOC102639563	0.612052689
1812	Rnu1b1	Vaultrc5	0.728238836
1813	Rnu1b1	Inmt	0.646471019
1814	Rnu1b1	Fam107a	0.645410606
1815	Rnu1b1	mt-Tk	0.720414242
1816	Rnu1b1	Glrx3	0.616971069
1817	Rnu1b1	mt-Th	0.66178471
1818	Rnu1b1	Ddit4	0.63226978
1819	Rnu1b1	mt-Tp	0.667405111
1820	Rnu1b1	mt-Ta	0.680121023
1821	Rnu1b1	Mpv17	-0.61068715
1822	Rnu1b1	Gm6245	-0.638394295
1823	Rnu1b1	Cd59a	-0.637322477
1824	Rnu1b1	Tmem159	-0.60103159
1825	Rnu1b1	Acot2	-0.679628534
1826	Rnu1b1	Dhdh	-0.622508261
1827	Rnu1b1	Fam213a	-0.643220229
1828	Rnu1b1	Nmnat1	-0.605873152
1829	Rnu1b1	Coq5	-0.677305385
1830	Rnu1b1	Tmem184c	-0.651508083
1831	Rnu1b1	Nrn1	-0.610300306
1832	Rnu1b1	Uprt	-0.651921824
1833	Rnu1b1	Nsun3	-0.673017501
1834	Rnu1b1	Nr4a1	-0.67405666
1835	Rnu1b1	BC023105	-0.605373598
1836	Rnu1b1	Gm5346	-0.657448885

1837	Rnu1b1	Gm5912	-0.651967258
1838	Rnu1b1	Murc	-0.88953734
1839	Myl4	Gm20815	0.618753345
1840	Myl4	Gm20747	0.607448307
1841	Myl4	Gm10718	-0.609800071
1842	Gm22155	Olfr1231	0.618922514
1843	Gm22155	Gm20806	0.603370638
1844	Gm22155	Ipw	0.679543558
1845	Gm22155	Olfr1034	0.662686071
1846	Gm22155	Gm21943	0.62432152
1847	Gm22155	LOC102640399	0.653001706
1848	Gm22155	mt-Tf	0.753346542
1849	Gm22155	Gm23947	0.642276287
1850	Gm22155	Gm20815	0.624089122
1851	Gm22155	mt-Ts1	0.753346542
1852	Gm22155	mt-Ty	0.753346542
1853	Gm22155	Gm24624	0.601008593
1854	Gm22155	LOC102633726	0.610520962
1855	Gm22155	Gm20747	0.607448307
1856	Gm22155	Snora74a	0.716709874
1857	Gm22155	mt-Ts2	0.753346542
1858	Gm22155	Gm22866	0.753346542
1859	Gm22155	Rnu12	0.714196988
1860	Gm22155	Gm22749	0.608771096
1861	Gm22155	Tmeff1	0.65030418
1862	Gm22155	Gm23928	0.602562509
1863	Gm22155	LOC102639563	0.612052689
1864	Gm22155	Vaultrc5	0.728238836
1865	Gm22155	Inmt	0.646471019
1866	Gm22155	Fam107a	0.645410606
1867	Gm22155	mt-Tk	0.720414242
1868	Gm22155	Glrx3	0.616971069
1869	Gm22155	mt-Th	0.66178471
1870	Gm22155	Ddit4	0.63226978
1871	Gm22155	mt-Tp	0.667405111
1872	Gm22155	mt-Ta	0.680121023
1873	Gm22155	Mpv17	-0.61068715
1874	Gm22155	Gm6245	-0.638394295
1875	Gm22155	Cd59a	-0.637322477
1876	Gm22155	Tmem159	-0.60103159
1877	Gm22155	Acot2	-0.679628534
1878	Gm22155	Dhdh	-0.622508261
1879	Gm22155	Fam213a	-0.643220229
1880	Gm22155	Nmnat1	-0.605873152
1881	Gm22155	Coq5	-0.677305385
1882	Gm22155	Tmem184c	-0.651508083

1883	Gm22155	Nrn1	-0.610300306
1884	Gm22155	Uprt	-0.651921824
1885	Gm22155	Nsun3	-0.673017501
1886	Gm22155	Nr4a1	-0.747000222
1887	Gm22155	BC023105	-0.605373598
1888	Gm22155	Egr1	-0.619063383
1889	Gm22155	Fos	-0.66127862
1890	Gm22155	G530011O06Rik	-0.700359365
1891	Gm22155	Gm5346	-0.657448885
1892	Gm22155	Gm5912	-0.651967258
1893	Gm22155	Murc	-0.753346542
1894	Olfr1231	Gm4787	0.605277579
1895	Olfr1231	Gm20806	0.603370638
1896	Olfr1231	Ipw	0.618922514
1897	Olfr1231	Olfr1034	0.618922514
1898	Olfr1231	Gm21943	0.618922514
1899	Olfr1231	LOC102640399	0.618922514
1900	Olfr1231	Gm10375	0.616879434
1901	Olfr1231	mt-Tf	0.618922514
1902	Olfr1231	Gm23947	0.618922514
1903	Olfr1231	Gm20815	0.618922514
1904	Olfr1231	mt-Ts1	0.618922514
1905	Olfr1231	mt-Ty	0.618922514
1906	Olfr1231	Gm24624	0.601008593
1907	Olfr1231	LOC102633726	0.610520962
1908	Olfr1231	Gm20747	0.607448307
1909	Olfr1231	Trdn	0.618922514
1910	Olfr1231	Snora74a	0.618922514
1911	Olfr1231	mt-Ts2	0.618922514
1912	Olfr1231	Gm22866	0.618922514
1913	Olfr1231	Rnu12	0.618922514
1914	Olfr1231	Ppp4r2	0.618922514
1915	Olfr1231	Gm22749	0.618922514
1916	Olfr1231	Tmeff1	0.618922514
1917	Olfr1231	Gm23928	0.602562509
1918	Olfr1231	LOC102639563	0.612052689
1919	Olfr1231	Vaultrc5	0.618922514
1920	Olfr1231	Inmt	0.618922514
1921	Olfr1231	Fam107a	0.618922514
1922	Olfr1231	mt-Tk	0.618922514
1923	Olfr1231	Brox	0.618922514
1924	Olfr1231	Glrx3	0.616971069
1925	Olfr1231	mt-Th	0.618922514
1926	Olfr1231	Ddit4	0.618922514
1927	Olfr1231	mt-Tp	0.618922514
1928	Olfr1231	mt-Ta	0.618922514

1929	Olfr1231	Mpv17	-0.61068715
1930	Olfr1231	Gm6245	-0.618922514
1931	Olfr1231	Cd59a	-0.618922514
1932	Olfr1231	Tmem159	-0.60103159
1933	Olfr1231	Acot2	-0.618922514
1934	Olfr1231	Dhdh	-0.618922514
1935	Olfr1231	Fam213a	-0.618922514
1936	Olfr1231	Nmnat1	-0.605873152
1937	Olfr1231	Coq5	-0.618922514
1938	Olfr1231	Tmem184c	-0.618922514
1939	Olfr1231	Nrn1	-0.610300306
1940	Olfr1231	Uprt	-0.618922514
1941	Olfr1231	Nsun3	-0.618922514
1942	Olfr1231	Nr4a1	-0.618922514
1943	Olfr1231	BC023105	-0.605373598
1944	Olfr1231	Fos	-0.618922514
1945	Olfr1231	G530011O06Rik	-0.618922514
1946	Olfr1231	Gm5346	-0.618922514
1947	Olfr1231	Gm5912	-0.618922514
1948	Olfr1231	Murc	-0.618922514
1949	Gm4787	Gm20806	0.603370638
1950	Gm4787	Ipw	0.605277579
1951	Gm4787	Olfr1034	0.605277579
1952	Gm4787	Gm21943	0.605277579
1953	Gm4787	LOC102640399	0.605277579
1954	Gm4787	Gm10375	0.605277579
1955	Gm4787	mt-Tf	0.605277579
1956	Gm4787	Gm23947	0.605277579
1957	Gm4787	Gm20815	0.605277579
1958	Gm4787	mt-Ts1	0.605277579
1959	Gm4787	mt-Ty	0.605277579
1960	Gm4787	Gm24624	0.601008593
1961	Gm4787	LOC102633726	0.605277579
1962	Gm4787	Gm20747	0.605277579
1963	Gm4787	Trdn	0.605277579
1964	Gm4787	mt-Ts2	0.602346686
1965	Gm4787	Gm22866	0.605277579
1966	Gm4787	Rnu12	0.605277579
1967	Gm4787	Ppp4r2	0.605277579
1968	Gm4787	Gm22749	0.605277579
1969	Gm4787	Tmeff1	0.605277579
1970	Gm4787	Gm23928	0.602562509
1971	Gm4787	LOC102639563	0.605277579
1972	Gm4787	Vaultrc5	0.605277579
1973	Gm4787	Inmt	0.605277579
1974	Gm4787	Fam107a	0.605277579

1975	Gm4787	mt-Tk	0.605277579
1976	Gm4787	Brox	0.605277579
1977	Gm4787	Glrx3	0.605277579
1978	Gm4787	mt-Th	0.605277579
1979	Gm4787	Ddit4	0.605277579
1980	Gm4787	mt-Tp	0.605277579
1981	Gm4787	mt-Ta	0.605277579
1982	Gm4787	Mpv17	-0.605277579
1983	Gm4787	Gm6245	-0.605277579
1984	Gm4787	Cd59a	-0.605277579
1985	Gm4787	Tmem159	-0.60103159
1986	Gm4787	Acot2	-0.605277579
1987	Gm4787	Dhdh	-0.605277579
1988	Gm4787	Fam213a	-0.605277579
1989	Gm4787	Coq5	-0.605277579
1990	Gm4787	Tmem184c	-0.605277579
1991	Gm4787	Nrn1	-0.605277579
1992	Gm4787	Uprt	-0.605277579
1993	Gm4787	Nsun3	-0.605277579
1994	Gm4787	Gm10718	-0.605277579
1995	Gm4787	Nr4a1	-0.605277579
1996	Gm4787	Egr1	-0.605277579
1997	Gm4787	Fos	-0.605277579
1998	Gm4787	G530011O06Rik	-0.605277579
1999	Gm4787	Gm5346	-0.605277579
2000	Gm4787	Gm5912	-0.605277579
2001	Gm4787	Murc	-0.605277579
2002	Gm20806	Ipw	0.603370638
2003	Gm20806	Olfr1034	0.603370638
2004	Gm20806	Gm21943	0.603370638
2005	Gm20806	LOC102640399	0.603370638
2006	Gm20806	Gm10375	0.603370638
2007	Gm20806	mt-Tf	0.603370638
2008	Gm20806	Gm23947	0.603370638
2009	Gm20806	Gm20815	0.603370638
2010	Gm20806	mt-Ts1	0.603370638
2011	Gm20806	mt-Ty	0.603370638
2012	Gm20806	Gm24624	0.601008593
2013	Gm20806	LOC102633726	0.603370638
2014	Gm20806	Gm20747	0.603370638
2015	Gm20806	Trdn	0.603370638
2016	Gm20806	Snora74a	0.603370638
2017	Gm20806	mt-Ts2	0.603370638
2018	Gm20806	Gm22866	0.603370638
2019	Gm20806	Rnu12	0.603370638
2020	Gm20806	Tmeff1	0.603370638

2021	Gm20806	Gm23928	0.602562509
2022	Gm20806	LOC102639563	0.603370638
2023	Gm20806	Vaultrc5	0.603370638
2024	Gm20806	Inmt	0.603370638
2025	Gm20806	Fam107a	0.603370638
2026	Gm20806	mt-Tk	0.603370638
2027	Gm20806	Glrx3	0.603370638
2028	Gm20806	mt-Th	0.603370638
2029	Gm20806	Ddit4	0.603370638
2030	Gm20806	mt-Tp	0.603370638
2031	Gm20806	mt-Ta	0.603370638
2032	Gm20806	Mpv17	-0.603370638
2033	Gm20806	Gm6245	-0.603370638
2034	Gm20806	Cd59a	-0.603370638
2035	Gm20806	Tmem159	-0.60103159
2036	Gm20806	Acot2	-0.603370638
2037	Gm20806	Dhdh	-0.603370638
2038	Gm20806	Fam213a	-0.603370638
2039	Gm20806	Nmnat1	-0.603370638
2040	Gm20806	Coq5	-0.603370638
2041	Gm20806	Tmem184c	-0.603370638
2042	Gm20806	Nrn1	-0.603370638
2043	Gm20806	Uprt	-0.603370638
2044	Gm20806	Nsun3	-0.603370638
2045	Gm20806	Gm10718	-0.603370638
2046	Gm20806	Nr4a1	-0.603370638
2047	Gm20806	BC023105	-0.603370638
2048	Gm20806	Gm5346	-0.603370638
2049	Gm20806	Gm5912	-0.603370638
2050	Gm20806	Murc	-0.603370638
2051	Ipw	Olfr1034	0.662686071
2052	Ipw	Gm21943	0.62432152
2053	Ipw	LOC102640399	0.653001706
2054	Ipw	Gm10375	0.616879434
2055	Ipw	mt-Tf	0.679543558
2056	Ipw	Gm23947	0.642276287
2057	Ipw	Gm20815	0.624089122
2058	Ipw	mt-Ts1	0.679543558
2059	Ipw	mt-Ty	0.679543558
2060	Ipw	Gm24624	0.601008593
2061	Ipw	LOC102633726	0.610520962
2062	Ipw	Gm20747	0.607448307
2063	Ipw	Trdn	0.662913558
2064	Ipw	Snora74a	0.679543558
2065	Ipw	mt-Ts2	0.679543558
2066	Ipw	Gm22866	0.679543558

2067	Ipw	Rnu12	0.679543558
2068	Ipw	Ppp4r2	0.679543558
2069	Ipw	Tmeff1	0.65030418
2070	Ipw	Gm23928	0.602562509
2071	Ipw	LOC102639563	0.612052689
2072	Ipw	Vaultrc5	0.679543558
2073	Ipw	Inmt	0.646471019
2074	Ipw	Fam107a	0.645410606
2075	Ipw	mt-Tk	0.679543558
2076	Ipw	Brox	0.657411274
2077	Ipw	Glrx3	0.616971069
2078	Ipw	mt-Th	0.66178471
2079	Ipw	Ddit4	0.63226978
2080	Ipw	mt-Tp	0.667405111
2081	Ipw	mt-Ta	0.679543558
2082	Ipw	Mpv17	-0.61068715
2083	Ipw	Gm6245	-0.638394295
2084	Ipw	Cd59a	-0.637322477
2085	Ipw	Tmem159	-0.60103159
2086	Ipw	Acot2	-0.679543558
2087	Ipw	Dhdh	-0.622508261
2088	Ipw	Fam213a	-0.643220229
2089	Ipw	Nmnat1	-0.605873152
2090	Ipw	Coq5	-0.677305385
2091	Ipw	Tmem184c	-0.651508083
2092	Ipw	Nrn1	-0.610300306
2093	Ipw	Uprt	-0.651921824
2094	Ipw	Nsun3	-0.673017501
2095	Ipw	Gm10718	-0.609800071
2096	Ipw	Nr4a1	-0.679543558
2097	Ipw	Egr1	-0.679543558
2098	Ipw	Fos	-0.679543558
2099	Ipw	G530011O06Rik	-0.679543558
2100	Ipw	Gm5346	-0.657448885
2101	Ipw	Gm5912	-0.651967258
2102	Ipw	Murc	-0.679543558
2103	Olfr1034	Gm21943	0.62432152
2104	Olfr1034	LOC102640399	0.653001706
2105	Olfr1034	mt-Tf	0.662686071
2106	Olfr1034	Gm20815	0.624089122
2107	Olfr1034	mt-Ts1	0.662686071
2108	Olfr1034	mt-Ty	0.662686071
2109	Olfr1034	Gm24624	0.601008593
2110	Olfr1034	LOC102633726	0.610520962
2111	Olfr1034	Gm20747	0.607448307
2112	Olfr1034	Trdn	0.605928444

2113	Olfr1034	Snora74a	0.662686071
2114	Olfr1034	mt-Ts2	0.662686071
2115	Olfr1034	Gm22866	0.662686071
2116	Olfr1034	Rnu12	0.662686071
2117	Olfr1034	Ppp4r2	0.608536463
2118	Olfr1034	Tmeff1	0.65030418
2119	Olfr1034	Gm23928	0.602562509
2120	Olfr1034	LOC102639563	0.612052689
2121	Olfr1034	Vaultrc5	0.662686071
2122	Olfr1034	Inmt	0.646471019
2123	Olfr1034	Fam107a	0.645410606
2124	Olfr1034	mt-Tk	0.662686071
2125	Olfr1034	Brox	0.657411274
2126	Olfr1034	Glrx3	0.616971069
2127	Olfr1034	mt-Th	0.66178471
2128	Olfr1034	Ddit4	0.63226978
2129	Olfr1034	mt-Tp	0.662686071
2130	Olfr1034	mt-Ta	0.662686071
2131	Olfr1034	Mpv17	-0.61068715
2132	Olfr1034	Gm6245	-0.638394295
2133	Olfr1034	Cd59a	-0.637322477
2134	Olfr1034	Tmem159	-0.60103159
2135	Olfr1034	Acot2	-0.662686071
2136	Olfr1034	Dhdh	-0.622508261
2137	Olfr1034	Fam213a	-0.643220229
2138	Olfr1034	Nmnat1	-0.605873152
2139	Olfr1034	Coq5	-0.662686071
2140	Olfr1034	Tmem184c	-0.651508083
2141	Olfr1034	Nrn1	-0.610300306
2142	Olfr1034	Uprt	-0.651921824
2143	Olfr1034	Nsun3	-0.662686071
2144	Olfr1034	Gm10718	-0.609800071
2145	Olfr1034	Nr4a1	-0.662686071
2146	Olfr1034	Egr1	-0.662686071
2147	Olfr1034	Fos	-0.662686071
2148	Olfr1034	G530011O06Rik	-0.662686071
2149	Olfr1034	Gm5346	-0.657448885
2150	Olfr1034	Gm5912	-0.651967258
2151	Olfr1034	Murc	-0.662686071
2152	Gm21943	LOC102640399	0.62432152
2153	Gm21943	Gm10375	0.616879434
2154	Gm21943	mt-Tf	0.62432152
2155	Gm21943	Gm23947	0.62432152
2156	Gm21943	Gm20815	0.624089122
2157	Gm21943	mt-Ts1	0.62432152
2158	Gm21943	mt-Ty	0.62432152

2159	Gm21943	Gm24624	0.601008593
2160	Gm21943	LOC102633726	0.610520962
2161	Gm21943	Gm20747	0.607448307
2162	Gm21943	Trdn	0.62432152
2163	Gm21943	Snora74a	0.62432152
2164	Gm21943	mt-Ts2	0.62432152
2165	Gm21943	Gm22866	0.62432152
2166	Gm21943	Rnu12	0.62432152
2167	Gm21943	Tmeff1	0.62432152
2168	Gm21943	Gm23928	0.602562509
2169	Gm21943	LOC102639563	0.612052689
2170	Gm21943	Vaultrc5	0.62432152
2171	Gm21943	Inmt	0.62432152
2172	Gm21943	Fam107a	0.62432152
2173	Gm21943	mt-Tk	0.62432152
2174	Gm21943	Brox	0.617708927
2175	Gm21943	Glrx3	0.616971069
2176	Gm21943	mt-Th	0.62432152
2177	Gm21943	Ddit4	0.62432152
2178	Gm21943	mt-Tp	0.62432152
2179	Gm21943	mt-Ta	0.62432152
2180	Gm21943	Mpv17	-0.61068715
2181	Gm21943	Gm6245	-0.62432152
2182	Gm21943	Cd59a	-0.62432152
2183	Gm21943	Tmem159	-0.60103159
2184	Gm21943	Acot2	-0.62432152
2185	Gm21943	Dhdh	-0.622508261
2186	Gm21943	Fam213a	-0.62432152
2187	Gm21943	Nmnat1	-0.605873152
2188	Gm21943	Coq5	-0.62432152
2189	Gm21943	Tmem184c	-0.62432152
2190	Gm21943	Nrn1	-0.610300306
2191	Gm21943	Uprt	-0.62432152
2192	Gm21943	Nsun3	-0.62432152
2193	Gm21943	Gm10718	-0.609800071
2194	Gm21943	Nr4a1	-0.621845927
2195	Gm21943	BC023105	-0.605373598
2196	Gm21943	Egr1	-0.62432152
2197	Gm21943	Fos	-0.62432152
2198	Gm21943	Gm5346	-0.62432152
2199	Gm21943	Gm5912	-0.62432152
2200	Gm21943	Murc	-0.62432152
2201	LOC102640399	Gm10375	0.616879434
2202	LOC102640399	mt-Tf	0.653001706
2203	LOC102640399	Gm23947	0.642276287
2204	LOC102640399	Gm20815	0.624089122

2205	LOC102640399	mt-Ts1	0.653001706
2206	LOC102640399	mt-Ty	0.653001706
2207	LOC102640399	Gm24624	0.601008593
2208	LOC102640399	LOC102633726	0.610520962
2209	LOC102640399	Gm20747	0.607448307
2210	LOC102640399	Trdn	0.641821472
2211	LOC102640399	Snora74a	0.653001706
2212	LOC102640399	mt-Ts2	0.653001706
2213	LOC102640399	Gm22866	0.653001706
2214	LOC102640399	Rnu12	0.653001706
2215	LOC102640399	Tmeff1	0.65030418
2216	LOC102640399	Gm23928	0.602562509
2217	LOC102640399	LOC102639563	0.612052689
2218	LOC102640399	Vaultrc5	0.653001706
2219	LOC102640399	Inmt	0.646471019
2220	LOC102640399	Fam107a	0.645410606
2221	LOC102640399	mt-Tk	0.653001706
2222	LOC102640399	Brox	0.653001706
2223	LOC102640399	Glrx3	0.616971069
2224	LOC102640399	mt-Th	0.653001706
2225	LOC102640399	Ddit4	0.63226978
2226	LOC102640399	mt-Tp	0.653001706
2227	LOC102640399	mt-Ta	0.653001706
2228	LOC102640399	Mpv17	-0.61068715
2229	LOC102640399	Gm6245	-0.638394295
2230	LOC102640399	Cd59a	-0.637322477
2231	LOC102640399	Tmem159	-0.60103159
2232	LOC102640399	Acot2	-0.653001706
2233	LOC102640399	Dhdh	-0.622508261
2234	LOC102640399	Fam213a	-0.643220229
2235	LOC102640399	Nmnat1	-0.605873152
2236	LOC102640399	Coq5	-0.653001706
2237	LOC102640399	Tmem184c	-0.651508083
2238	LOC102640399	Nrn1	-0.610300306
2239	LOC102640399	Uprt	-0.651921824
2240	LOC102640399	Nsun3	-0.653001706
2241	LOC102640399	Gm10718	-0.609800071
2242	LOC102640399	Nr4a1	-0.653001706
2243	LOC102640399	Egr1	-0.653001706
2244	LOC102640399	Fos	-0.653001706
2245	LOC102640399	G530011O06Rik	-0.653001706
2246	LOC102640399	Gm5346	-0.653001706
2247	LOC102640399	Gm5912	-0.651967258
2248	LOC102640399	Murc	-0.653001706
2249	Gm10375	mt-Tf	0.616144722
2250	Gm10375	Gm23947	0.616879434

2251	Gm10375	Gm20815	0.616879434
2252	Gm10375	mt-Ty	0.616879434
2253	Gm10375	LOC102633726	0.610520962
2254	Gm10375	Gm20747	0.607448307
2255	Gm10375	Trdn	0.616879434
2256	Gm10375	Ppp4r2	0.616879434
2257	Gm10375	Gm22749	0.616879434
2258	Gm10375	Inmt	0.616879434
2259	Gm10375	Fam107a	0.616879434
2260	Gm10375	Brox	0.616879434
2261	Gm10375	Ddit4	0.616879434
2262	Gm10375	Mpv17	-0.61068715
2263	Gm10375	Gm6245	-0.616879434
2264	Gm10375	Cd59a	-0.616787635
2265	Gm10375	Tmem159	-0.60103159
2266	Gm10375	Acot2	-0.60971604
2267	Gm10375	Dhdh	-0.616879434
2268	Gm10375	Fam213a	-0.616879434
2269	Gm10375	Tmem184c	-0.616879434
2270	Gm10375	Nrn1	-0.610300306
2271	Gm10375	Uprt	-0.616879434
2272	Gm10375	Nsun3	-0.61180126
2273	Gm10375	Gm10718	-0.609800071
2274	Gm10375	Egr1	-0.616879434
2275	Gm10375	Fos	-0.616879434
2276	Gm10375	G530011O06Rik	-0.616879434
2277	Gm10375	Gm5346	-0.616879434
2278	Gm10375	Gm5912	-0.608955289
2279	Gm10375	Murc	-0.616879434
2280	mt-Tf	Gm23947	0.642276287
2281	mt-Tf	Gm20815	0.624089122
2282	mt-Tf	mt-Ts1	0.823514957
2283	mt-Tf	mt-Ty	0.792687001
2284	mt-Tf	Gm24624	0.601008593
2285	mt-Tf	LOC102633726	0.610520962
2286	mt-Tf	Gm20747	0.607448307
2287	mt-Tf	Trdn	0.662913558
2288	mt-Tf	Snora74a	0.716709874
2289	mt-Tf	mt-Ts2	0.822093546
2290	mt-Tf	Gm22866	0.810797753
2291	mt-Tf	Rnu12	0.714196988
2292	mt-Tf	Ppp4r2	0.630692301
2293	mt-Tf	Gm22749	0.614416992
2294	mt-Tf	Tmeff1	0.65030418
2295	mt-Tf	Gm23928	0.602562509
2296	mt-Tf	LOC102639563	0.612052689

2297	mt-Tf	Vaultrc5	0.728238836
2298	mt-Tf	Inmt	0.646471019
2299	mt-Tf	Fam107a	0.645410606
2300	mt-Tf	mt-Tk	0.720414242
2301	mt-Tf	Brox	0.657411274
2302	mt-Tf	Glrx3	0.616971069
2303	mt-Tf	mt-Th	0.66178471
2304	mt-Tf	Ddit4	0.63226978
2305	mt-Tf	mt-Tp	0.667405111
2306	mt-Tf	mt-Ta	0.680121023
2307	mt-Tf	Mpv17	-0.61068715
2308	mt-Tf	Gm6245	-0.638394295
2309	mt-Tf	Cd59a	-0.637322477
2310	mt-Tf	Tmem159	-0.60103159
2311	mt-Tf	Acot2	-0.679628534
2312	mt-Tf	Dhdh	-0.622508261
2313	mt-Tf	Fam213a	-0.643220229
2314	mt-Tf	Nmnat1	-0.605873152
2315	mt-Tf	Coq5	-0.677305385
2316	mt-Tf	Tmem184c	-0.651508083
2317	mt-Tf	Nrn1	-0.610300306
2318	mt-Tf	Uprt	-0.651921824
2319	mt-Tf	Nsun3	-0.673017501
2320	mt-Tf	Gm10718	-0.609800071
2321	mt-Tf	Nr4a1	-0.747000222
2322	mt-Tf	BC023105	-0.605373598
2323	mt-Tf	Egr1	-0.704399843
2324	mt-Tf	Fos	-0.695614744
2325	mt-Tf	G530011O06Rik	-0.740456125
2326	mt-Tf	Gm5346	-0.657448885
2327	mt-Tf	Gm5912	-0.651967258
2328	mt-Tf	Murc	-0.843977183
2329	Gm23947	Gm20815	0.624089122
2330	Gm23947	mt-Ts1	0.642276287
2331	Gm23947	mt-Ty	0.642276287
2332	Gm23947	Gm24624	0.601008593
2333	Gm23947	LOC102633726	0.610520962
2334	Gm23947	Gm20747	0.607448307
2335	Gm23947	Trdn	0.642276287
2336	Gm23947	Snora74a	0.642276287
2337	Gm23947	mt-Ts2	0.642276287
2338	Gm23947	Gm22866	0.642276287
2339	Gm23947	Rnu12	0.642276287
2340	Gm23947	Gm22749	0.634337211
2341	Gm23947	Gm24149	0.642276287
2342	Gm23947	Tmeff1	0.642276287

2343	Gm23947	Gm23928	0.602562509
2344	Gm23947	LOC102639563	0.612052689
2345	Gm23947	Vaultrc5	0.642276287
2346	Gm23947	Inmt	0.642276287
2347	Gm23947	Fam107a	0.642276287
2348	Gm23947	mt-Tk	0.642276287
2349	Gm23947	Glrx3	0.616971069
2350	Gm23947	mt-Th	0.642276287
2351	Gm23947	Ddit4	0.60558849
2352	Gm23947	mt-Tp	0.642276287
2353	Gm23947	mt-Ta	0.642276287
2354	Gm23947	Mpv17	-0.61068715
2355	Gm23947	Gm6245	-0.638394295
2356	Gm23947	Cd59a	-0.637322477
2357	Gm23947	Tmem159	-0.60103159
2358	Gm23947	Acot2	-0.642276287
2359	Gm23947	Dhdh	-0.622508261
2360	Gm23947	Fam213a	-0.642276287
2361	Gm23947	Nmnat1	-0.605873152
2362	Gm23947	Coq5	-0.642276287
2363	Gm23947	Tmem184c	-0.642276287
2364	Gm23947	Nrn1	-0.610300306
2365	Gm23947	Uprt	-0.642276287
2366	Gm23947	Nsun3	-0.642276287
2367	Gm23947	BC023105	-0.605373598
2368	Gm23947	Gm5346	-0.642276287
2369	Gm23947	Murc	-0.642276287
2370	Gm20815	mt-Ts1	0.624089122
2371	Gm20815	mt-Ty	0.624089122
2372	Gm20815	Gm24624	0.601008593
2373	Gm20815	LOC102633726	0.610520962
2374	Gm20815	Gm20747	0.607448307
2375	Gm20815	Trdn	0.624089122
2376	Gm20815	Snora74a	0.624089122
2377	Gm20815	mt-Ts2	0.624089122
2378	Gm20815	Gm22866	0.624089122
2379	Gm20815	Rnu12	0.624089122
2380	Gm20815	Ppp4r2	0.624089122
2381	Gm20815	Tmeff1	0.624089122
2382	Gm20815	Gm23928	0.602562509
2383	Gm20815	LOC102639563	0.612052689
2384	Gm20815	Vaultrc5	0.624089122
2385	Gm20815	Inmt	0.624089122
2386	Gm20815	Fam107a	0.624089122
2387	Gm20815	mt-Tk	0.624089122
2388	Gm20815	Brox	0.624089122

2389	Gm20815	Glrx3	0.616971069
2390	Gm20815	mt-Th	0.624089122
2391	Gm20815	Ddit4	0.624089122
2392	Gm20815	mt-Tp	0.624089122
2393	Gm20815	mt-Ta	0.624089122
2394	Gm20815	Mpv17	-0.61068715
2395	Gm20815	Gm6245	-0.624089122
2396	Gm20815	Cd59a	-0.624089122
2397	Gm20815	Tmem159	-0.60103159
2398	Gm20815	Acot2	-0.624089122
2399	Gm20815	Dhdh	-0.622508261
2400	Gm20815	Fam213a	-0.624089122
2401	Gm20815	Nmnat1	-0.605873152
2402	Gm20815	Coq5	-0.624089122
2403	Gm20815	Tmem184c	-0.624089122
2404	Gm20815	Nrn1	-0.610300306
2405	Gm20815	Uprt	-0.624089122
2406	Gm20815	Nsun3	-0.624089122
2407	Gm20815	Gm10718	-0.609800071
2408	Gm20815	BC023105	-0.605373598
2409	Gm20815	Egr1	-0.624089122
2410	Gm20815	Fos	-0.624089122
2411	Gm20815	Gm5346	-0.624089122
2412	Gm20815	Gm5912	-0.624089122
2413	Gm20815	Murc	-0.624089122
2414	mt-Ts1	mt-Ty	0.792687001
2415	mt-Ts1	Gm24624	0.601008593
2416	mt-Ts1	LOC102633726	0.610520962
2417	mt-Ts1	Gm20747	0.607448307
2418	mt-Ts1	Trdn	0.662913558
2419	mt-Ts1	Snora74a	0.716709874
2420	mt-Ts1	mt-Ts2	0.822093546
2421	mt-Ts1	Gm22866	0.810797753
2422	mt-Ts1	Rnu12	0.714196988
2423	mt-Ts1	Gm22749	0.610521668
2424	mt-Ts1	Tmeff1	0.65030418
2425	mt-Ts1	Gm23928	0.602562509
2426	mt-Ts1	LOC102639563	0.612052689
2427	mt-Ts1	Vaultrc5	0.728238836
2428	mt-Ts1	Inmt	0.646471019
2429	mt-Ts1	Fam107a	0.645410606
2430	mt-Ts1	mt-Tk	0.720414242
2431	mt-Ts1	Brox	0.62787898
2432	mt-Ts1	Glrx3	0.616971069
2433	mt-Ts1	mt-Th	0.66178471
2434	mt-Ts1	Ddit4	0.63226978

2435	mt-Ts1	mt-Tp	0.667405111
2436	mt-Ts1	mt-Ta	0.680121023
2437	mt-Ts1	Mpv17	-0.61068715
2438	mt-Ts1	Gm6245	-0.638394295
2439	mt-Ts1	Cd59a	-0.637322477
2440	mt-Ts1	Tmem159	-0.60103159
2441	mt-Ts1	Acot2	-0.679628534
2442	mt-Ts1	Dhdh	-0.622508261
2443	mt-Ts1	Fam213a	-0.643220229
2444	mt-Ts1	Nmnat1	-0.605873152
2445	mt-Ts1	Coq5	-0.677305385
2446	mt-Ts1	Tmem184c	-0.651508083
2447	mt-Ts1	Nrn1	-0.610300306
2448	mt-Ts1	Uprt	-0.651921824
2449	mt-Ts1	Nsun3	-0.673017501
2450	mt-Ts1	Gm10718	-0.609800071
2451	mt-Ts1	Nr4a1	-0.742765616
2452	mt-Ts1	BC023105	-0.605373598
2453	mt-Ts1	Egr1	-0.60898327
2454	mt-Ts1	Fos	-0.652122797
2455	mt-Ts1	G530011O06Rik	-0.624279924
2456	mt-Ts1	Gm5346	-0.657448885
2457	mt-Ts1	Gm5912	-0.651967258
2458	mt-Ts1	Murc	-0.823514957
2459	mt-Ty	Gm24624	0.601008593
2460	mt-Ty	LOC102633726	0.610520962
2461	mt-Ty	Gm20747	0.607448307
2462	mt-Ty	Trdn	0.662913558
2463	mt-Ty	Snora74a	0.716709874
2464	mt-Ty	mt-Ts2	0.792687001
2465	mt-Ty	Gm22866	0.792687001
2466	mt-Ty	Rnu12	0.714196988
2467	mt-Ty	Ppp4r2	0.65687002
2468	mt-Ty	Gm22749	0.634337211
2469	mt-Ty	Tmeff1	0.65030418
2470	mt-Ty	Gm23928	0.602562509
2471	mt-Ty	LOC102639563	0.612052689
2472	mt-Ty	Vaultrc5	0.728238836
2473	mt-Ty	Inmt	0.646471019
2474	mt-Ty	Fam107a	0.645410606
2475	mt-Ty	mt-Tk	0.720414242
2476	mt-Ty	Brox	0.657411274
2477	mt-Ty	Glrx3	0.616971069
2478	mt-Ty	mt-Th	0.66178471
2479	mt-Ty	Ddit4	0.63226978
2480	mt-Ty	mt-Tp	0.667405111

2481	mt-Ty	mt-Ta	0.680121023
2482	mt-Ty	Mpv17	-0.61068715
2483	mt-Ty	Gm6245	-0.638394295
2484	mt-Ty	Cd59a	-0.637322477
2485	mt-Ty	Tmem159	-0.60103159
2486	mt-Ty	Acot2	-0.679628534
2487	mt-Ty	Dhdh	-0.622508261
2488	mt-Ty	Fam213a	-0.643220229
2489	mt-Ty	Nmnat1	-0.605873152
2490	mt-Ty	Coq5	-0.677305385
2491	mt-Ty	Tmem184c	-0.651508083
2492	mt-Ty	Nrn1	-0.610300306
2493	mt-Ty	Uprt	-0.651921824
2494	mt-Ty	Nsun3	-0.673017501
2495	mt-Ty	Gm10718	-0.609800071
2496	mt-Ty	Nr4a1	-0.747000222
2497	mt-Ty	BC023105	-0.605373598
2498	mt-Ty	Egr1	-0.67487865
2499	mt-Ty	Fos	-0.695614744
2500	mt-Ty	G530011O06Rik	-0.716188592
2501	mt-Ty	Gm5346	-0.657448885
2502	mt-Ty	Gm5912	-0.651967258
2503	mt-Ty	Murc	-0.792687001
2504	Gm24624	LOC102633726	0.601008593
2505	Gm24624	Gm20747	0.601008593
2506	Gm24624	Snora74a	0.601008593
2507	Gm24624	mt-Ts2	0.601008593
2508	Gm24624	Gm22866	0.601008593
2509	Gm24624	Rnu12	0.601008593
2510	Gm24624	Gm24149	0.601008593
2511	Gm24624	Tmeff1	0.601008593
2512	Gm24624	Gm23928	0.601008593
2513	Gm24624	LOC102639563	0.601008593
2514	Gm24624	Vaultrc5	0.601008593
2515	Gm24624	Inmt	0.601008593
2516	Gm24624	Fam107a	0.601008593
2517	Gm24624	mt-Tk	0.601008593
2518	Gm24624	Glrx3	0.601008593
2519	Gm24624	mt-Th	0.601008593
2520	Gm24624	Ddit4	0.601008593
2521	Gm24624	mt-Tp	0.601008593
2522	Gm24624	mt-Ta	0.601008593
2523	Gm24624	Mpv17	-0.601008593
2524	Gm24624	Gm6245	-0.601008593
2525	Gm24624	Cd59a	-0.601008593
2526	Gm24624	Tmem159	-0.601008593

2527	Gm24624	Acot2	-0.601008593
2528	Gm24624	Dhdh	-0.601008593
2529	Gm24624	Fam213a	-0.601008593
2530	Gm24624	Nmnat1	-0.601008593
2531	Gm24624	Coq5	-0.601008593
2532	Gm24624	Tmem184c	-0.601008593
2533	Gm24624	Nrn1	-0.601008593
2534	Gm24624	Uprt	-0.601008593
2535	Gm24624	Nsun3	-0.601008593
2536	Gm24624	Nr4a1	-0.601008593
2537	Gm24624	BC023105	-0.601008593
2538	Gm24624	Egr1	-0.601008593
2539	Gm24624	Fos	-0.601008593
2540	Gm24624	Gm5346	-0.601008593
2541	Gm24624	Murc	-0.601008593
2542	LOC102633726	Gm20747	0.607448307
2543	LOC102633726	Trdn	0.610520962
2544	LOC102633726	Snora74a	0.610520962
2545	LOC102633726	mt-Ts2	0.610520962
2546	LOC102633726	Gm22866	0.610520962
2547	LOC102633726	Rnu12	0.610520962
2548	LOC102633726	Tmeff1	0.610520962
2549	LOC102633726	Gm23928	0.602562509
2550	LOC102633726	LOC102639563	0.610520962
2551	LOC102633726	Vaultrc5	0.610520962
2552	LOC102633726	Inmt	0.610520962
2553	LOC102633726	Fam107a	0.610520962
2554	LOC102633726	mt-Tk	0.610520962
2555	LOC102633726	Brox	0.610520962
2556	LOC102633726	Glrx3	0.610520962
2557	LOC102633726	mt-Th	0.610520962
2558	LOC102633726	Ddit4	0.610520962
2559	LOC102633726	mt-Tp	0.610520962
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2561	LOC102633726	Mpv17	-0.610520962
2562	LOC102633726	Gm6245	-0.610520962
2563	LOC102633726	Cd59a	-0.610520962
2564	LOC102633726	Tmem159	-0.60103159
2565	LOC102633726	Acot2	-0.610520962
2566	LOC102633726	Dhdh	-0.610520962
2567	LOC102633726	Fam213a	-0.610520962
2568	LOC102633726	Nmnat1	-0.605873152
2569	LOC102633726	Coq5	-0.610520962
2570	LOC102633726	Tmem184c	-0.610520962
2571	LOC102633726	Nrn1	-0.610300306
2572	LOC102633726	Uprt	-0.610520962

2573	LOC102633726	Nsun3	-0.610520962
2574	LOC102633726	Gm10718	-0.609800071
2575	LOC102633726	Nr4a1	-0.610520962
2576	LOC102633726	BC023105	-0.605373598
2577	LOC102633726	Egr1	-0.610520962
2578	LOC102633726	Fos	-0.610520962
2579	LOC102633726	G530011O06Rik	-0.610520962
2580	LOC102633726	Gm5346	-0.610520962
2581	LOC102633726	Gm5912	-0.610520962
2582	LOC102633726	Murc	-0.610520962
2583	Gm20747	Trdn	0.607448307
2584	Gm20747	Snora74a	0.607448307
2585	Gm20747	mt-Ts2	0.607448307
2586	Gm20747	Gm22866	0.607448307
2587	Gm20747	Rnu12	0.607448307
2588	Gm20747	Ppp4r2	0.607448307
2589	Gm20747	Tmeff1	0.607448307
2590	Gm20747	Gm23928	0.602562509
2591	Gm20747	LOC102639563	0.607448307
2592	Gm20747	Vaultrc5	0.607448307
2593	Gm20747	Inmt	0.607448307
2594	Gm20747	Fam107a	0.607448307
2595	Gm20747	mt-Tk	0.607448307
2596	Gm20747	Brox	0.607448307
2597	Gm20747	Glrx3	0.607448307
2598	Gm20747	mt-Th	0.607448307
2599	Gm20747	Ddit4	0.607448307
2600	Gm20747	mt-Tp	0.607448307
2601	Gm20747	mt-Ta	0.607448307
2602	Gm20747	Mpv17	-0.607448307
2603	Gm20747	Gm6245	-0.607448307
2604	Gm20747	Cd59a	-0.607448307
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2614	Gm20747	Nsun3	-0.607448307
2615	Gm20747	Gm10718	-0.607448307
2616	Gm20747	Nr4a1	-0.607448307
2617	Gm20747	BC023105	-0.605373598
2618	Gm20747	Egr1	-0.607448307

2619	Gm20747	Fos	-0.607448307
2620	Gm20747	Gm5346	-0.607448307
2621	Gm20747	Gm5912	-0.607448307
2622	Gm20747	Murc	-0.607448307
2623	Trdn	Snora74a	0.662913558
2624	Trdn	mt-Ts2	0.600342649
2625	Trdn	Gm22866	0.653174468
2626	Trdn	Rnu12	0.662913558
2627	Trdn	Ppp4r2	0.662913558
2628	Trdn	Gm22749	0.634337211
2629	Trdn	Tmeff1	0.65030418
2630	Trdn	Gm23928	0.602562509
2631	Trdn	Vaultrc5	0.662913558
2632	Trdn	Inmt	0.646471019
2633	Trdn	mt-Tk	0.618371874
2634	Trdn	Brox	0.657411274
2635	Trdn	mt-Th	0.655376867
2636	Trdn	mt-Ta	0.662913558
2637	Trdn	Mpv17	-0.61068715
2638	Trdn	Gm6245	-0.638394295
2639	Trdn	Cd59a	-0.637322477
2640	Trdn	Tmem159	-0.60103159
2641	Trdn	Acot2	-0.662913558
2642	Trdn	Dhdh	-0.622508261
2643	Trdn	Fam213a	-0.643220229
2644	Trdn	Coq5	-0.662913558
2645	Trdn	Tmem184c	-0.647554647
2646	Trdn	Nrn1	-0.610300306
2647	Trdn	Uprt	-0.651921824
2648	Trdn	Gm10718	-0.609800071
2649	Trdn	Gm5346	-0.657448885
2650	Trdn	Gm5912	-0.651967258
2651	Trdn	Murc	-0.662913558
2652	Snora74a	mt-Ts2	0.716709874
2653	Snora74a	Gm22866	0.716709874
2654	Snora74a	Rnu12	0.714196988
2655	Snora74a	Gm22749	0.634337211
2656	Snora74a	Tmeff1	0.65030418
2657	Snora74a	Gm23928	0.602562509
2658	Snora74a	LOC102639563	0.612052689
2659	Snora74a	Vaultrc5	0.716709874
2660	Snora74a	Inmt	0.646471019
2661	Snora74a	Fam107a	0.62496117
2662	Snora74a	mt-Tk	0.716709874
2663	Snora74a	Glrx3	0.616971069
2664	Snora74a	mt-Th	0.66178471

2665	Snora74a	mt-Tp	0.667405111
2666	Snora74a	mt-Ta	0.680121023
2667	Snora74a	Mpv17	-0.61068715
2668	Snora74a	Gm6245	-0.638394295
2669	Snora74a	Cd59a	-0.637322477
2670	Snora74a	Tmem159	-0.60103159
2671	Snora74a	Acot2	-0.679628534
2672	Snora74a	Dhdh	-0.622508261
2673	Snora74a	Fam213a	-0.643220229
2674	Snora74a	Nmnat1	-0.605873152
2675	Snora74a	Coq5	-0.677305385
2676	Snora74a	Tmem184c	-0.651508083
2677	Snora74a	Nrn1	-0.610300306
2678	Snora74a	Uprt	-0.651921824
2679	Snora74a	Nsun3	-0.673017501
2680	Snora74a	BC023105	-0.605373598
2681	Snora74a	Gm5912	-0.651967258
2682	Snora74a	Murc	-0.716709874
2683	mt-Ts2	Gm22866	0.810797753
2684	mt-Ts2	Rnu12	0.714196988
2685	mt-Ts2	Tmeff1	0.65030418
2686	mt-Ts2	Gm23928	0.602562509
2687	mt-Ts2	LOC102639563	0.612052689
2688	mt-Ts2	Vaultrc5	0.728238836
2689	mt-Ts2	Inmt	0.646471019
2690	mt-Ts2	Fam107a	0.645410606
2691	mt-Ts2	mt-Tk	0.720414242
2692	mt-Ts2	Glrx3	0.616971069
2693	mt-Ts2	mt-Th	0.66178471
2694	mt-Ts2	Ddit4	0.63226978
2695	mt-Ts2	mt-Tp	0.667405111
2696	mt-Ts2	mt-Ta	0.680121023
2697	mt-Ts2	Mpv17	-0.61068715
2698	mt-Ts2	Gm6245	-0.638394295
2699	mt-Ts2	Cd59a	-0.637322477
2700	mt-Ts2	Tmem159	-0.60103159
2701	mt-Ts2	Acot2	-0.679628534
2702	mt-Ts2	Dhdh	-0.622508261
2703	mt-Ts2	Fam213a	-0.643220229
2704	mt-Ts2	Nmnat1	-0.605873152
2705	mt-Ts2	Coq5	-0.677305385
2706	mt-Ts2	Tmem184c	-0.651508083
2707	mt-Ts2	Nrn1	-0.610300306
2708	mt-Ts2	Uprt	-0.651921824
2709	mt-Ts2	Nsun3	-0.673017501
2710	mt-Ts2	Gm10718	-0.609800071

2711	mt-Ts2	Nr4a1	-0.747000222
2712	mt-Ts2	BC023105	-0.605373598
2713	mt-Ts2	Egr1	-0.61652364
2714	mt-Ts2	Fos	-0.652720916
2715	mt-Ts2	G530011O06Rik	-0.606523901
2716	mt-Ts2	Gm5346	-0.657448885
2717	mt-Ts2	Gm5912	-0.651967258
2718	mt-Ts2	Murc	-0.822093546
2719	Gm22866	Rnu12	0.714196988
2720	Gm22866	Gm22749	0.634337211
2721	Gm22866	Tmeff1	0.65030418
2722	Gm22866	Gm23928	0.602562509
2723	Gm22866	LOC102639563	0.612052689
2724	Gm22866	Vaultrc5	0.728238836
2725	Gm22866	Inmt	0.646471019
2726	Gm22866	Fam107a	0.645410606
2727	Gm22866	mt-Tk	0.720414242
2728	Gm22866	Glrx3	0.616971069
2729	Gm22866	mt-Th	0.66178471
2730	Gm22866	Ddit4	0.63226978
2731	Gm22866	mt-Tp	0.667405111
2732	Gm22866	mt-Ta	0.680121023
2733	Gm22866	Mpv17	-0.61068715
2734	Gm22866	Gm6245	-0.638394295
2735	Gm22866	Cd59a	-0.637322477
2736	Gm22866	Tmem159	-0.60103159
2737	Gm22866	Acot2	-0.679628534
2738	Gm22866	Dhdh	-0.622508261
2739	Gm22866	Fam213a	-0.643220229
2740	Gm22866	Nmnat1	-0.605873152
2741	Gm22866	Coq5	-0.677305385
2742	Gm22866	Tmem184c	-0.651508083
2743	Gm22866	Nrn1	-0.610300306
2744	Gm22866	Uprt	-0.651921824
2745	Gm22866	Nsun3	-0.673017501
2746	Gm22866	Nr4a1	-0.685927353
2747	Gm22866	BC023105	-0.605373598
2748	Gm22866	Gm5346	-0.657448885
2749	Gm22866	Gm5912	-0.651967258
2750	Gm22866	Murc	-0.810797753
2751	Rnu12	Gm22749	0.621666819
2752	Rnu12	Tmeff1	0.65030418
2753	Rnu12	Gm23928	0.602562509
2754	Rnu12	LOC102639563	0.612052689
2755	Rnu12	Vaultrc5	0.714196988
2756	Rnu12	Inmt	0.646471019

2757	Rnu12	Fam107a	0.645410606
2758	Rnu12	mt-Tk	0.714196988
2759	Rnu12	Brox	0.633692105
2760	Rnu12	Glrx3	0.616971069
2761	Rnu12	mt-Th	0.66178471
2762	Rnu12	Ddit4	0.63226978
2763	Rnu12	mt-Tp	0.667405111
2764	Rnu12	mt-Ta	0.680121023
2765	Rnu12	Mpv17	-0.61068715
2766	Rnu12	Gm6245	-0.638394295
2767	Rnu12	Cd59a	-0.637322477
2768	Rnu12	Tmem159	-0.60103159
2769	Rnu12	Acot2	-0.679628534
2770	Rnu12	Dhdh	-0.622508261
2771	Rnu12	Fam213a	-0.643220229
2772	Rnu12	Nmnat1	-0.605873152
2773	Rnu12	Coq5	-0.677305385
2774	Rnu12	Tmem184c	-0.651508083
2775	Rnu12	Nrn1	-0.610300306
2776	Rnu12	Uprt	-0.651921824
2777	Rnu12	Nsun3	-0.673017501
2778	Rnu12	Nr4a1	-0.714196988
2779	Rnu12	BC023105	-0.605373598
2780	Rnu12	Egr1	-0.608129223
2781	Rnu12	Fos	-0.661717656
2782	Rnu12	G530011O06Rik	-0.684519954
2783	Rnu12	Gm5346	-0.657448885
2784	Rnu12	Gm5912	-0.651967258
2785	Rnu12	Murc	-0.714196988
2786	Ppp4r2	Inmt	0.646471019
2787	Ppp4r2	Brox	0.657411274
2788	Ppp4r2	Mpv17	-0.61068715
2789	Ppp4r2	Tmem159	-0.60103159
2790	Ppp4r2	Gm10718	-0.609800071
2791	Ppp4r2	Nr4a1	-0.646217126
2792	Ppp4r2	Egr1	-0.696533816
2793	Ppp4r2	Fos	-0.695614744
2794	Ppp4r2	G530011O06Rik	-0.725777902
2795	Ppp4r2	Gm5346	-0.657448885
2796	Ppp4r2	Gm5912	-0.651967258
2797	Ppp4r2	Murc	-0.708092287
2798	Gm22749	Gm24149	0.634337211
2799	Gm22749	Gm23928	0.602562509
2800	Gm22749	Vaultrc5	0.634337211
2801	Gm22749	Inmt	0.634337211
2802	Gm22749	Brox	0.627581231

2803	Gm22749	mt-Ta	0.634337211
2804	Gm22749	Mpv17	-0.61068715
2805	Gm22749	Gm6245	-0.634337211
2806	Gm22749	Cd59a	-0.634337211
2807	Gm22749	Tmem159	-0.60103159
2808	Gm22749	Acot2	-0.634337211
2809	Gm22749	Dhdh	-0.622508261
2810	Gm22749	Fam213a	-0.634337211
2811	Gm22749	Coq5	-0.634337211
2812	Gm22749	Tmem184c	-0.634337211
2813	Gm22749	Nrn1	-0.610300306
2814	Gm22749	Uprt	-0.634337211
2815	Gm22749	Nsun3	-0.634337211
2816	Gm22749	Gm5346	-0.634337211
2817	Gm24149	Gm23928	0.602562509
2818	Gm24149	Fam107a	0.632030655
2819	Gm24149	Dhdh	-0.619438228
2820	Gm24149	Tmem184c	-0.651508083
2821	Gm24149	Nrn1	-0.610300306
2822	Gm24149	Nsun3	-0.63332989
2823	Tmeff1	Gm23928	0.602562509
2824	Tmeff1	LOC102639563	0.612052689
2825	Tmeff1	Vaultrc5	0.65030418
2826	Tmeff1	Inmt	0.646471019
2827	Tmeff1	Fam107a	0.612505914
2828	Tmeff1	mt-Tk	0.65030418
2829	Tmeff1	Glrx3	0.616971069
2830	Tmeff1	mt-Th	0.65030418
2831	Tmeff1	Ddit4	0.63226978
2832	Tmeff1	mt-Tp	0.65030418
2833	Tmeff1	mt-Ta	0.65030418
2834	Tmeff1	Mpv17	-0.61068715
2835	Tmeff1	Gm6245	-0.638394295
2836	Tmeff1	Cd59a	-0.637322477
2837	Tmeff1	Tmem159	-0.60103159
2838	Tmeff1	Acot2	-0.65030418
2839	Tmeff1	Dhdh	-0.622508261
2840	Tmeff1	Fam213a	-0.643220229
2841	Tmeff1	Nmnat1	-0.605873152
2842	Tmeff1	Coq5	-0.65030418
2843	Tmeff1	Tmem184c	-0.65030418
2844	Tmeff1	Nrn1	-0.610300306
2845	Tmeff1	Uprt	-0.65030418
2846	Tmeff1	Nsun3	-0.65030418
2847	Tmeff1	Gm10718	-0.609800071
2848	Tmeff1	Nr4a1	-0.645284069

2849	Tmeff1	BC023105	-0.605373598
2850	Tmeff1	Fos	-0.620415975
2851	Tmeff1	Gm5346	-0.634603988
2852	Tmeff1	Gm5912	-0.65030418
2853	Tmeff1	Murc	-0.65030418
2854	Gm23928	LOC102639563	0.602562509
2855	Gm23928	Vaultrc5	0.602562509
2856	Gm23928	Inmt	0.602562509
2857	Gm23928	Fam107a	0.602562509
2858	Gm23928	mt-Tk	0.602562509
2859	Gm23928	Brox	0.602562509
2860	Gm23928	Glrx3	0.602562509
2861	Gm23928	mt-Th	0.602562509
2862	Gm23928	Ddit4	0.602562509
2863	Gm23928	mt-Tp	0.602562509
2864	Gm23928	mt-Ta	0.602562509
2865	Gm23928	Mpv17	-0.602562509
2866	Gm23928	Gm6245	-0.602562509
2867	Gm23928	Cd59a	-0.602562509
2868	Gm23928	Tmem159	-0.60103159
2869	Gm23928	Acot2	-0.602562509
2870	Gm23928	Dhdh	-0.602562509
2871	Gm23928	Fam213a	-0.602562509
2872	Gm23928	Nmnat1	-0.602562509
2873	Gm23928	Coq5	-0.602562509
2874	Gm23928	Tmem184c	-0.602562509
2875	Gm23928	Nrn1	-0.602562509
2876	Gm23928	Uprt	-0.602562509
2877	Gm23928	Nsun3	-0.602562509
2878	Gm23928	Nr4a1	-0.602562509
2879	Gm23928	Egr1	-0.602562509
2880	Gm23928	Fos	-0.602562509
2881	Gm23928	G530011O06Rik	-0.602562509
2882	Gm23928	Gm5346	-0.602562509
2883	Gm23928	Gm5912	-0.602562509
2884	Gm23928	Murc	-0.602562509
2885	LOC102639563	Vaultrc5	0.612052689
2886	LOC102639563	Inmt	0.612052689
2887	LOC102639563	Fam107a	0.612052689
2888	LOC102639563	mt-Tk	0.612052689
2889	LOC102639563	Glrx3	0.612052689
2890	LOC102639563	mt-Th	0.612052689
2891	LOC102639563	Ddit4	0.612052689
2892	LOC102639563	mt-Tp	0.612052689
2893	LOC102639563	mt-Ta	0.612052689
2894	LOC102639563	Mpv17	-0.61068715

2895	LOC102639563	Gm6245	-0.612052689
2896	LOC102639563	Cd59a	-0.612052689
2897	LOC102639563	Tmem159	-0.60103159
2898	LOC102639563	Acot2	-0.612052689
2899	LOC102639563	Dhdh	-0.612052689
2900	LOC102639563	Fam213a	-0.612052689
2901	LOC102639563	Nmnat1	-0.605873152
2902	LOC102639563	Coq5	-0.612052689
2903	LOC102639563	Tmem184c	-0.612052689
2904	LOC102639563	Nrn1	-0.610300306
2905	LOC102639563	Uprt	-0.612052689
2906	LOC102639563	Nsun3	-0.612052689
2907	LOC102639563	Gm10718	-0.609800071
2908	LOC102639563	Nr4a1	-0.612052689
2909	LOC102639563	BC023105	-0.605373598
2910	LOC102639563	Egr1	-0.612052689
2911	LOC102639563	Fos	-0.612052689
2912	LOC102639563	G530011O06Rik	-0.612052689
2913	LOC102639563	Gm5346	-0.612052689
2914	LOC102639563	Murc	-0.612052689
2915	Vaultrc5	Inmt	0.646471019
2916	Vaultrc5	Fam107a	0.645410606
2917	Vaultrc5	mt-Tk	0.720414242
2918	Vaultrc5	Glrx3	0.616971069
2919	Vaultrc5	mt-Th	0.66178471
2920	Vaultrc5	Ddit4	0.63226978
2921	Vaultrc5	mt-Tp	0.667405111
2922	Vaultrc5	mt-Ta	0.680121023
2923	Vaultrc5	Mpv17	-0.61068715
2924	Vaultrc5	Gm6245	-0.638394295
2925	Vaultrc5	Cd59a	-0.637322477
2926	Vaultrc5	Tmem159	-0.60103159
2927	Vaultrc5	Acot2	-0.679628534
2928	Vaultrc5	Dhdh	-0.622508261
2929	Vaultrc5	Fam213a	-0.643220229
2930	Vaultrc5	Nmnat1	-0.605873152
2931	Vaultrc5	Coq5	-0.677305385
2932	Vaultrc5	Tmem184c	-0.651508083
2933	Vaultrc5	Nrn1	-0.610300306
2934	Vaultrc5	Uprt	-0.651921824
2935	Vaultrc5	Nsun3	-0.673017501
2936	Vaultrc5	BC023105	-0.605373598
2937	Vaultrc5	Gm5346	-0.657448885
2938	Vaultrc5	Gm5912	-0.651967258
2939	Vaultrc5	Murc	-0.728238836
2940	Inmt	Fam107a	0.645410606

2941	Inmt	mt-Tk	0.646471019
2942	Inmt	Brox	0.646471019
2943	Inmt	Glrx3	0.616971069
2944	Inmt	mt-Th	0.646471019
2945	Inmt	Ddit4	0.63226978
2946	Inmt	mt-Tp	0.646471019
2947	Inmt	mt-Ta	0.646471019
2948	Inmt	Mpv17	-0.61068715
2949	Inmt	Gm6245	-0.638394295
2950	Inmt	Cd59a	-0.637322477
2951	Inmt	Tmem159	-0.60103159
2952	Inmt	Acot2	-0.646471019
2953	Inmt	Dhdh	-0.622508261
2954	Inmt	Fam213a	-0.643220229
2955	Inmt	Nmnat1	-0.605873152
2956	Inmt	Coq5	-0.646471019
2957	Inmt	Tmem184c	-0.646471019
2958	Inmt	Nrn1	-0.610300306
2959	Inmt	Uprt	-0.646471019
2960	Inmt	Nsun3	-0.646471019
2961	Inmt	Nr4a1	-0.646471019
2962	Inmt	BC023105	-0.605373598
2963	Inmt	Egr1	-0.604479588
2964	Inmt	Fos	-0.646471019
2965	Inmt	G530011O06Rik	-0.646471019
2966	Inmt	Gm5346	-0.646471019
2967	Inmt	Gm5912	-0.646471019
2968	Inmt	Murc	-0.646471019
2969	Fam107a	mt-Tk	0.645410606
2970	Fam107a	Brox	0.645410606
2971	Fam107a	Glrx3	0.616971069
2972	Fam107a	mt-Th	0.645410606
2973	Fam107a	Ddit4	0.63226978
2974	Fam107a	mt-Tp	0.645410606
2975	Fam107a	mt-Ta	0.645410606
2976	Fam107a	Mpv17	-0.61068715
2977	Fam107a	Gm6245	-0.638394295
2978	Fam107a	Cd59a	-0.637322477
2979	Fam107a	Tmem159	-0.60103159
2980	Fam107a	Acot2	-0.645410606
2981	Fam107a	Dhdh	-0.622508261
2982	Fam107a	Fam213a	-0.643220229
2983	Fam107a	Nmnat1	-0.605873152
2984	Fam107a	Coq5	-0.645410606
2985	Fam107a	Tmem184c	-0.645410606
2986	Fam107a	Nrn1	-0.610300306

2987	Fam107a	Uprt	-0.645410606
2988	Fam107a	Nsun3	-0.645410606
2989	Fam107a	Nr4a1	-0.645410606
2990	Fam107a	Egr1	-0.645410606
2991	Fam107a	Fos	-0.645410606
2992	Fam107a	G530011O06Rik	-0.645410606
2993	Fam107a	Gm5346	-0.645410606
2994	Fam107a	Murc	-0.645410606
2995	mt-Tk	Brox	0.657411274
2996	mt-Tk	Glrx3	0.616971069
2997	mt-Tk	mt-Th	0.66178471
2998	mt-Tk	Ddit4	0.63226978
2999	mt-Tk	mt-Tp	0.667405111
3000	mt-Tk	mt-Ta	0.680121023
3001	mt-Tk	Mpv17	-0.61068715
3002	mt-Tk	Gm6245	-0.638394295
3003	mt-Tk	Cd59a	-0.637322477
3004	mt-Tk	Tmem159	-0.60103159
3005	mt-Tk	Acot2	-0.679628534
3006	mt-Tk	Dhdh	-0.622508261
3007	mt-Tk	Fam213a	-0.643220229
3008	mt-Tk	Nmnat1	-0.605873152
3009	mt-Tk	Coq5	-0.677305385
3010	mt-Tk	Tmem184c	-0.651508083
3011	mt-Tk	Nrn1	-0.610300306
3012	mt-Tk	Uprt	-0.651921824
3013	mt-Tk	Nsun3	-0.673017501
3014	mt-Tk	Gm10718	-0.609800071
3015	mt-Tk	Nr4a1	-0.720414242
3016	mt-Tk	Egr1	-0.704399843
3017	mt-Tk	Fos	-0.695614744
3018	mt-Tk	G530011O06Rik	-0.720414242
3019	mt-Tk	Gm5346	-0.657448885
3020	mt-Tk	Gm5912	-0.651967258
3021	mt-Tk	Murc	-0.720414242
3022	Brox	Glrx3	0.616971069
3023	Brox	mt-Th	0.648440869
3024	Brox	Ddit4	0.63226978
3025	Brox	mt-Tp	0.605450373
3026	Brox	mt-Ta	0.657411274
3027	Brox	Mpv17	-0.61068715
3028	Brox	Gm6245	-0.638394295
3029	Brox	Tmem159	-0.60103159
3030	Brox	Dhdh	-0.622508261
3031	Brox	Fam213a	-0.643220229
3032	Brox	Coq5	-0.626735973

3033	Brox	Tmem184c	-0.641514331
3034	Brox	Nrn1	-0.610300306
3035	Brox	Uprt	-0.651921824
3036	Brox	Gm10718	-0.609800071
3037	Brox	Nr4a1	-0.657411274
3038	Brox	Egr1	-0.657411274
3039	Brox	Fos	-0.657411274
3040	Brox	G530011O06Rik	-0.657411274
3041	Brox	Gm5346	-0.657411274
3042	Brox	Gm5912	-0.651967258
3043	Brox	Murc	-0.657411274
3044	Glrx3	mt-Th	0.616971069
3045	Glrx3	Ddit4	0.616971069
3046	Glrx3	mt-Tp	0.616971069
3047	Glrx3	mt-Ta	0.616971069
3048	Glrx3	Mpv17	-0.61068715
3049	Glrx3	Gm6245	-0.616971069
3050	Glrx3	Cd59a	-0.616971069
3051	Glrx3	Tmem159	-0.60103159
3052	Glrx3	Acot2	-0.616971069
3053	Glrx3	Dhdh	-0.616971069
3054	Glrx3	Fam213a	-0.616971069
3055	Glrx3	Nmnat1	-0.605873152
3056	Glrx3	Coq5	-0.616971069
3057	Glrx3	Tmem184c	-0.616971069
3058	Glrx3	Nrn1	-0.610300306
3059	Glrx3	Uprt	-0.616971069
3060	Glrx3	Nsun3	-0.616971069
3061	Glrx3	Gm10718	-0.609800071
3062	Glrx3	Nr4a1	-0.616971069
3063	Glrx3	Egr1	-0.616971069
3064	Glrx3	Fos	-0.616971069
3065	Glrx3	G530011O06Rik	-0.616971069
3066	Glrx3	Gm5346	-0.616971069
3067	Glrx3	Gm5912	-0.616971069
3068	Glrx3	Murc	-0.616971069
3069	mt-Th	Ddit4	0.63226978
3070	mt-Th	mt-Tp	0.66178471
3071	mt-Th	mt-Ta	0.66178471
3072	mt-Th	Mpv17	-0.61068715
3073	mt-Th	Gm6245	-0.638394295
3074	mt-Th	Cd59a	-0.637322477
3075	mt-Th	Tmem159	-0.60103159
3076	mt-Th	Acot2	-0.66178471
3077	mt-Th	Dhdh	-0.622508261
3078	mt-Th	Fam213a	-0.643220229

3079	mt-Th	Nmnat1	-0.605873152
3080	mt-Th	Coq5	-0.66178471
3081	mt-Th	Tmem184c	-0.651508083
3082	mt-Th	Nrn1	-0.610300306
3083	mt-Th	Uprt	-0.651921824
3084	mt-Th	Nsun3	-0.66178471
3085	mt-Th	Gm10718	-0.609800071
3086	mt-Th	Nr4a1	-0.66178471
3087	mt-Th	BC023105	-0.605373598
3088	mt-Th	Egr1	-0.66178471
3089	mt-Th	Fos	-0.66178471
3090	mt-Th	G530011O06Rik	-0.66178471
3091	mt-Th	Gm5346	-0.657448885
3092	mt-Th	Gm5912	-0.651967258
3093	mt-Th	Murc	-0.66178471
3094	Ddit4	mt-Tp	0.63226978
3095	Ddit4	mt-Ta	0.63226978
3096	Ddit4	Mpv17	-0.61068715
3097	Ddit4	Gm6245	-0.63226978
3098	Ddit4	Cd59a	-0.63226978
3099	Ddit4	Tmem159	-0.60103159
3100	Ddit4	Acot2	-0.63226978
3101	Ddit4	Dhdh	-0.622508261
3102	Ddit4	Fam213a	-0.63226978
3103	Ddit4	Nmnat1	-0.605873152
3104	Ddit4	Coq5	-0.63226978
3105	Ddit4	Tmem184c	-0.63226978
3106	Ddit4	Nrn1	-0.610300306
3107	Ddit4	Uprt	-0.63226978
3108	Ddit4	Nsun3	-0.63226978
3109	Ddit4	Gm10718	-0.609800071
3110	Ddit4	Nr4a1	-0.63226978
3111	Ddit4	Egr1	-0.63226978
3112	Ddit4	Fos	-0.63226978
3113	Ddit4	G530011O06Rik	-0.63226978
3114	Ddit4	Gm5346	-0.63226978
3115	Ddit4	Murc	-0.63226978
3116	mt-Tp	mt-Ta	0.667405111
3117	mt-Tp	Mpv17	-0.61068715
3118	mt-Tp	Gm6245	-0.638394295
3119	mt-Tp	Cd59a	-0.637322477
3120	mt-Tp	Tmem159	-0.60103159
3121	mt-Tp	Acot2	-0.667405111
3122	mt-Tp	Dhdh	-0.622508261
3123	mt-Tp	Fam213a	-0.643220229
3124	mt-Tp	Nmnat1	-0.605873152

3125	mt-Tp	Coq5	-0.667405111
3126	mt-Tp	Tmem184c	-0.651508083
3127	mt-Tp	Nrn1	-0.610300306
3128	mt-Tp	Uprt	-0.651921824
3129	mt-Tp	Nsun3	-0.667405111
3130	mt-Tp	Gm10718	-0.609800071
3131	mt-Tp	Nr4a1	-0.667405111
3132	mt-Tp	BC023105	-0.605373598
3133	mt-Tp	Egr1	-0.667405111
3134	mt-Tp	Fos	-0.667405111
3135	mt-Tp	G530011O06Rik	-0.667405111
3136	mt-Tp	Gm5346	-0.657448885
3137	mt-Tp	Gm5912	-0.651967258
3138	mt-Tp	Murc	-0.667405111
3139	mt-Ta	Mpv17	-0.61068715
3140	mt-Ta	Gm6245	-0.638394295
3141	mt-Ta	Cd59a	-0.637322477
3142	mt-Ta	Tmem159	-0.60103159
3143	mt-Ta	Acot2	-0.679628534
3144	mt-Ta	Dhdh	-0.622508261
3145	mt-Ta	Fam213a	-0.643220229
3146	mt-Ta	Nmnat1	-0.605873152
3147	mt-Ta	Coq5	-0.677305385
3148	mt-Ta	Tmem184c	-0.651508083
3149	mt-Ta	Nrn1	-0.610300306
3150	mt-Ta	Uprt	-0.651921824
3151	mt-Ta	Nsun3	-0.673017501
3152	mt-Ta	Nr4a1	-0.680121023
3153	mt-Ta	BC023105	-0.605373598
3154	mt-Ta	Egr1	-0.640973115
3155	mt-Ta	Fos	-0.680121023
3156	mt-Ta	G530011O06Rik	-0.680121023
3157	mt-Ta	Gm5346	-0.657448885
3158	mt-Ta	Gm5912	-0.651967258
3159	mt-Ta	Murc	-0.680121023
3160	Mpv17	Gm6245	0.61068715
3161	Mpv17	Cd59a	0.61068715
3162	Mpv17	Tmem159	0.60103159
3163	Mpv17	Acot2	0.61068715
3164	Mpv17	Dhdh	0.61068715
3165	Mpv17	Fam213a	0.61068715
3166	Mpv17	Nmnat1	0.605873152
3167	Mpv17	Coq5	0.61068715
3168	Mpv17	Tmem184c	0.61068715
3169	Mpv17	Nrn1	0.610300306
3170	Mpv17	Uprt	0.61068715

3171	Mpv17	Nsun3	0.61068715
3172	Mpv17	Gm10718	0.609800071
3173	Mpv17	Nr4a1	0.61068715
3174	Mpv17	BC023105	0.605373598
3175	Mpv17	Egr1	0.61068715
3176	Mpv17	Fos	0.61068715
3177	Mpv17	G530011O06Rik	0.61068715
3178	Mpv17	Gm5346	0.61068715
3179	Mpv17	Gm5912	0.61068715
3180	Mpv17	Murc	0.61068715
3181	Gm6245	Cd59a	0.637322477
3182	Gm6245	Tmem159	0.60103159
3183	Gm6245	Acot2	0.638394295
3184	Gm6245	Dhdh	0.622508261
3185	Gm6245	Fam213a	0.638394295
3186	Gm6245	Nmnat1	0.605873152
3187	Gm6245	Coq5	0.638394295
3188	Gm6245	Tmem184c	0.638394295
3189	Gm6245	Nrn1	0.610300306
3190	Gm6245	Uprt	0.638394295
3191	Gm6245	Nsun3	0.638394295
3192	Gm6245	Gm10718	0.609800071
3193	Gm6245	Nr4a1	0.638394295
3194	Gm6245	BC023105	0.605373598
3195	Gm6245	Egr1	0.62827716
3196	Gm6245	Fos	0.638394295
3197	Gm6245	G530011O06Rik	0.621019387
3198	Gm6245	Gm5346	0.638394295
3199	Gm6245	Gm5912	0.638394295
3200	Gm6245	Murc	0.638394295
3201	Cd59a	Tmem159	0.60103159
3202	Cd59a	Acot2	0.637322477
3203	Cd59a	Dhdh	0.622508261
3204	Cd59a	Fam213a	0.637322477
3205	Cd59a	Nmnat1	0.605873152
3206	Cd59a	Coq5	0.637322477
3207	Cd59a	Tmem184c	0.637322477
3208	Cd59a	Nrn1	0.610300306
3209	Cd59a	Uprt	0.637322477
3210	Cd59a	Nsun3	0.637322477
3211	Cd59a	BC023105	0.605373598
3212	Cd59a	Gm5346	0.637322477
3213	Cd59a	Gm5912	0.637322477
3214	Cd59a	Murc	0.637322477
3215	Tmem159	Acot2	0.60103159
3216	Tmem159	Dhdh	0.60103159

3217	Tmem159	Fam213a	0.60103159
3218	Tmem159	Nmnat1	0.60103159
3219	Tmem159	Coq5	0.60103159
3220	Tmem159	Tmem184c	0.60103159
3221	Tmem159	Nrn1	0.60103159
3222	Tmem159	Uprt	0.60103159
3223	Tmem159	Nsun3	0.60103159
3224	Tmem159	Gm10718	0.60103159
3225	Tmem159	Nr4a1	0.60103159
3226	Tmem159	Egr1	0.60103159
3227	Tmem159	Fos	0.60103159
3228	Tmem159	G530011O06Rik	0.60103159
3229	Tmem159	Gm5346	0.60103159
3230	Tmem159	Gm5912	0.60103159
3231	Tmem159	Murc	0.60103159
3232	Acot2	Dhdh	0.622508261
3233	Acot2	Fam213a	0.643220229
3234	Acot2	Nmnat1	0.605873152
3235	Acot2	Coq5	0.677305385
3236	Acot2	Tmem184c	0.651508083
3237	Acot2	Nrn1	0.610300306
3238	Acot2	Uprt	0.651921824
3239	Acot2	Nsun3	0.673017501
3240	Acot2	BC023105	0.605373598
3241	Acot2	Gm5346	0.657448885
3242	Acot2	Gm5912	0.651967258
3243	Acot2	Murc	0.679628534
3244	Dhdh	Fam213a	0.622508261
3245	Dhdh	Nmnat1	0.605873152
3246	Dhdh	Coq5	0.622508261
3247	Dhdh	Tmem184c	0.622508261
3248	Dhdh	Nrn1	0.610300306
3249	Dhdh	Uprt	0.622508261
3250	Dhdh	Nsun3	0.622508261
3251	Dhdh	Nr4a1	0.622508261
3252	Dhdh	BC023105	0.605373598
3253	Dhdh	Egr1	0.622508261
3254	Dhdh	Fos	0.622508261
3255	Dhdh	G530011O06Rik	0.622508261
3256	Dhdh	Gm5346	0.622508261
3257	Dhdh	Gm5912	0.622508261
3258	Dhdh	Murc	0.622508261
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3260	Fam213a	Coq5	0.643220229
3261	Fam213a	Tmem184c	0.643220229
3262	Fam213a	Nrn1	0.610300306

3263	Fam213a	Uprt	0.643220229
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3265	Fam213a	Gm10718	0.609800071
3266	Fam213a	Nr4a1	0.643220229
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3268	Fam213a	Egr1	0.643220229
3269	Fam213a	Fos	0.643220229
3270	Fam213a	G530011O06Rik	0.643220229
3271	Fam213a	Gm5346	0.643220229
3272	Fam213a	Gm5912	0.643220229
3273	Fam213a	Murc	0.643220229
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3275	Nmnat1	Tmem184c	0.605873152
3276	Nmnat1	Nrn1	0.605873152
3277	Nmnat1	Uprt	0.605873152
3278	Nmnat1	Nsun3	0.605873152
3279	Nmnat1	Nr4a1	0.605873152
3280	Nmnat1	BC023105	0.605373598
3281	Nmnat1	Gm5346	0.605873152
3282	Nmnat1	Gm5912	0.605873152
3283	Nmnat1	Murc	0.605873152
3284	Coq5	Tmem184c	0.651508083
3285	Coq5	Nrn1	0.610300306
3286	Coq5	Uprt	0.651921824
3287	Coq5	Nsun3	0.673017501
3288	Coq5	Gm10718	0.602732694
3289	Coq5	Nr4a1	0.677305385
3290	Coq5	BC023105	0.605373598
3291	Coq5	Fos	0.628958607
3292	Coq5	G530011O06Rik	0.616075739
3293	Coq5	Gm5346	0.657448885
3294	Coq5	Gm5912	0.651967258
3295	Coq5	Murc	0.677305385
3296	Tmem184c	Nrn1	0.610300306
3297	Tmem184c	Uprt	0.651508083
3298	Tmem184c	Nsun3	0.651508083
3299	Tmem184c	Nr4a1	0.607968651
3300	Tmem184c	BC023105	0.605373598
3301	Tmem184c	G530011O06Rik	0.639262445
3302	Tmem184c	Gm5346	0.651508083
3303	Tmem184c	Murc	0.651508083
3304	Nrn1	Uprt	0.610300306
3305	Nrn1	Nsun3	0.610300306
3306	Nrn1	Nr4a1	0.60682593
3307	Nrn1	BC023105	0.605373598
3308	Nrn1	Gm5346	0.610300306

3309	Nrn1	Gm5912	0.610300306
3310	Nrn1	Murc	0.610300306
3311	Uprt	Nsun3	0.651921824
3312	Uprt	Gm10718	0.609800071
3313	Uprt	Nr4a1	0.651921824
3314	Uprt	BC023105	0.605373598
3315	Uprt	Egr1	0.651921824
3316	Uprt	Fos	0.651921824
3317	Uprt	G530011O06Rik	0.62605167
3318	Uprt	Gm5346	0.651921824
3319	Uprt	Gm5912	0.651921824
3320	Uprt	Murc	0.651921824
3321	Nsun3	BC023105	0.605373598
3322	Nsun3	Gm5346	0.657448885
3323	Nsun3	Murc	0.673017501
3324	Gm10718	Nr4a1	0.609800071
3325	Gm10718	Egr1	0.609800071
3326	Gm10718	Fos	0.609800071
3327	Gm10718	Gm5346	0.609800071
3328	Gm10718	Gm5912	0.609800071
3329	Gm10718	Murc	0.609800071
3330	Nr4a1	Egr1	0.704399843
3331	Nr4a1	Fos	0.695614744
3332	Nr4a1	G530011O06Rik	0.740456125
3333	Nr4a1	Gm5346	0.657448885
3334	Nr4a1	Gm5912	0.638183711
3335	Nr4a1	Murc	0.747000222
3336	BC023105	Gm5912	0.605373598
3337	Egr1	Fos	0.695614744
3338	Egr1	G530011O06Rik	0.704399843
3339	Egr1	Gm5346	0.657448885
3340	Egr1	Murc	0.704399843
3341	Fos	G530011O06Rik	0.695614744
3342	Fos	Gm5346	0.657448885
3343	Fos	Murc	0.695614744
3344	G530011O06Rik	Gm5346	0.657448885
3345	G530011O06Rik	Murc	0.722746106
3346	Gm5346	Gm5912	0.651967258
3347	Gm5346	Murc	0.657448885
3348	Gm5912	Murc	0.651967258

Table S4. Benjamini corrected P-values of the enrichment pathways in Figure 1B.

Term	P-value
Gamete generation	1.40E-04
Skeletal muscle cell differentiation	0.0042497
Methyltransferase activity	0.02957848
Methylation	0.03585928
Regulation of the force of heart contraction	0.03994466
Cellular response to reactive oxygen species	0.04164585
Response to hypoxia	0.04517363
Protein heterodimerization activity	0.04829376
Cellular response to organic substance	0.05682571
Reactive oxygen species metabolic process	0.06515804

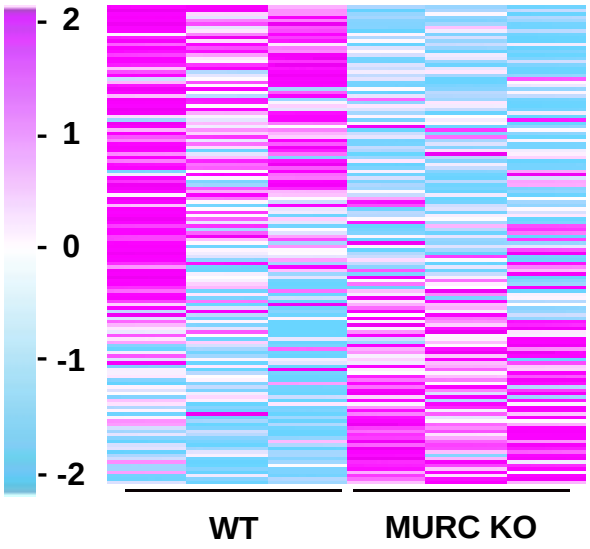
P=0.05 is a significance threshold.

Table S5. Benjamini corrected P-values of the enrichment pathways in Figure 4C.

Term	P-value
Regulation of the force of heart contraction	0.002678
Response to reactive oxygen species	0.003656
Regulation of apoptosis	0.008735
Response to hypoxia	0.017106

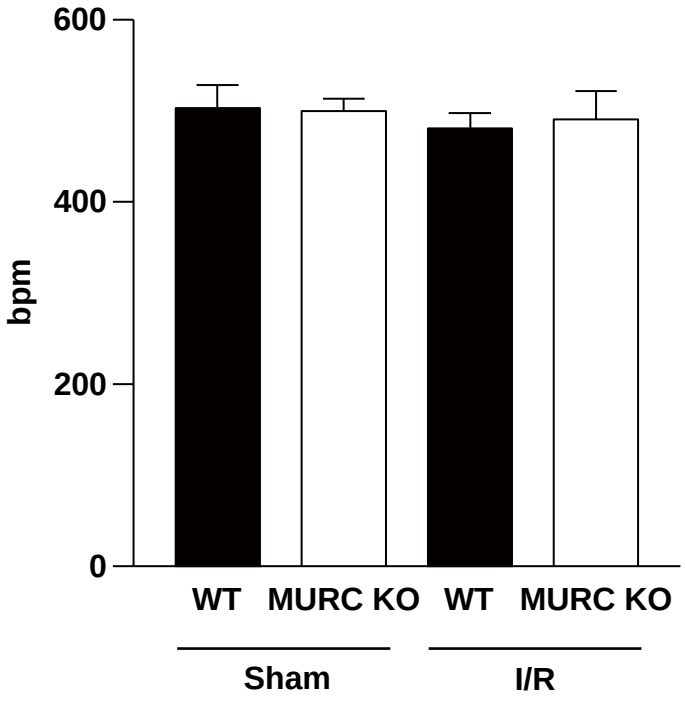
P=0.05 is a significance threshold.

Figure S1. Microarray analysis of the heart of WT and MURC KO mice.



Heat map for entire genes. Magenta color indicates upregulated gene, while cyan color indicates down-regulated gene. Gene expression is scaled by log10.

Figure S2. Heart rate of WT and MURC KO mouse heart during echocardiography after sham operation or 24 h after I/R. n = 10 per group.



Data are presented as mean ± SEM.

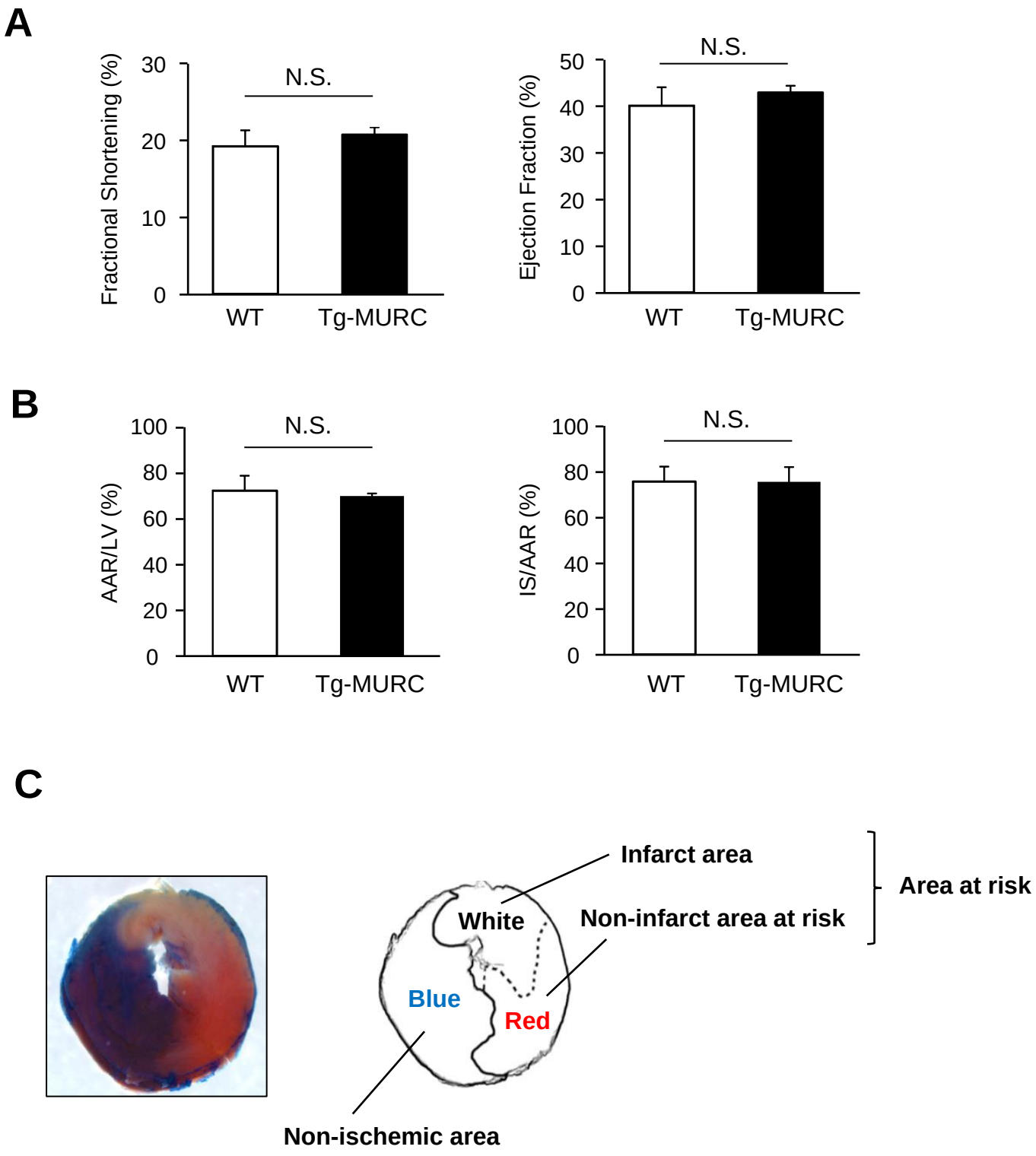


Figure S3. Effect of cardiospecific MURC overexpression in I/R injury. (A) LV systolic function of Tg-MURC mouse hearts 24 h after I/R. n = 5 per group. (B) Infarct size as measured by TTC and Evans blue staining of LV tissue from Tg-MURC mouse hearts 24 h after I/R. (C) Representative photo (left) and its illustration (right) of TTC and Evans blue staining. Blue, white and red regions represent the non-ischemic area, the infarct area and the non-infarct area at risk respectively. The area at risk consists of the infarct area and the non-infarct area at risk. Data are presented as mean ± SEM. n = 3 per group. N.S. indicates not significant ($P \geq 0.05$). I/R, ischemia/reperfusion; LV, left ventricle; AAR, area at risk; IS, infarct size; TTC, triphenyltetrazolium chloride.

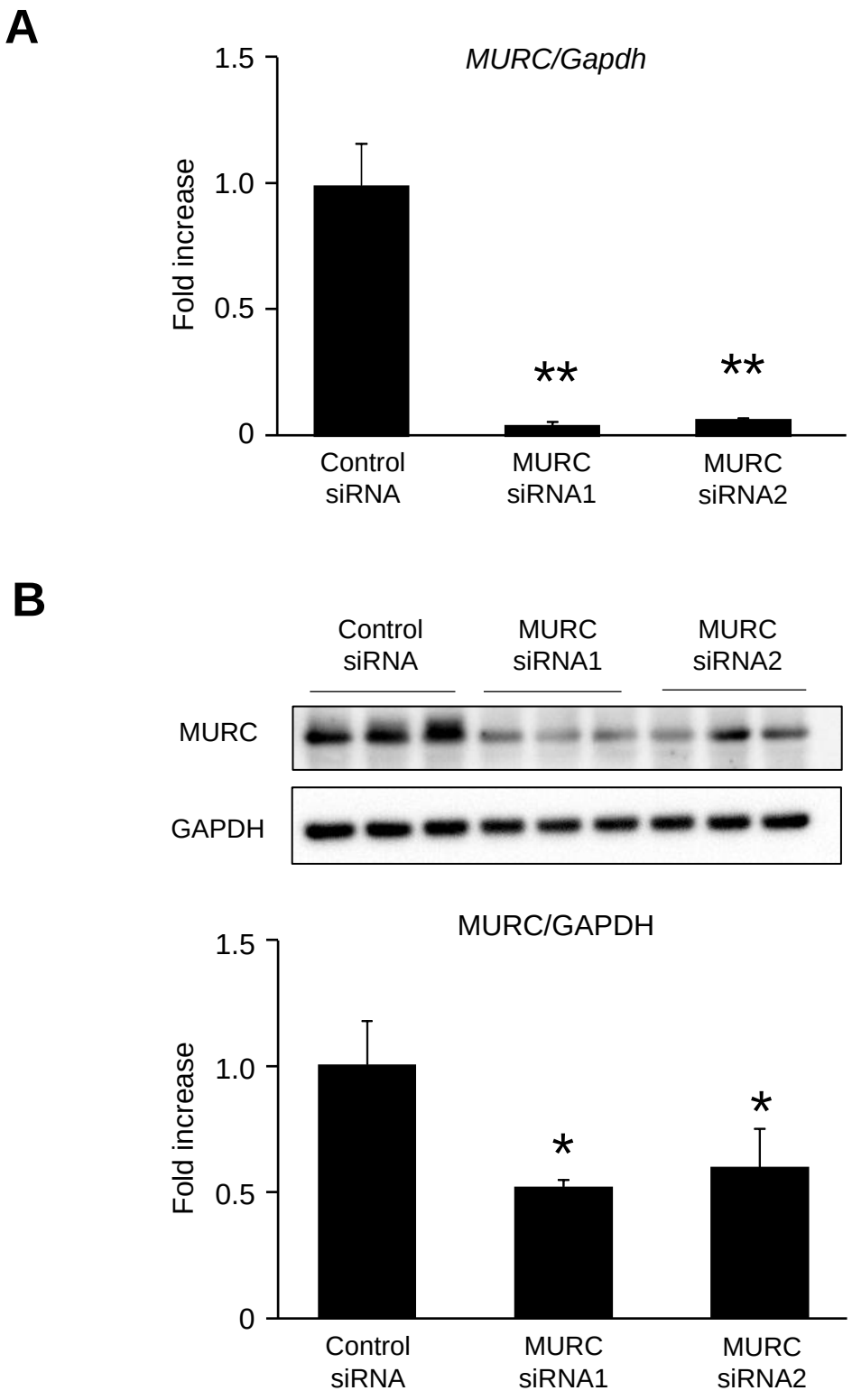


Figure S4. Gene silencing of MURC through siRNA in neonatal rat cardiomyocytes. (A) mRNA expression of MURC in neonatal rat cardiomyocytes 48 h after transfection with control siRNA, MURC siRNA1 and siRNA2. (B) Representative Western blots (upper) and its quantification (lower) of MURC in neonatal rat cardiomyocytes 72 h after transfection with control siRNA, MURC siRNA1 and siRNA2. Data are presented as mean ± SEM. *$P < 0.05$, **$P < 0.01$ compared with control siRNA. n = 3 per group. Gapdh, Glyceraldehyde-3-phosphate dehydrogenase.

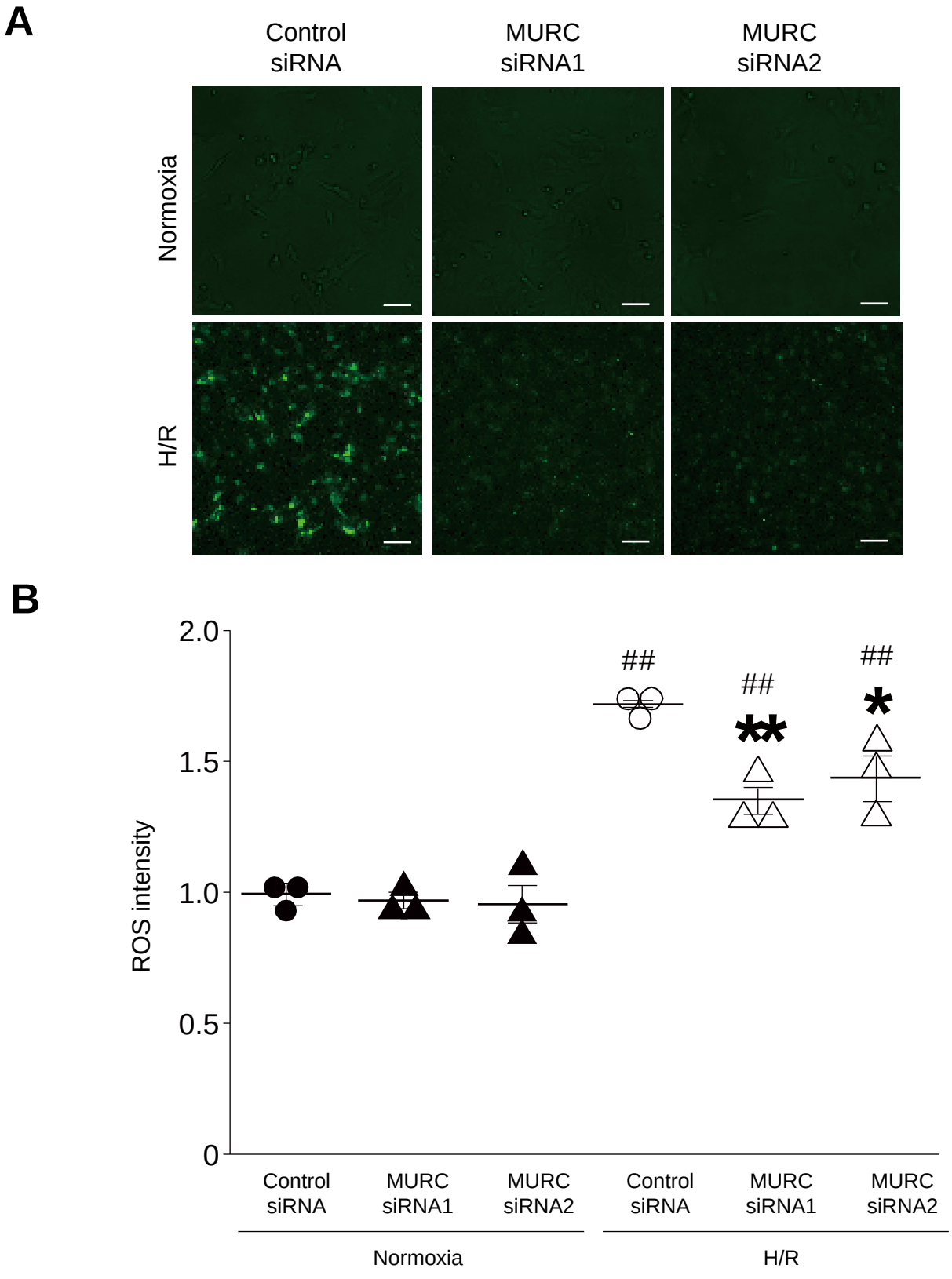


Figure S5. MURC knockdown ameliorates ROS production in cardiomyocytes after H/R. (A) Representative photos of *in vitro* ROS detection as measured by Cell ROX staining in H/R stimulating-neonatal rat cardiomyocytes transfected with control siRNA, MURC siRNA1 or MURC siRNA2. (B) Quantification of *in vitro* ROS production. n = 3 per group. $^{\#\#}P < 0.01$ vs. corresponding normoxia group; * $P < 0.05$, ** $P < 0.01$ vs. control siRNA in H/R group. Scale bar, 50 μm. ROS, reactive oxygen species; H/R, hypoxia-reoxygenation.

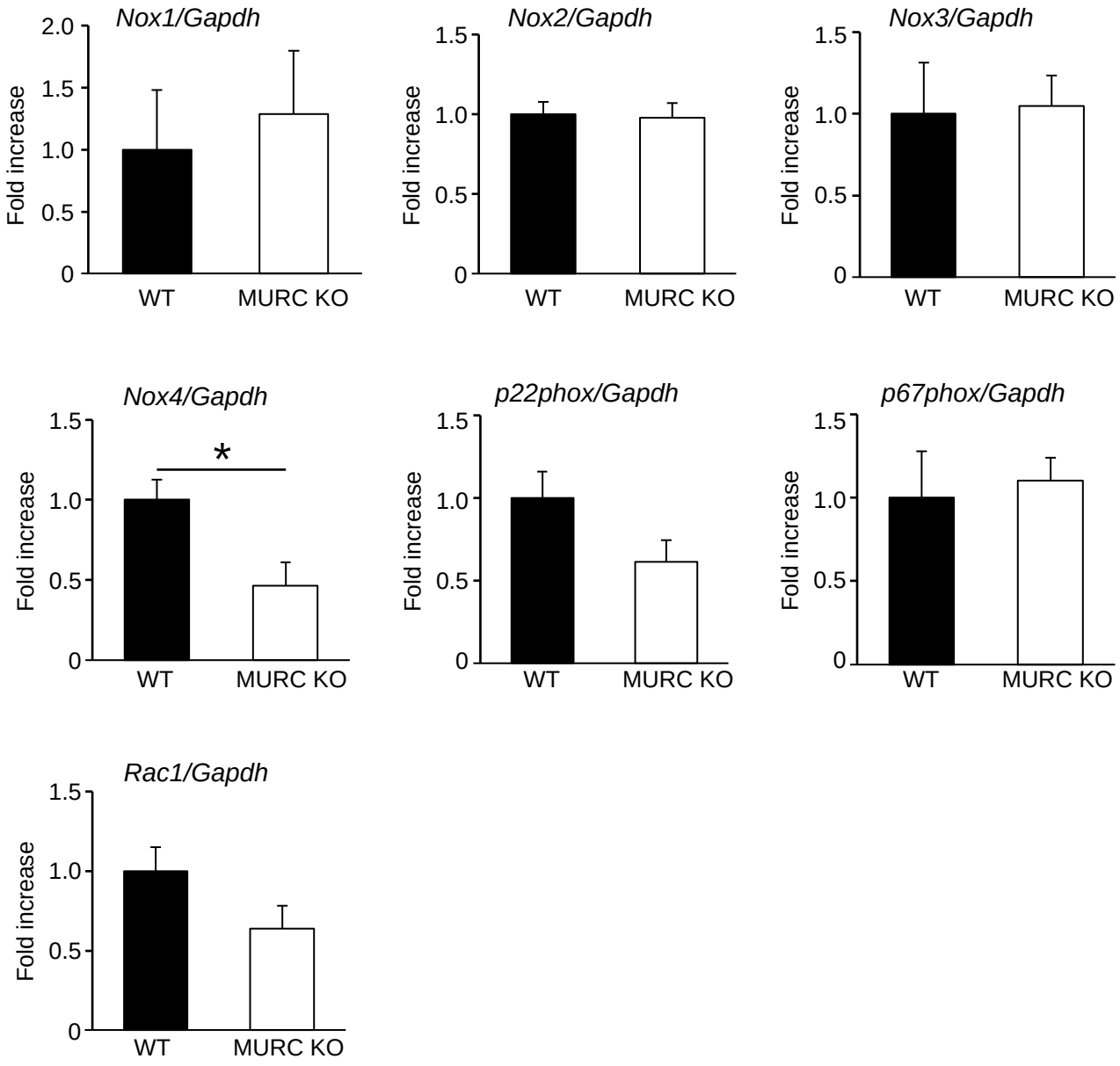


Figure S6. mRNA expression of NADPH oxidase (Nox) family genes in WT and MURC KO mouse hearts 24 h after I/R. Data are presented as mean ± SEM. **P* < 0.05. n = 4 per groups. Rac1, RAS-related C3 botulinus toxin substrate 1.

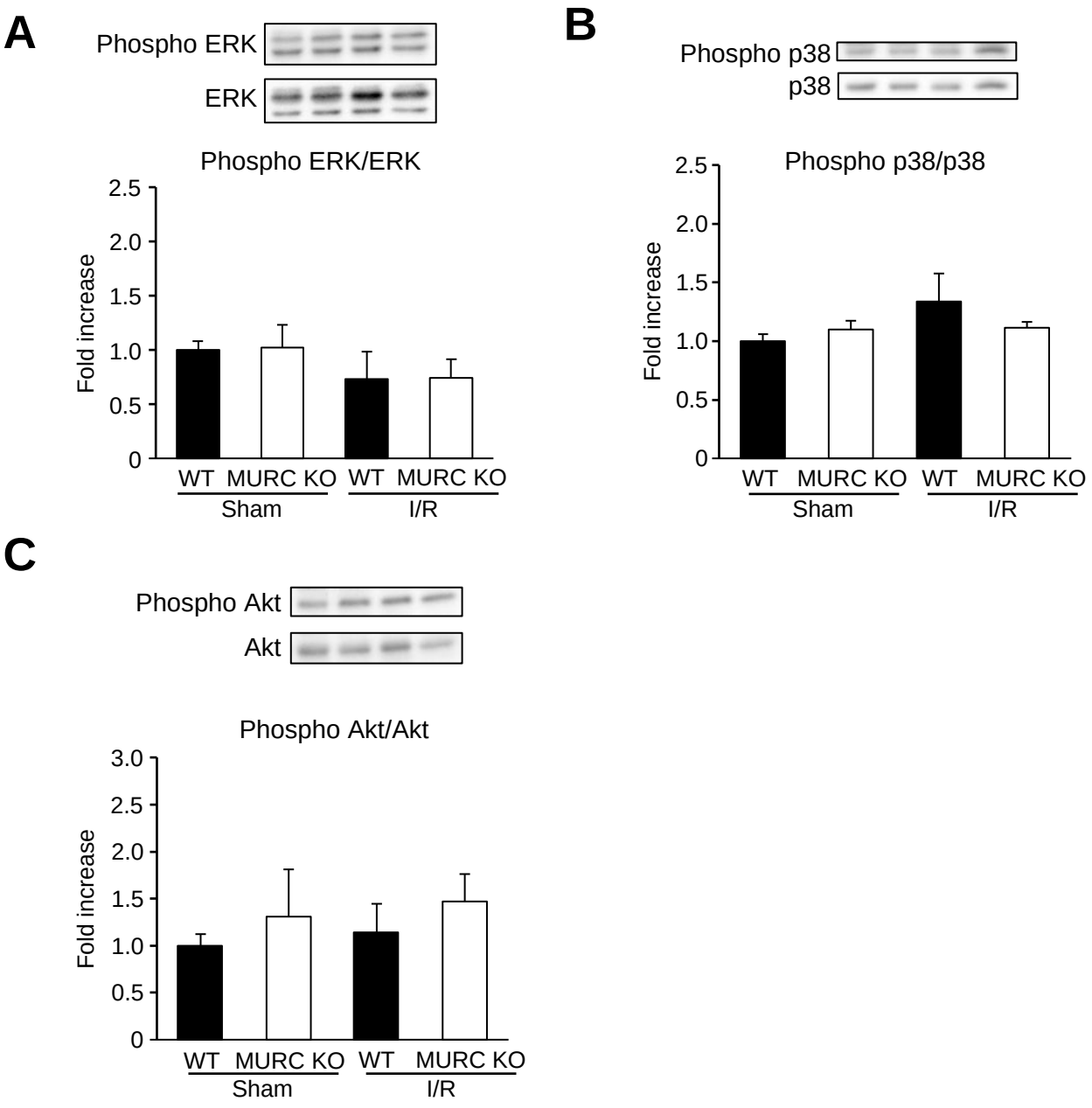


Figure S7. (A-C) Representative Western blots (upper panel) and its quantification (lower graph) of the activation of apoptosis-related proteins in WT and MURC KO mouse hearts 24 h after I/R. Data are presented as mean ± SEM. n = 5 per group. ERK, extracellular signal-regulated kinase; p38, mitogen-activated protein kinase p38; Akt, phosphoinositide-3-kinase–protein kinase B.

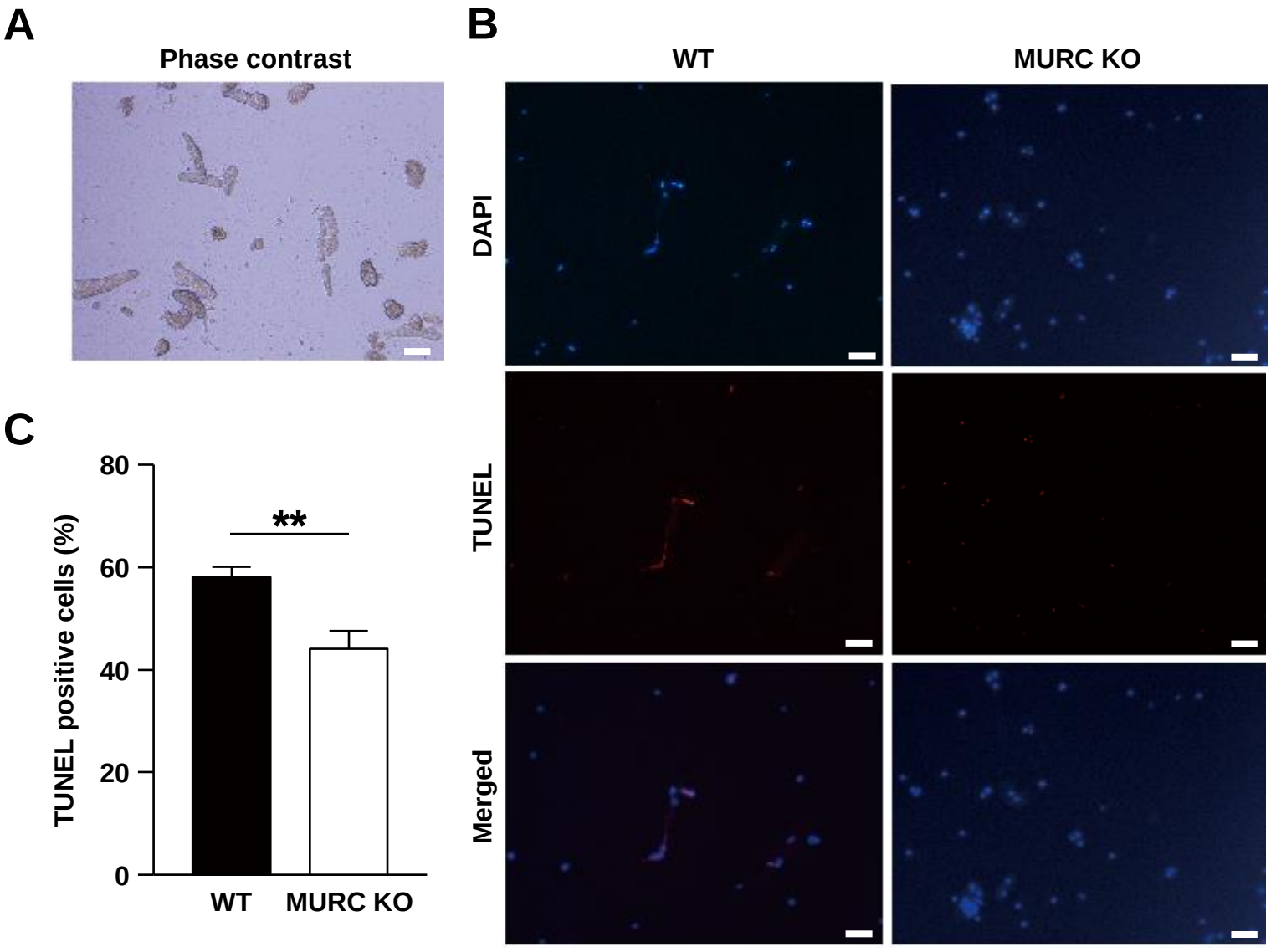


Figure S8. A, Cardiomyocytes isolated from adult mouse heart after incubation for 24 h. Rod-shaped cells are alive cardiomyocytes. B and C, Representative TUNEL staining (B) and its quantification (C) of WT and MURC KO adult mouse cardiomyocytes after H_2O_2 exposure. The number of cell death was assessed by the percentage of TUNEL positive cells / DAPI positive cells. n = 5 per group. Data are presented as mean ± SEM. ***P* < 0.01. Scale bar indicates 50 μm.

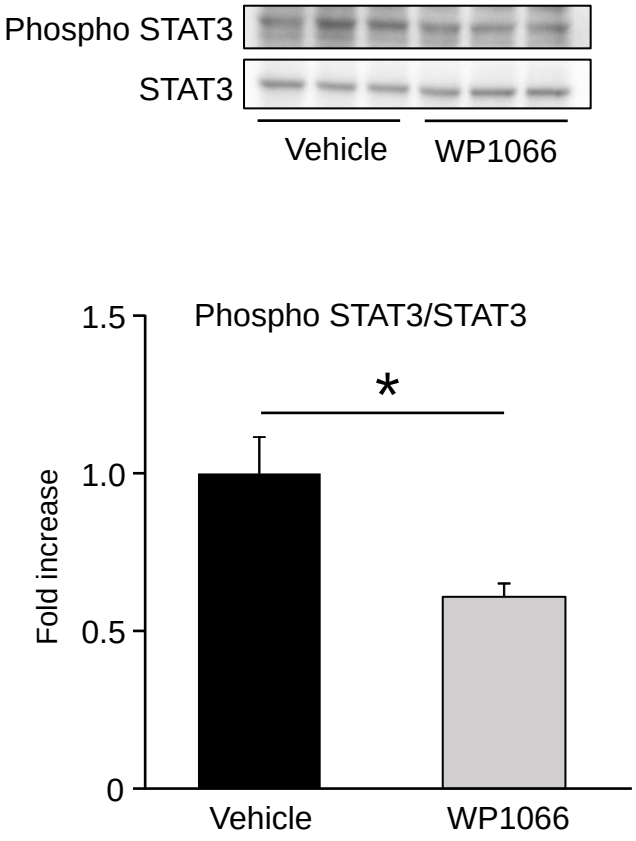
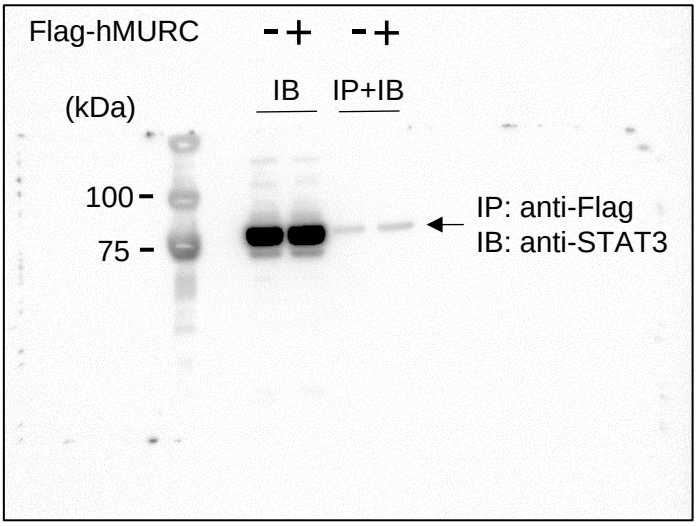


Figure S9. STAT3 inhibitor cancels the cardioprotective effect of MURC deficiency. (A) Representative Western blots (upper) and its quantification (lower) of mouse hearts after WP1066 or vehicle i.p. injection daily for 3 days. n = 3 per group. *$P < 0.05$. Data are presented as mean ± SEM. WP1066, a STAT3 inhibitor.

A



B

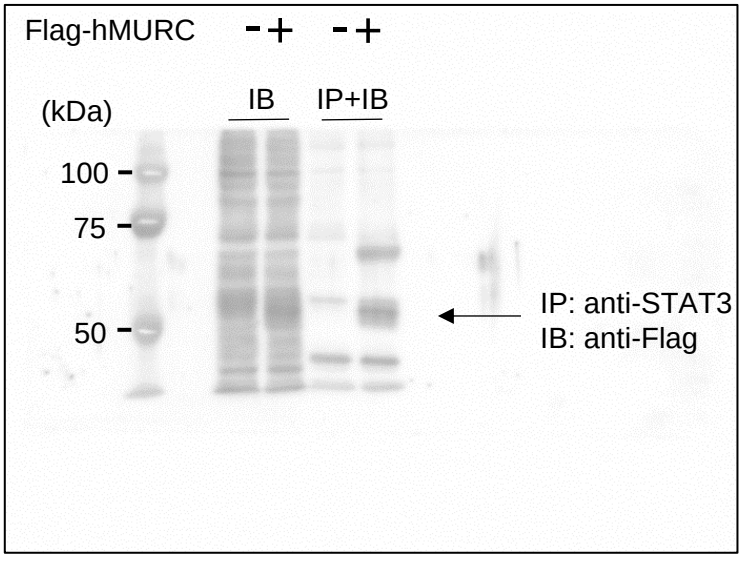


Figure S10. Immunoprecipitation of MURC and STAT3 in neonatal rat cardiomyocytes transduced with Lac Z or Flag-human (h) MURC. IP, immunoprecipitation; IB, immunoblotting.

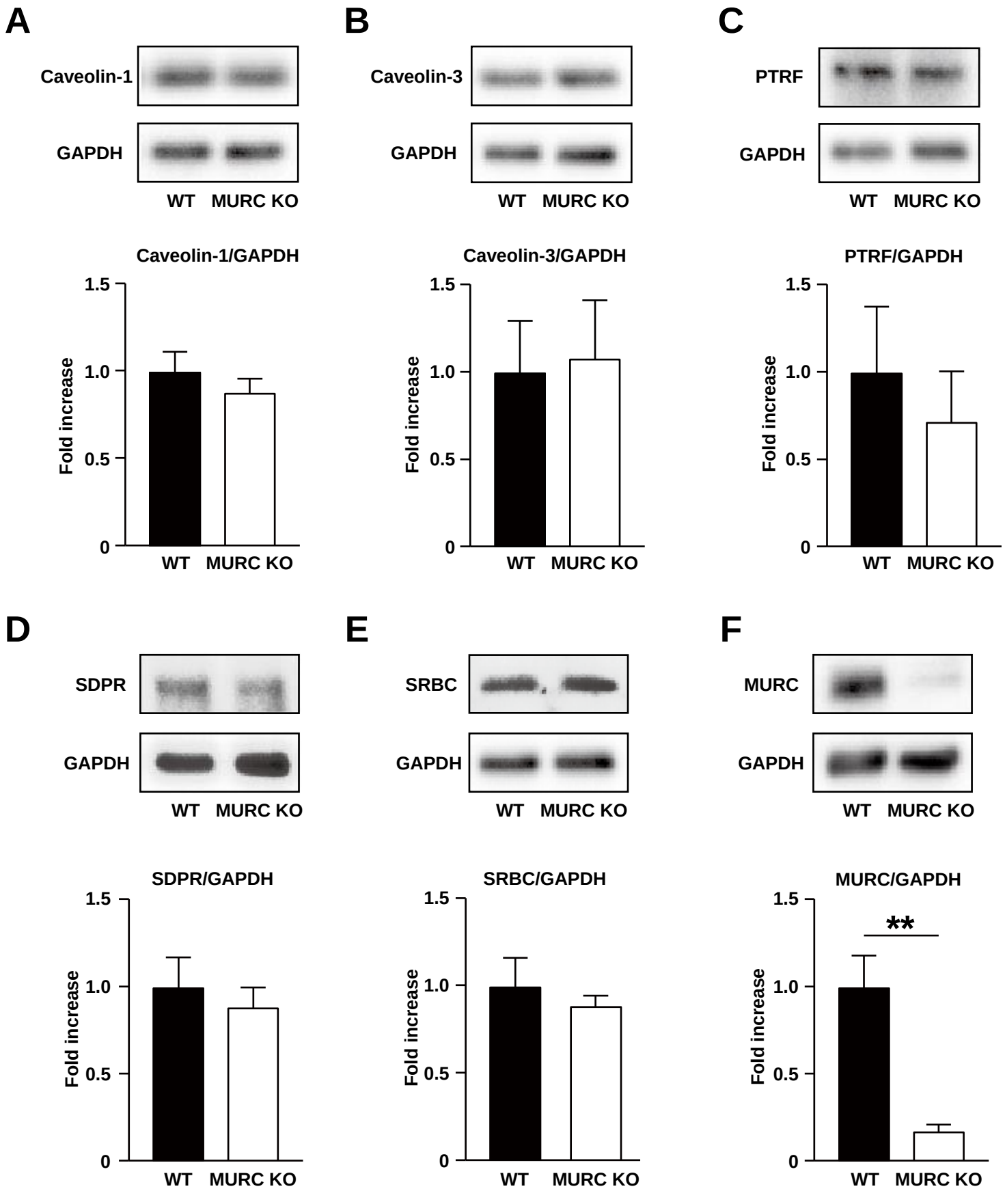


Figure S11. (A-F) Representative Western blots (upper panel) and its quantification (lower graph) of the caveola-related proteins in WT and MURC KO mouse hearts. n = 5 per group. Data are presented as mean ± SEM. ***P* < 0.01. PTRF, polymerase I and transcript release factor; SDPR, serum deprivation protein response; SRBC, SDR-related gene product that binds to C kinase.