

# DNAJC10 maintains survival and self-renewal of leukemia stem cells through PERK branch of the unfolded protein response

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## Supplementary Materials and Methods

### Reagents and Antibodies

PERK inhibitor GSK2606414 (PERKi) (CAS No. 1337531-36-8) were purchased from Selleckchem (Houston, TX, USA). Antibodies against PERK (#5683), p-PERK (#3179), eIF2 $\alpha$  (#5324), p-eIF2 $\alpha$  (#3398), ATF6 (#65880), and XBP-1s (#40435) were purchased from Cell Signaling Technology (Boston, MA, USA). Antibodies against DNAJC10 (#13101-1-AP), GRP78 (#11587-1-AP), GRP94 (#60012-2-Ig), GADD34 (#10449-1-AP), CHOP (#15204-1-AP), BAX (#50599-2-Ig), BCL-2 (#60178-1-AP), Caspase-3 (#66470-1-Ig) and Actin (#66009-1-Ig) were purchased from Proteintech (Chicago, IL, USA).

### Cell Culture

The AML cell lines NB4, MV4-11, THP-1, U937, Kasumi-1, HL-60 and the immortalized T lymphocyte cell line Jurkat were cultured in PMI-1640 medium supplemented with 10% FBS. HEK-293T cells were cultured in high glucose DMEM medium supplemented with 10% FBS. All cell lines were maintained in the humidified incubator containing 5% CO<sub>2</sub> at 37 °C.

### In Silico and Survival analysis.

The mRNA expression profile of DNAJC10 in 1556 human leukemia bone marrow samples were obtained from the GEO (Gene Expression Omnibus, GEO) data set accession number GSE13159. *DNAJC10* expression levels were calculated by averaging the values from probe sets that recognize all DNAJC10 isoforms (243635\_at, 225174\_at, 221782\_at, 221781\_s\_at, 229588\_at). For survival analyses, transcriptomic profiles of DNAJC10 and the clinical information in 200 primary AML patients were obtained from the cBio Cancer Genomics Portal (cBioPortal) in three independent datasets TCGA PanCancer Atlas, TCGA Firehose Legacy, and TCGA NEJM 2013 (<http://www.cbioportal.org/>). For univariate analysis of overall survival (OS), patients were divided into two groups based on *DNAJC10* expression level, Sex, Age, FAB classification, Cytogenetics Risk, white blood cell (WBC), PB Blast, and BM blast. For multivariate analysis of OS, potential risk factors including *DNAJC10* expression level, Age, FAB classification, and Cytogenetics Risk were conducted. Kaplan–Meier analysis was used to estimate OS and a log–rank test was used to compare survival differences and Hazard Ratio (HR) between the paired groups. The OS of AML patients relative to *DNAJC10* mRNA expression levels were further validated in GEPIA (Gene

Expression Profiling Interactive Analysis) (<http://gepia.cancer-pku.cn/index.html>) and BloodSpot (<https://servers.binf.ku.dk/bloodspot/>) online tool.

### **Plasmid, Virus Construction and Infection**

shRNAs targeting human *DNAJC10*, human *PERK*, mouse *Perk* or a Scrambled shRNA were cloned into PLL3.7 or pLV-H1-SX lentiviral vector. The doxycycline-inducible Cas9-expressing lentivirus pCW-Cas9 (#50661) and sgRNA-expressing lentivirus pSLQ1651 (#51024) was from Addgene. Plasmid pSLQ1651 was modified by replacing the puro-mcherry with GFP for sorting. Viral production and cell infection were performed as we previously described [1]. Briefly, retroviral constructs MSCV-MLL-AF9-IRES-YFP were mixed with PCL-ECO (2:1), and the lentivirus constructs pCW-Cas9, shRNA or sgRNA were mixed with pSPAX2 and pMD2.G (4:3:1), followed by transfection into HEK-293T cells using polyJet. The lentivirus or retrovirus-containing supernatant was collected at 48-72 hours post-transfection. For infection, Cells were maintained in lentivirus or retrovirus supernatant supplemented with 4 µg/ml polybrene and centrifuged at 1800 rpm for 120 min at 37 °C. After continued cultured in viral supernatant for 4 h, the virus supernatant was discarded and replaced with RPMI-1640 medium with 10% FBS. 24 hours later, the procedures were repeated for the secondary infection. The target sequences of the shRNAs were listed at Supplementary Table S2.

### **CRISPR–Cas9-based DNAJC10 knockout in AML cells**

DNAJC10-knockout (DNAJC10-KO) cell lines were performed as previously described [2], and the scheme was summarized as in online supplementary Figure S3I. Briefly, the cells were infected with Cas9-expressing lentivirus (pCW-Cas9, Addgene 50661), followed by treatment with 1 µg/ml puromycin. Surviving cells were further infected with the sgRNA lentivirus, followed by treatment with 1 µg/ml doxycycline for 7 days to induce expression of Cas9. GFP+ cells were seeded into a 96-well plate as a single cell per well. After cell expansion, knockout clones were verified by immunoblotting (IB). The sgRNA sequence were listed at Supplementary Table S2.

### **Flow cytometry**

For flow cytometry analyses of mouse AML cells, PB, BM, liver or spleen cells were stained with anti-Mac-1–APC (M1/70), anti-Gr-1–PE (RB6-8C5), anti-CD3–APC (17A2), anti-B220–PE (RA3-6B2), anti-c-Kit–PE/Cy7 (ACK2), anti-c-Kit–PE (2B8), anti-Ter-119-APC (Ter-119), anti-Gr-1-

APC (RB6-8C5), anti-CD3 $\epsilon$ -APC (145-2C11), anti-Gr-1-APC (RB6-8C5), anti-B220-APC (RA3-6B2), anti-Mac-1-PerCP/Cyanine5.5 (M1/70), anti-Sca-1-PE/Cyanine7 (E13-161.7), anti-Sca-1-APC (D7), anti-IL-7R $\alpha$ -APC (SB/199), anti-CD34-BV421 (SA376A4), and anti-CD16/32-APC/Cy7 (93) monoclonal antibodies (Biolegend). For analysis of human haematopoietic engraftment in NSG mice, we used anti-human CD45-PE (#555483, BD) to quantify the total human AML engraftment. For analysis of cell apoptosis, GFP+ AML cells were stained with PE-conjugated anti-Annexin V and 7-AAD (BD Pharmingen), according to the manufacturer's instructions. The data were analyzed using FlowJo software.

### **Human AML mouse xenograft model**

The animal studies were performed according to the guidelines and approval of the Ethical Committee of Binzhou Medical University (Approval No.:2020-087). 6-8-week-old NSG mice (NOD-*Prkdc*<sup>scid</sup>*Il2rg*<sup>em1</sup>/Smoc) were purchased from Shanghai Model Organisms, maintained in the standard pathogen-free animal house. For AML xenograft establishment, DNAJC10-WT or KO THP-1 cells were suspended in PBS containing 1% FBS at a final dose of  $1 \times 10^6$  /200  $\mu$ l. Each mouse was injected with 200  $\mu$ L of the cell suspension via tail vein. To determine the development of the xenografted mice, we analyzed the numbers and frequency of hCD45+ cells in PB, BM, liver and spleen, and examined the size of spleen at 28 days post-injection. In another case, overall survival (OS) of the xenografted mice was calculated by Kaplan-Meier.

### **Establishment and analysis of the murine MLL-AF9 model**

*Dnajc10* knockout mouse (C57BL/6-*Dnajc10*tm1cyagen) were obtained from Cyagen Biosciences. A transplantable MLLAF9-inducible murine AML model was established as previously described [2, 3]. Briefly, Lin- cells were isolated from the bone marrow of WT or *Dnajc10*-KO mice, and infected with MSCV-MLL-AF9-IRES-YFP expressing retrovirus. Infected cells ( $2-3 \times 10^5$ ) were transplanted into lethally irradiated (10 Gy) C57BL/6 recipient mice by retro-orbital injection to establish leukaemic mice. For serial transplantation, 3000 or 5000 purified YFP+ BM leukemia cells or 2000 BM YFP+Mac-1+c-Kit+ cells or 1000 L-GMP (Lin- IL7R- Sca-1- c-Kit+ CD34+ CD16/32+) cells from primary recipient mice together with  $3 \times 10^5$  normal BM cells were transplanted into lethally irradiated recipients. To determine the development of the established MLL-AF9 leukaemic mice, we monitored the survival, analyzed the numbers and infiltration of

leukaemia cells in PB, BM and spleen, and examined the size and histological properties of spleen and liver. We further determined the different populations of leukaemia cells using flow cytometry. For the limiting dilution analysis (LDA), the indicated numbers of YFP+ WT or *Dnajc10*-KO MLL-AF9+ BM cells that were collected from secondary recipients were co-transplanted with  $3 \times 10^5$  competitor cells into lethally irradiated recipient mice. The survival times were recorded and the frequencies of LSCs were calculated according to Poisson statistics using ELDA software. For PERKi treatment, at day 7 after transplantation recipient mice were treated with 150 mg/kg of PERKi once daily by oral gavage for 14 days [4, 5].

### **GO and KEGG enrichment of DNAJC10 co-expression Genes**

*DNAJC10* co-expression genes were analyzed in 3 independent datasets (TCGA PanCancer Atlas, TCGA Firehose Legacy, and TCGA NEJM 2013) in cBioPortal. The *DNAJC10* co-expression genes were analyzed by Spearman's correlation, using adjust Q value  $< 0.001$  and  $|R| \geq 0.3$  as cut-off criteria. A total of 958 overlapping *DNAJC10* co-expression genes were used for further Gene ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) enrichment analysis. GO enrichment analysis including cellular component (CC), biological process (BP), and molecular function (MF) was performed by the Gene Ontology Resource online (<http://geneontology.org/>). The KEGG pathway enrichment analysis was conducted by the KEGG Orthology Based Annotation System (KOBAS). (<http://kobas.cbi.pku.edu.cn/kobas3>). The 958 overlapping *DNAJC10* co-expression genes were listed in supplementary Table S3.

### **Quantitative Real-Time PCR (qRT-PCR)**

The mRNA expression of *DNAJC10* was determined by qRT-PCR as previously described [1]. Briefly, the total RNAs were obtained from sorted AML cells by using Trizol Reagent. cDNAs were synthesized with random hexamers from mRNA, using the AMV reverse transcription kit. *DNAJC10* and reference GAPDH were amplified by using the Power SYBR Green PCR master amplification mix. Quantitative PCR reactions were conducted in triplicate on the iQ5™ for 35 cycles. Relative expression of *DNAJC10* was calculated by using the  $-\Delta\Delta C_t$  method. The primer sequence was listed at Supplementary Table S2.

### **Immunoblotting (IB)**

AML sorted cells were lysed with RIPA lysate buffer containing 1 mmol/L PMSF and 0.1 g/L leupeptin. Protein samples were quantified with BCA. For the IB, 30 µg of total protein was electrophoresed on 8%–10% SDS polyacrylamide gels and transferred onto PVDF membranes. The membrane then was blocked with 5% nonfat milk and incubated with indicated primary antibodies and appropriate HRP-conjugated secondary antibody. Detection was performed with ECL chemiluminescent agent.

### **Colony-forming unit assays**

For in vitro CFU assay, 500 YFP+Mac-1+c-Kit+ LSCs enriched fractions from the BM of secondary MLL-AF9 recipient mice were plated in methylcellulose-based medium (M3534, Stem Cell Technologies) according to the manufacturer's protocol. 1000 cells collected from three dishes of the primary plating were seeded for the secondary plating. The numbers of colonies and total cell numbers were counted at 10 days post transplantation.

### **Statistics**

Data are represented as mean ± S.D. Unpaired 2-tailed Student's t test was used to assess two independent groups. In some cases, 2-way ANOVA followed by Bonferroni's post-test was conducted to assess the statistical significance of differences between multiple comparisons. The associations between DNAJC10 mRNA expression and clinicopathologic parameters were analyzed with a chi-square test. Overall survival curves were determined by the Kaplan–Meier technique and contrasted via log-rank test. Statistical significance was set at  $p < 0.05$ . Data were analyzed using GraphPad and SPSS 24.0 software. All the experiments were repeated at least two or three times with similar results.

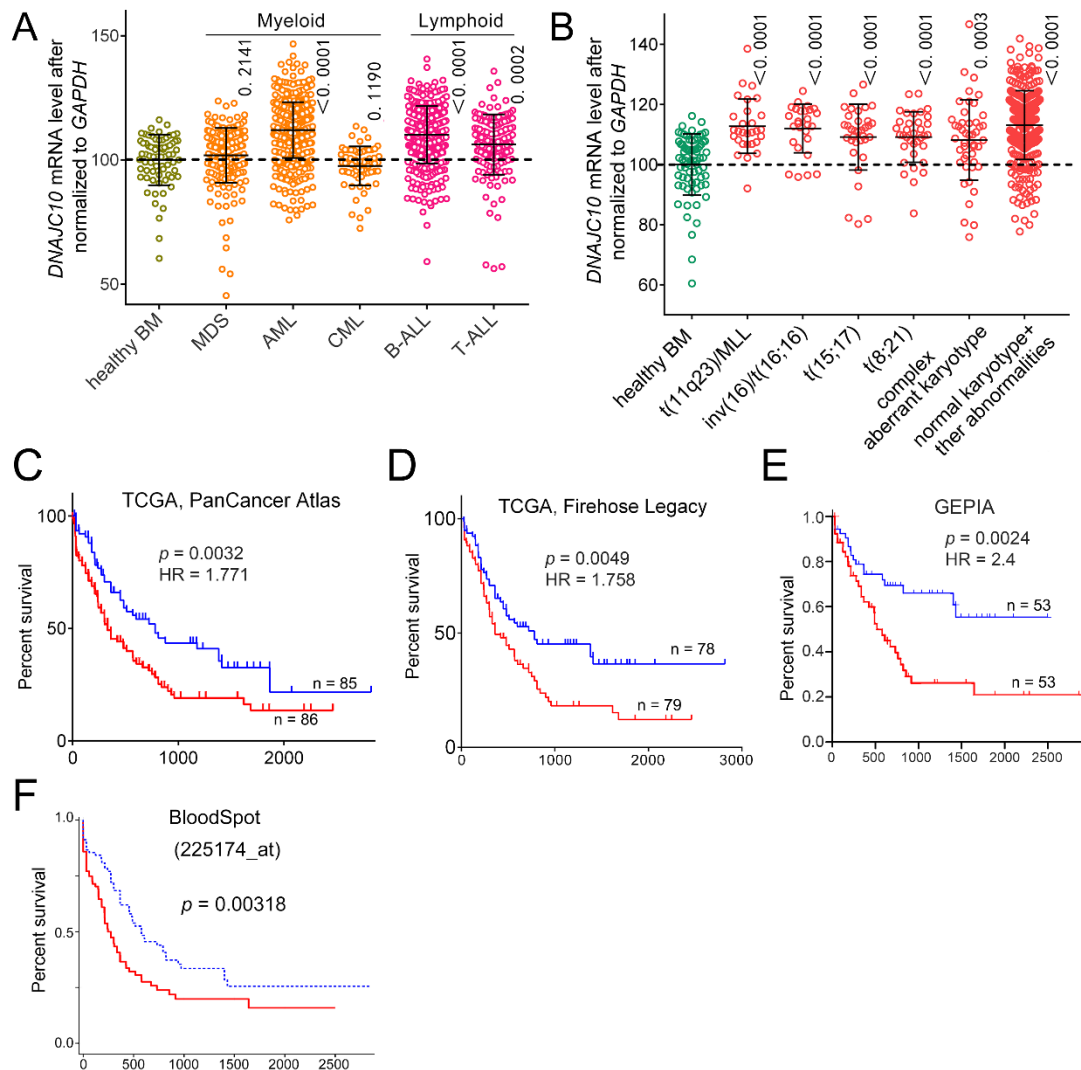
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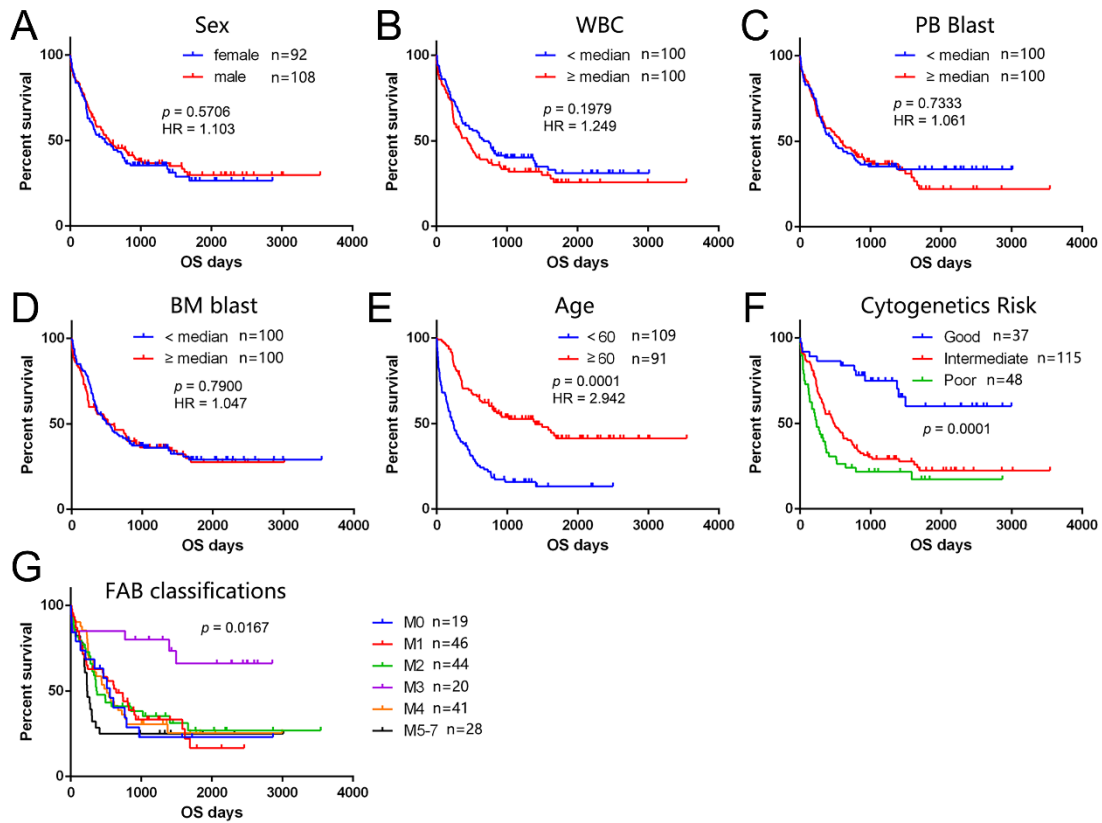
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## Supplementary Figures

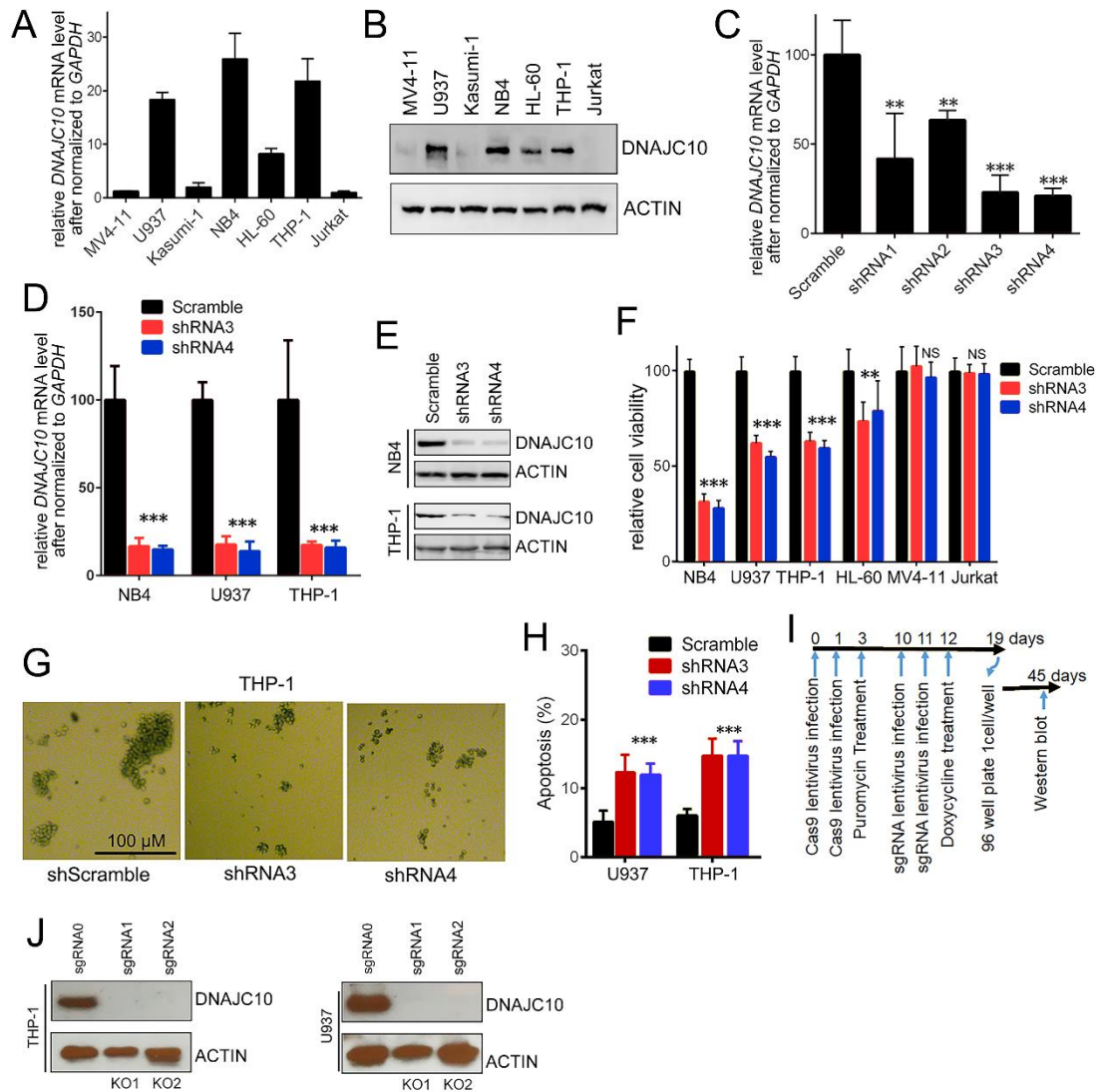


**Figure S1. DNAJC10 is up-regulated and negatively correlates with the overall survival in AML patients.** (A) The *DNAJC10* mRNA levels in the indicated types of human myeloid or lymphoid leukemia patients relative to healthy BM samples (GEO data set GSE13159). (B) The *DNAJC10* mRNA levels in the indicated types of AML patients relative to normal BM (GEO data set GSE13159). (C-F) Kaplan-Meier analysis of the overall survival (OS) of AML patients relative to *DNAJC10* mRNA expression levels above or below the 50th percentile. (Log-rank test; HR, Hazard Ratio).

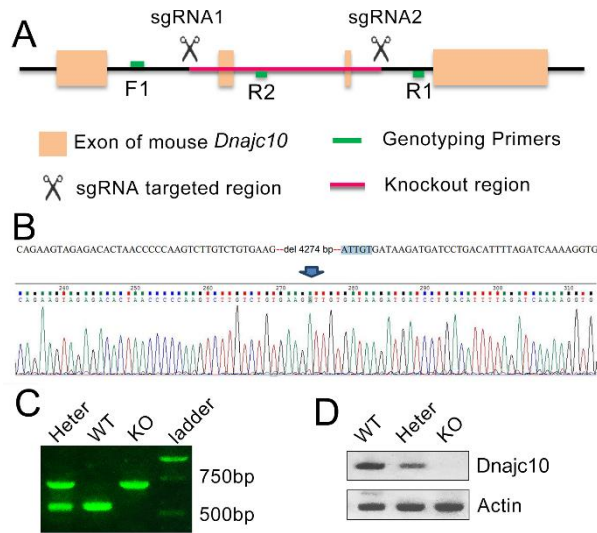


**Figure S2. Univariate and multivariate Cox regression analysis of overall survival in AML patients.** (A-G) Kaplan–Meier analysis of overall survival in AML patients relative to Sex (A), WBC (B), PB blast (C), BM blast (D), Age (E), Cytogenetics risk (F) and FAB classifications (G). Data were obtained from the TCGA NEJM 2013.

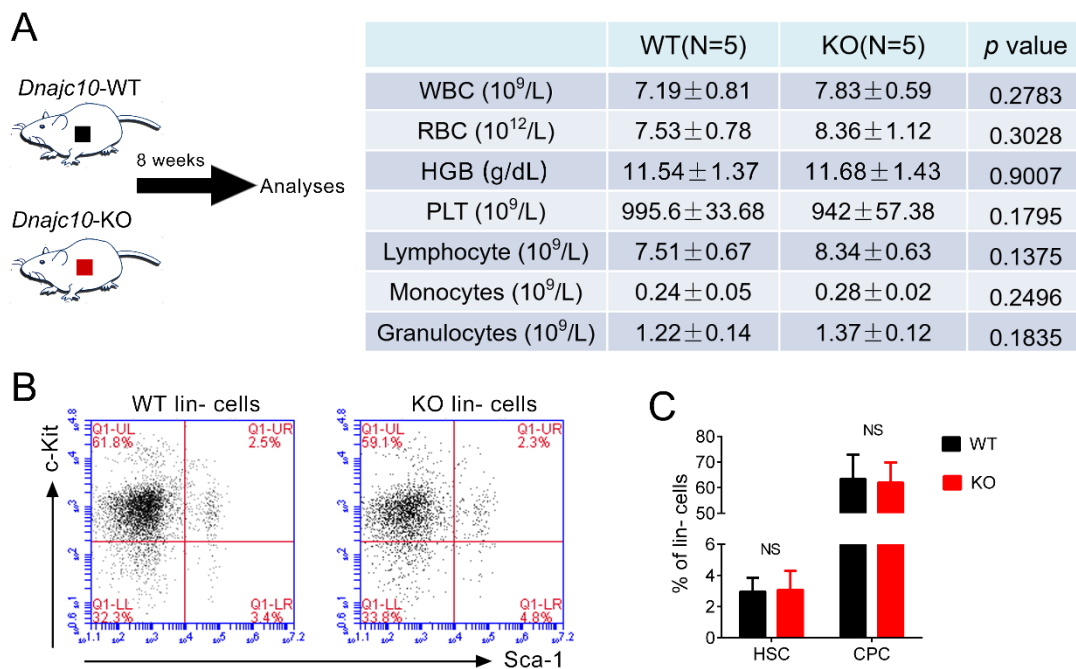




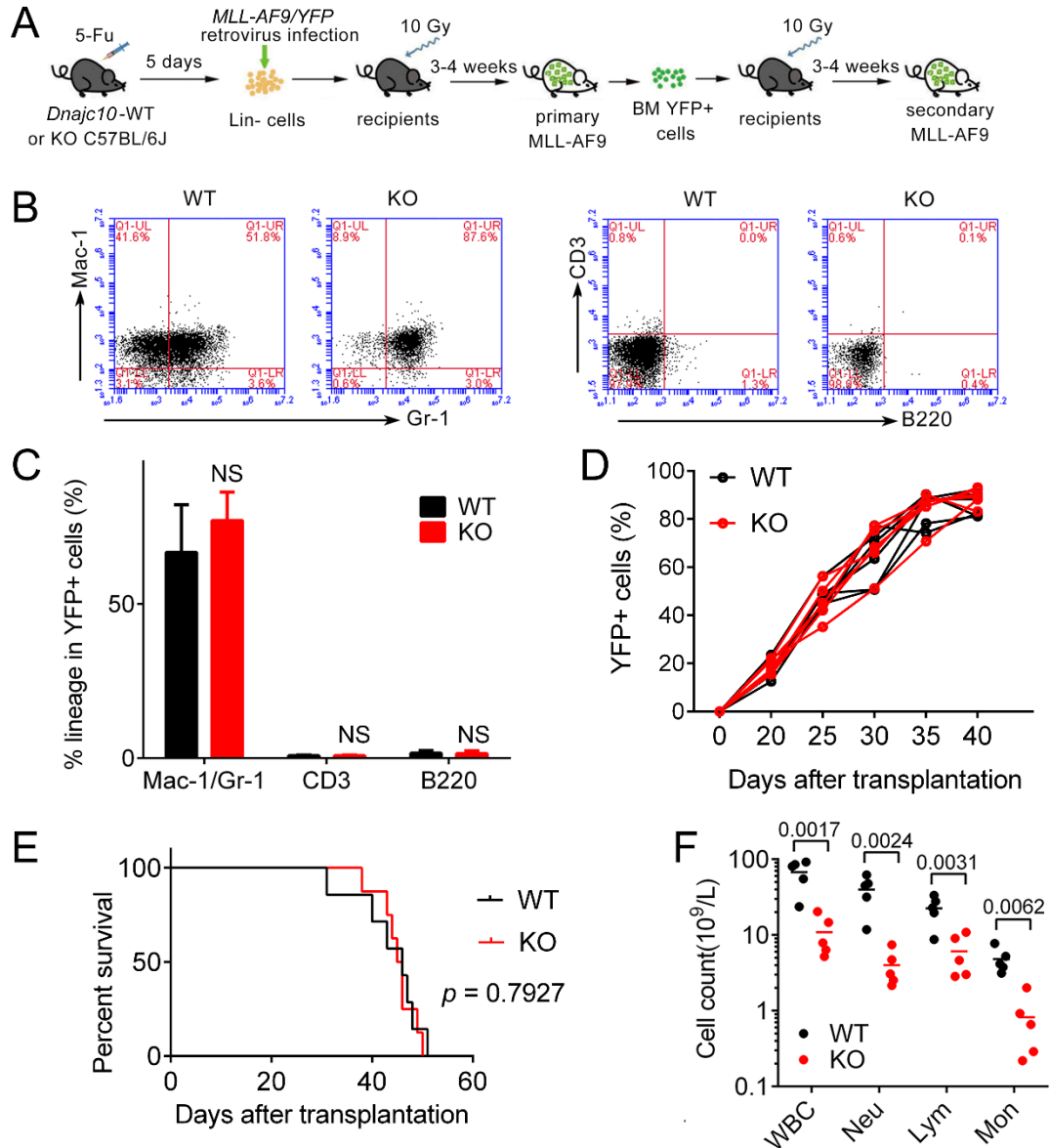
**Figure S3. Knockdown of *DNAJC10* inhibits growth of AML cells.** (A-B), RT-PCR or IB showing the mRNA/protein expression of *DNAJC10* in indicated cell lines. (C) HEK-293T cells were transfected with the indicated shRNA for 24 hours followed by RT-PCR analysis of *DNAJC10* transcription. N=4, \*\*,  $p < 0.005$ , \*\*\*,  $p < 0.001$ , compared to Scramble. (D) Cells were infected by the indicated shRNA lentivirus. mRNA expression of *DNAJC10* in the GFP+ sorted cells was analyzed by RT-PCR. N=4, \*\*,  $p < 0.005$ , \*\*\*,  $p < 0.001$ , compared to Scramble group. (E) Cells were infected with Scramble or *DNAJC10* shRNA. Expression of *DNAJC10* in the GFP+ sorted cells was determined by IB. (F) Viability of Scramble or *DNAJC10* shRNAs infected cells was determined by CCK-8 assay. Data were normalized to the Scramble cells of each group. N = 4, mean  $\pm$  SD, \*\*,  $p < 0.005$ , \*\*\*,  $p < 0.001$ , NS, no significant, compared to each Scramble group. (G) Representative images of THP-1 cells 4 days after infection with the indicated shRNAs. (H) Apoptosis was determined in U937 or THP-1 cells infected with indicated shRNAs. Shown are data summary (N = 4, \*\*\*,  $p < 0.0001$ , compared to each Scramble group). (I) Scheme of CRISPR/Cas9-based *DNAJC10* knockout in AML cells. (J), IB showing levels of *DNAJC10* in sgRNA0 (negative control) and sgRNA1/2 infected mono-clones, suggested *DNAJC10*-KO cell lines were constructed.



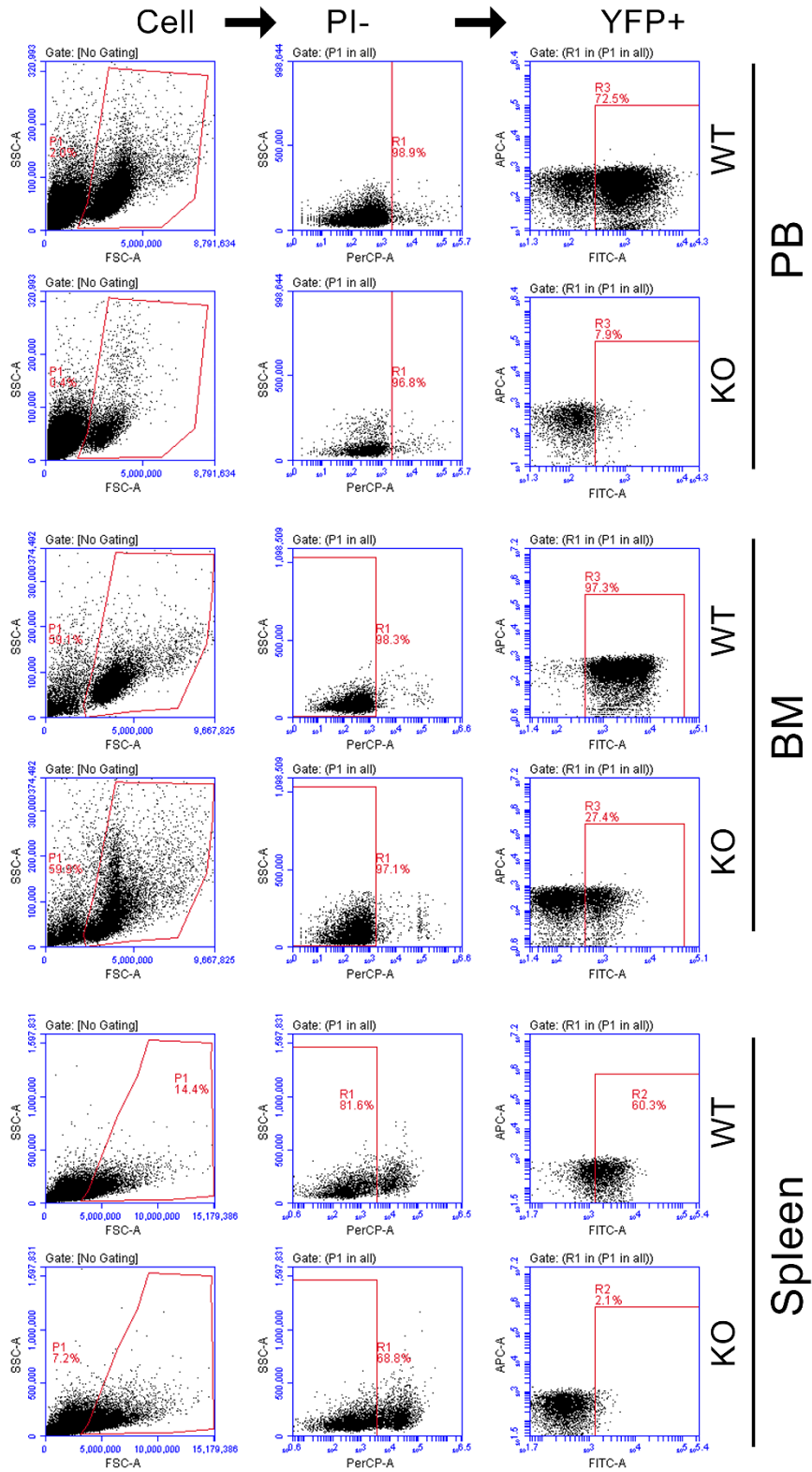
**Figure S4. *Dnajc10* knockout mouse.** (A) Scheme of the design of generation of *Dnajc10* knockout mice using the CRISPR-Cas9 technology. (B) Sequencing results suggested that 4274 bp were deleted in mouse *Dnajc10* in the designed region. Sequence primer: 5'-AACCCGGTAGGCAAACCTTTCTC-3'. (C) Representative DNA genotyping data of the samples from *Dnajc10* wild-type (WT), heterozygous (Heter) or knockout (KO) mice were shown. (D) Representative IB data of the samples from *Dnajc10*-WT, -Heterozygotes (Heter) or -KO mice were shown.



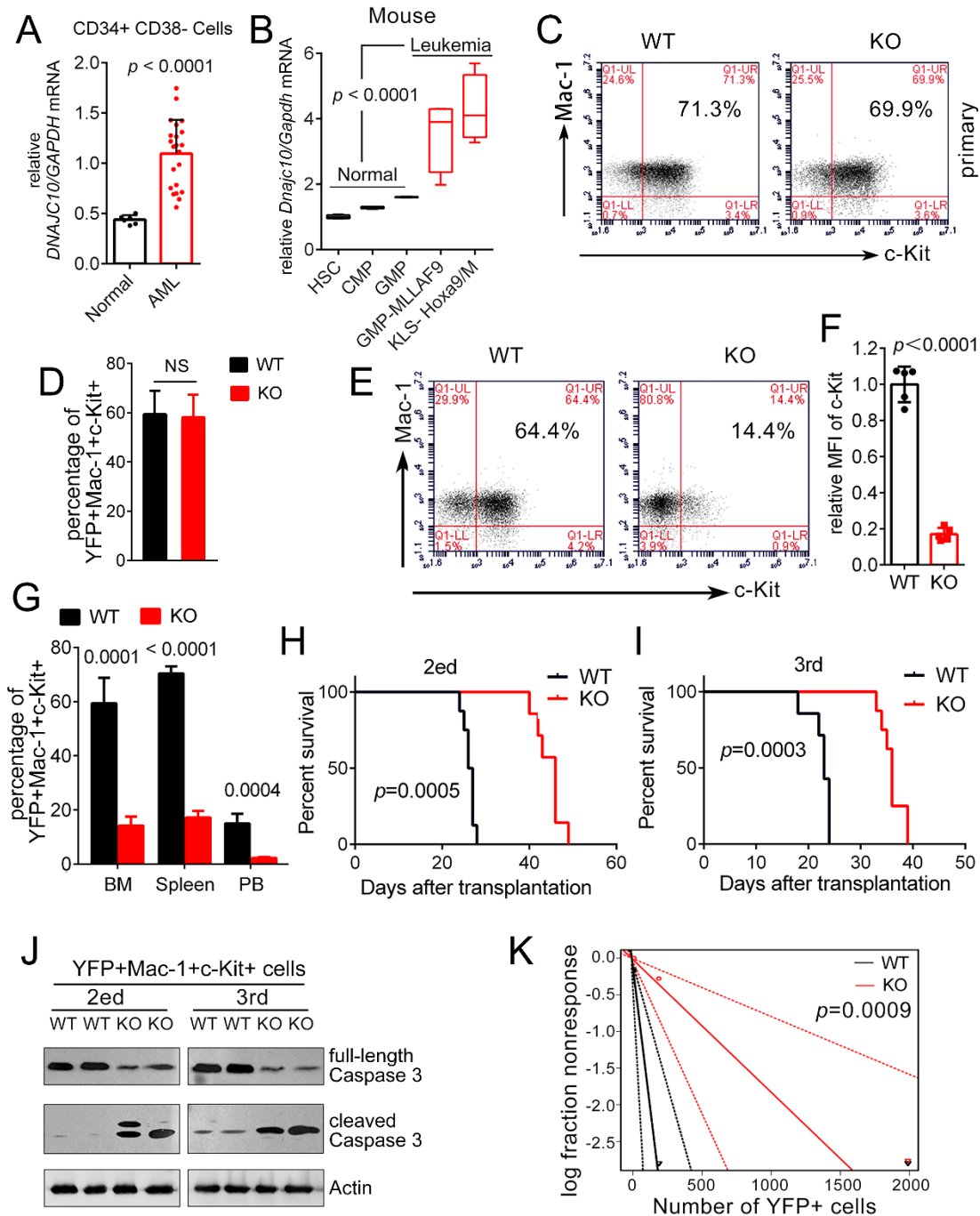
**Figure S5. DNAJC10 is not required for normal hematopoiesis function.** (A) Regularly bred 8 weeks DNAJC10-WT or KO mice were included for the analysis. (B-C) BM analysis of 6 pairs of the same sex/age littermates were shown. Cell types were identified by flow cytometry according to the expression of surface molecules: HSC (Lin<sup>-</sup> c-Kit<sup>+</sup> Sca-1<sup>+</sup>) and committed progenitor cells, CPC (Lin<sup>-</sup> c-Kit<sup>+</sup> Sca-1<sup>-</sup>).



**Figure S6. Establishment of MLL-AF9-induced AML mouse model.** (A) Schematic diagram for generation of MA9-induced *Dnajc10*-WT and *Dnajc10*-KO AML murine models. (B) Representative flow cytometric plots of lineage analysis with myeloid cell markers (Mac-1/Gr-1) and lymphoid cell markers (CD3/B220) in *Dnajc10*-WT and KO leukemia cells. (C) Quantification of the frequencies of lineage cells in panel B. (D) Flow cytometric detection of YFP<sup>+</sup> leukemic cells in PB of mice receiving WT or *Dnajc10* cells infected with MLL-AF9 retrovirus upon the primary transplantation. (E) Survival percent for mice receiving WT or *Dnajc10* KO GMP cells infected with MLL-AF9 retrovirus upon the primary transplantation. (F) WBC counts at 30 days post-transplantation in secondary recipient mice.



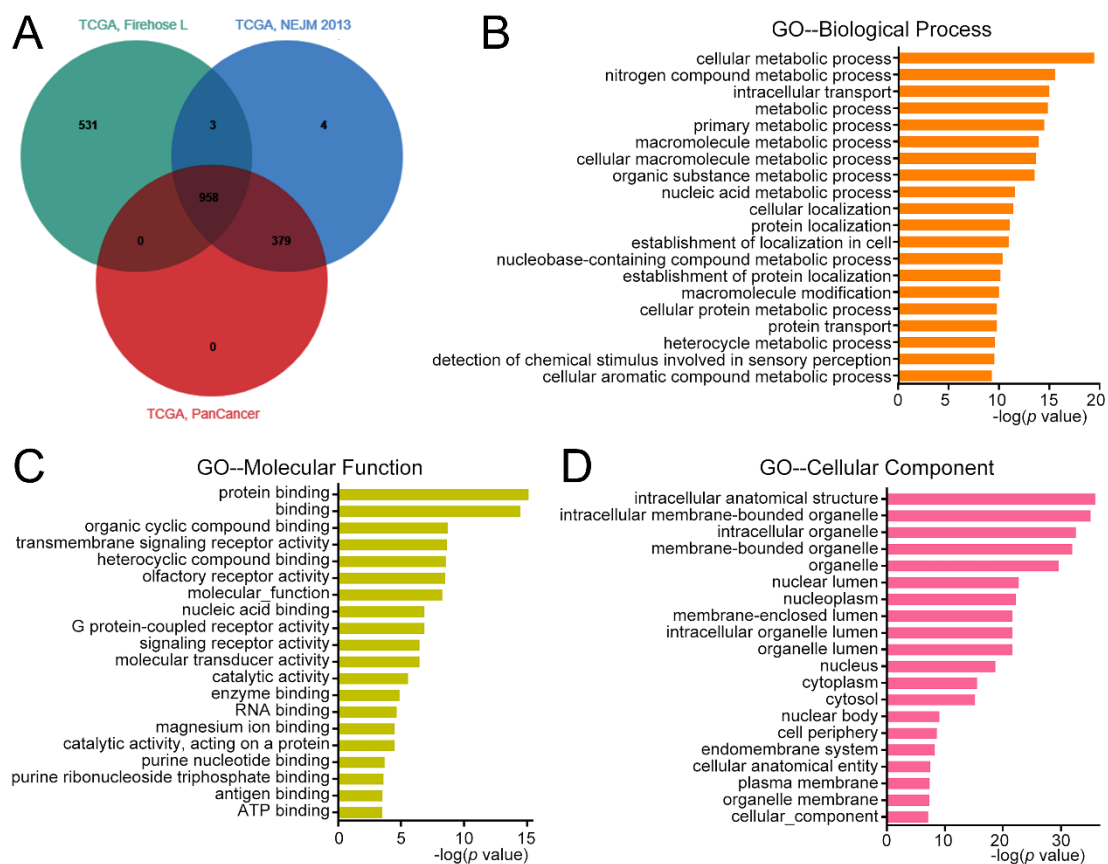
**Figure S7. DNAJC10 deficiency inhibits development of MLL-AF9-induced leukemia.** Representative flow cytometry plots showing that DNAJC10-KO transplanted mice have decreased YFP+ cells at 30 days after transplantation in PB, BM and spleen.



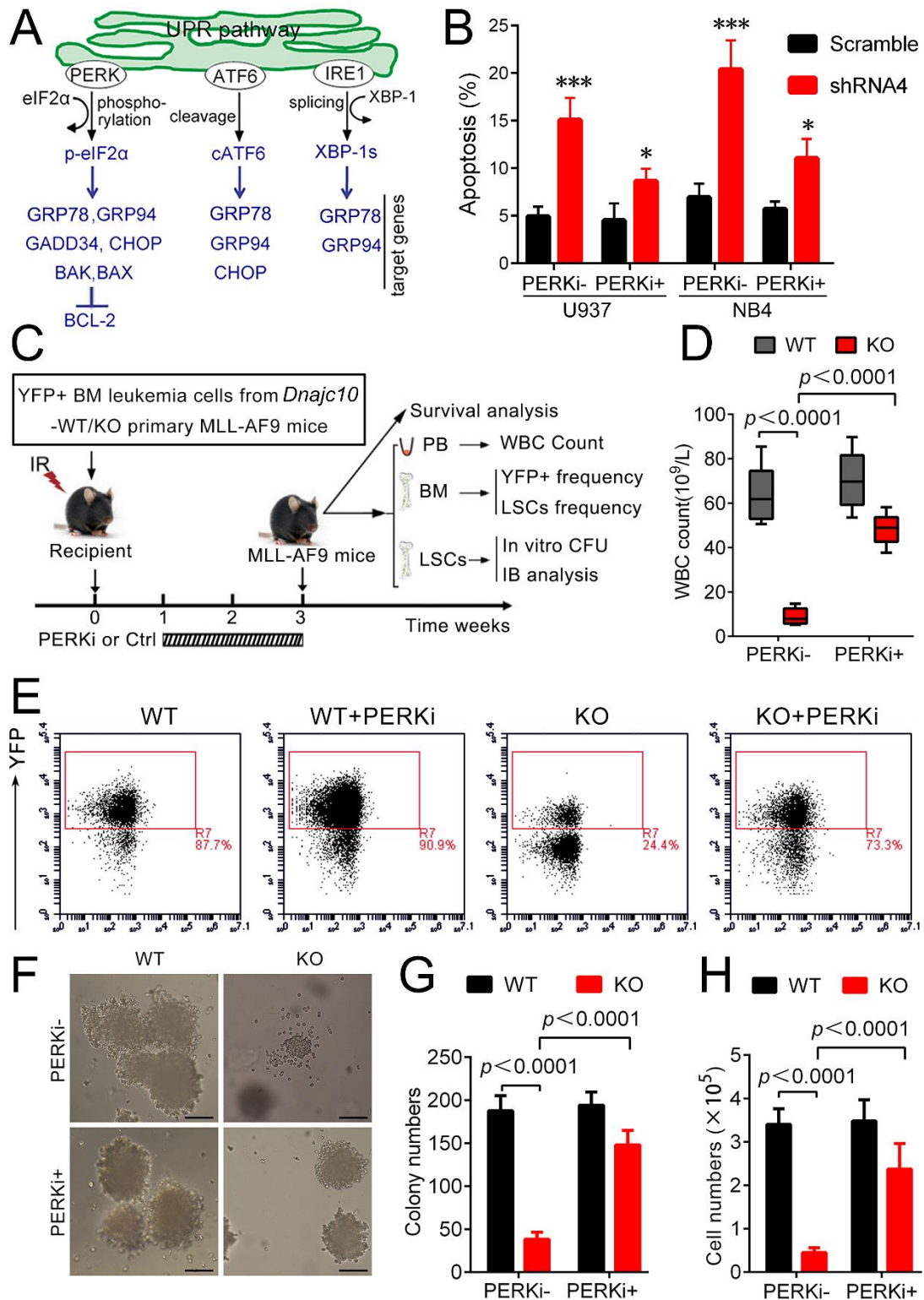
**Figure S8. DNAJC10 regulates the frequency of LSCs in MLL-AF9 induced leukemia.** (A) The relative transcription of *DNAJC10* in HSCs and LSCs enriched CD34+CD38<sup>-</sup> cells (GSE30377). (B) The relative transcription of *Dnajc10* in normal HSC, CMP and GMP, compared to that in L-GMP (Lin<sup>-</sup> IL7R<sup>-</sup> Sca1<sup>-</sup> c-Kit<sup>+</sup> CD34<sup>+</sup> CD16/32<sup>+</sup>) derived from MLL-AF9 or *Hoxa9/Meis1a* transduced mouse (GSE20377). (C) Representative flow cytometry plots of YFP+Mac-1+c-Kit<sup>+</sup> cells in primary MLL-AF9 mice. (D) Summary of the YFP+Mac-1+c-Kit<sup>+</sup> cells percentage. (E) Representative flow cytometric analysis for WT and *Dnajc10*-KO YFP+Mac-1+c-Kit<sup>+</sup> cells of the recipients upon the secondary transplantation. (F) Quantification of the relative mean fluorescence intensities (MFIs) of c-Kit in panel e. n = 5 mice for each group. (G) Summary of percentages of



YFP+Mac-1+c-Kit+ cells in BM, spleen and PB of secondary MLL-AF9 recipient mice. The experiment (E-G) was repeated 4 times with similar results. (H, I) Survival percent for mice receiving WT or *Dnajc10* KO YFP+Mac-1+ c-Kit+ cells upon the second (2ed) and third (3rd) transplantation. The experiment was repeated 3 times with similar results. (J) Immunoblot (IB) showing the activation of Caspase 3 in LSCs enriched YFP+Mac-1+c-Kit+ cells from second and third recipients. The experiment was repeated 3 times with similar results. (K) Limiting dilution assays estimating the frequency of LSCs in WT and *Dnajc10*-KO MLL-AF9 leukemia cells. Logarithmic plot showed the percentage of nonresponding recipients transplanted with indicated cell doses of YFP+ BM cells.

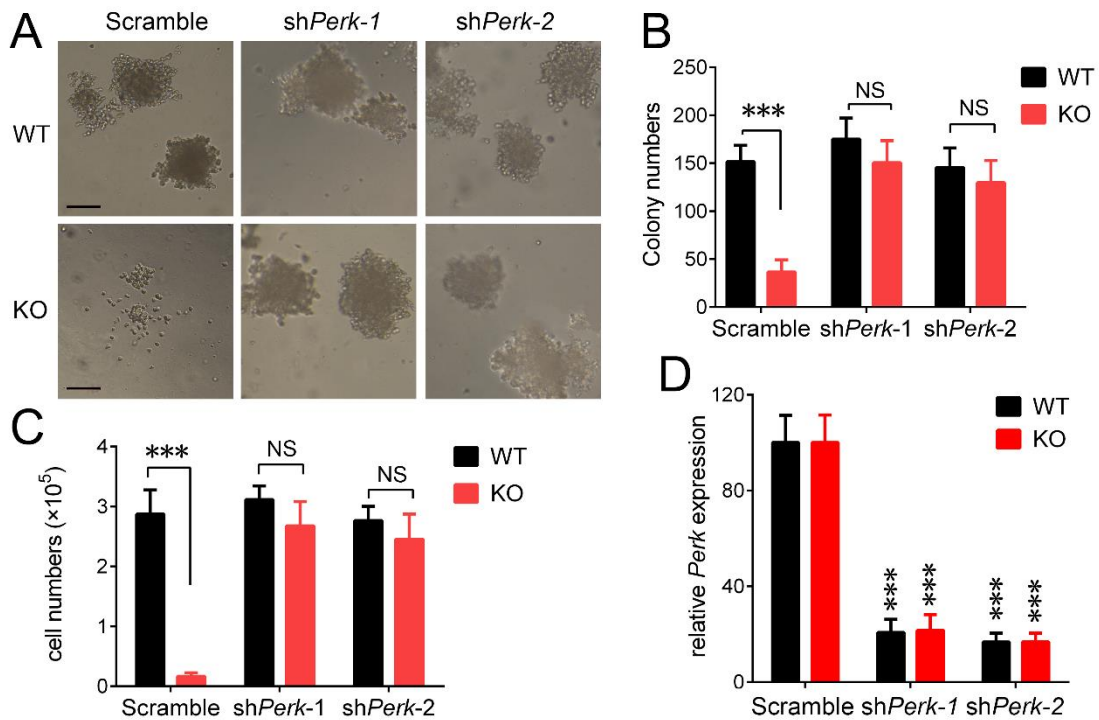


**Figure S9. Gene Ontology (GO) enrichment analysis for the *DNAJC10* co-expression genes.** (A) *DNAJC10* co-expression genes were analyzed in 3 independent datasets in cBioPortal, by using adjust p value < 0.0001 and  $|R| \geq 0.3$  as the cut-off criteria. 958 overlapping *DNAJC10*-co-expression genes were shown. (B-D) 958 overlapping *DNAJC10*-co-expression genes were used for further GO enrichment analysis. The top 20 most enriched GO biological process (b), GO molecular function (c), GO cellular component (d), categories are plotted.



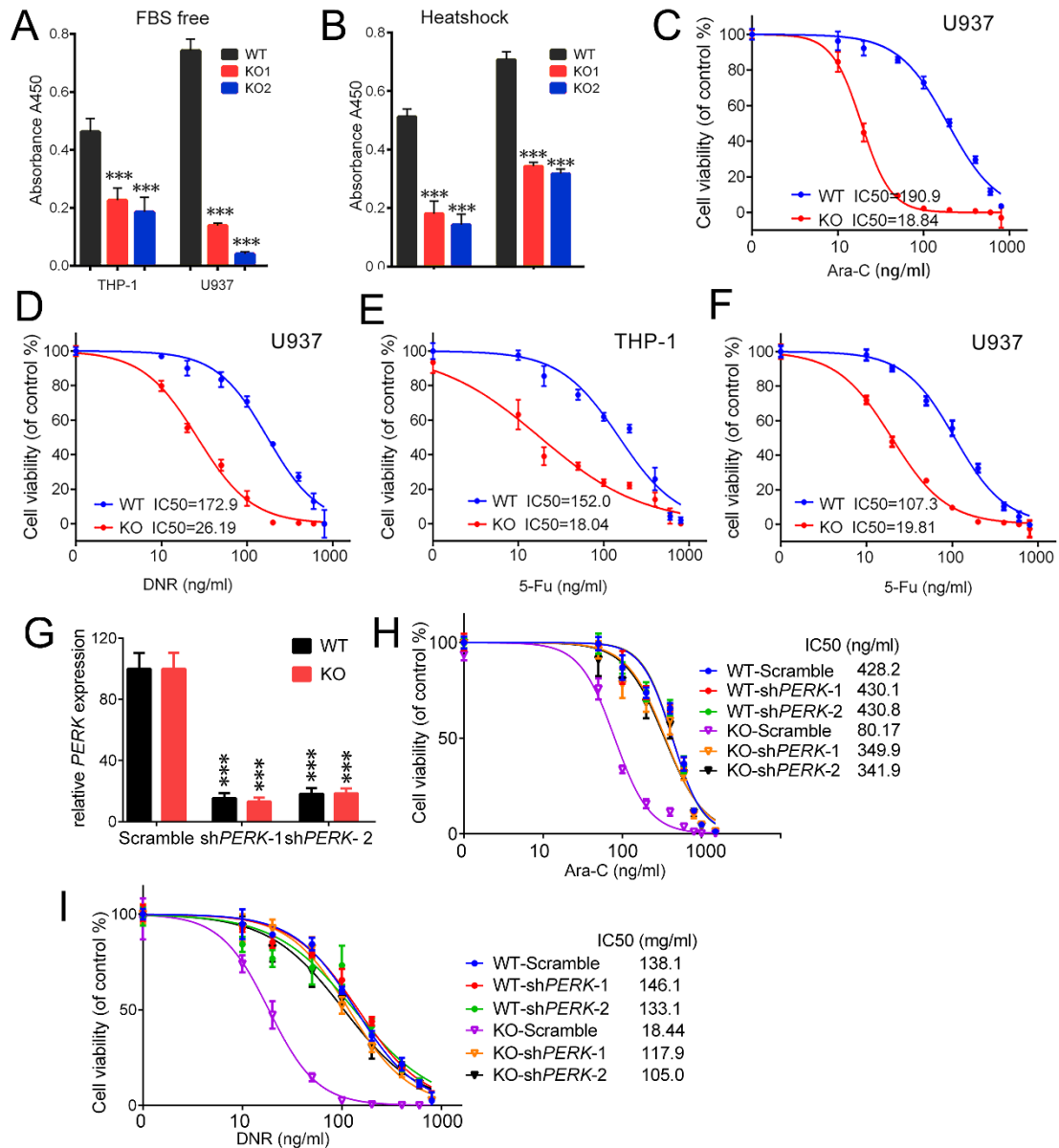
**Figure S10. PERKi treatment can partially rescue phenotypes of DNAJC10 deletion in MLL-AF9 mice.** (A) Schematic overview of the unfolded protein response pathways mediated through PERK, ATF6, and IRE1. XBP-1s, spliced XBP-1; cATF6, cleaved ATF6. (B) Scramble or *DNAJC10* shRNA infected cells were treated with or without 1 nM PERKi. Apoptosis was determined by flow cytometry at 48 hours post PERKi treatment. N = 4, \*\*\*,  $p < 0.0001$ , compared to the other 3 groups.

\*,  $p < 0.05$ , compared to Scramble, PERKi- and Scramble, PERKi+ groups. (C) Schema of strategy to evaluate the effect of PERK cascade on *Dnajc10*-KO MLL-AF9 mice (rescue experiments). (D) PB WBC counts at 22 days post-transplantation in secondary recipient mice of rescue experiments. (E) Representative flow cytometry plots of YFP+ cells in the BM in rescue experiments. Related to Figure 6B. (F) Representative images of colony formation of WT and *Dnajc10*-KO YFP+Mac-1+c-Kit+ cells of the second plating in the rescue experiments. Scale bars, 10 $\mu$ M. (G, H) Summary of colony numbers and total cell numbers in panel e.



**Figure S11. Knockdown of PERK by shRNA partially rescues phenotypes induced by *DNAJC10* knockout.** (A) Scramble or *Perk* shRNA lentivirus was introduced in *Dnajc10*-WT or KO YFP+Mac-1+c-Kit+ leukemia cells, which were then plated in M3534 medium for colony formation. Representative images of colony formation of the second plating were shown. (B, C) Summary of colony numbers and total cell numbers in panel a. ( $n = 5-6$ ; \*\*\* $P < 0.0001$ ; NS, no significant). (D) *Perk* expression were validated in colonies from the rescue experiment in panel a.





**Figure S12. DNAJC10-deficiency sensitizes AML cells to Ara-C, DNR, and 5-Fu.** (A) *DNAJC10*-WT or KO AML cells were cultured in FBS free medium for 96 hours, the cell viability was determined by CCK-8 assay. (B) *DNAJC10*-WT or KO AML cells were heat shock at 40°C for 1 hour, at 96 hours post-heat shock cell viability was determined by CCK-8 assay. (C-F) *DNAJC10*-WT or KO AML cells were treated with different concentrations of Ara-C, DNR or 5-Fu for 96 hours, then cell viability was quantified by CCK-8 assay. IC50 was calculated using nonlinear regression method. (G) Scramble or *PERK* shRNA lentivirus was introduced in *DNAJC10*-WT or KO THP-1 cells. Expression of *PERK* in the indicated cells was detected by qRT-PCR. (H, I) the indicated cells were treated with different concentrations of Ara-C or DNR for 96 hours, then cell viability was quantified by CCK-8 assay. IC50 was calculated using nonlinear regression method.

**Sup. Table S1. Repeated results for Figure 4.**

Panel	Experiment	Repeat	Results (Mean ± SD or 95% CI)		p value
			WT	KO	
Figure 4A	L-GMP frequency	Repeat 1	8.83 ± 0.682%	2.02 ± 0.610%	0.0002
		Repeat 2*	7.17 ± 0.794%	1.56 ± 0.421%	0.0003
		Repeat 3	5.41 ± 0.752%	1.64 ± 0.514%	0.0016
Figure 4C	CFU numbers for 1st plating	Repeat 1*	197.8 ± 10.35	51.25 ± 7.44	< 0.0001
		Repeat 2	155.2 ± 12.38	48.43 ± 8.40	< 0.0001
		Repeat 3	217.6 ± 18.07	97.39 ± 11.74	0.0001
Figure 4D	CFU numbers for 2ed plating	Repeat 1*	493.5 ± 14.17	223.3 ± 11.21	< 0.0001
		Repeat 2	488.6 ± 17.63	276.4 ± 14.03	0.0002
		Repeat 3	513.2 ± 20.33	307.6 ± 20.75	0.0006
Figure 4E	Apoptosis of YFP+Mac-1+ c-Kit+ BM cells	Repeat 1	7.133 ± 1.1855%	18.6 ± 1.5432%	0.0002
		Repeat 2*	5.200 ± 0.4438%	19.04 ± 1.299%	< 0.0001
		Repeat 3	4.810 ± 0.6437%	22.10 ± 2.376%	< 0.0001
		Repeat 4	9.213 ± 2.3220%	16.53 ± 1.061%	0.0003
Figure 4F	LSC frequency (LDA)	Repeat 1*	1/67 (1/30-1/150)	1/554 (1/242-1/1269)	0.0009
		Repeat 2	1/65 (1/27-1/155)	1/675 (1/289-1/1576)	0.0006
		Repeat 3	1/58 (1/24-1/141)	1/629 (1/260-1/1523)	0.0005

\*, the data was shown in Figure 4.

**Sup. Table S2. Primer Sequence**

Gene name	Primer/Target Sequence
<b>Primer for qRT-PCR</b>	<b>Primer Sequence</b>
human <i>DNAJC10</i> -F	GCTTAGTGGCATGTTGTTTCTCA
human <i>DNAJC10</i> -R	ACCGATGATGAGCCAAACGA
human <i>PERK</i> -F	TGGATGATGTGGTCAAGGTTGGAG
human <i>PERK</i> -R	GTGTCTGGCATAAGCTGGCATTG

human <i>GAPDH</i> -F	AAC TTTGGCATTGTGGAAGGA
human <i>GAPDH</i> -R	AACATC ATCCCTGCTTCCAC
mouse <i>Perk</i> -F	TGGACGAATCGCTGCACTGG
mouse <i>Perk</i> -R	CTCTGGCTTGCTGAGGCTAGATG
mouse <i>Gapdh</i> -F	AGAAGGTGGTGAAGCAGGCATC
mouse <i>Gapdh</i> -R	CGAAGGTGGAAGAGTGGGAGTTG
<b>primer for genotyping</b>	<b>Primer Sequence</b>
mouse <i>Dnajc10</i> -F1	AACCCGGTAGGCAAAC TTTCTC
mouse <i>Dnajc10</i> -R1	TTAAGGGTACAGAGGAAGGGCTC
mouse <i>Dnajc10</i> -R2	TCAAATAGTTACAAC TGGAAATCCC
<b>shRNA for human <i>DNAJC10</i></b>	<b>Target sequence</b>
Scramble	GATATGTGCGTACCTAGCAT
shRNA 1	GCCGAATGAAAGGAGTCAA
shRNA 2	GCCCCAGTGAAATATCATG
shRNA 3	GCATTGAAGTTACATCCTGAT
shRNA 4	GCACCAGACATCTGTAGTAAT
<b>shRNA for human <i>PERK</i></b>	<b>Target sequence</b>
Scramble	GATATGTGCGTACCTAGCAT
sh <i>PERK</i> -1	GGAACGACCTGAAGCTATAAA
sh <i>PERK</i> -2	TGCATCTGCCTGGT TACTTAA
<b>shRNA for mouse <i>Perk</i></b>	<b>target sequence</b>
Scramble	TTCTCCGAACGTGTCACGT
sh <i>Perk</i> -1	GCCACTTTGAACTTCGGTATA
sh <i>Perk</i> -2	CACTTTGAACTTCGGTATATT
<b>sgRNA for human <i>DNAJC10</i></b>	<b>target sequence</b>
sgRNA0	GAACGACTAGTTAGGCGTGTA
sgRNA1	CATTTTAGTGGGCACAGATC
sgRNA2	AATAGTTCCAGCTTTCATAC

**Sup. Table S3. Co-expression genes of *DNAJC10*\***

Gene name	TCGA, Firehose Legacy		TCGA, NEJM 2013		TCGA, PanCancer Atlas	
	SPCL	q-Value	SPCL	q-Value	SPCL	q-Value
AAGAB	0.40	2.42E-06	0.36	5.62E-05	0.36	4.73E-05
AASDH	0.43	2.37E-07	0.39	7.10E-06	0.39	5.98E-06
AASDHPPT	0.38	6.20E-06	0.33	2.00E-04	0.33	1.69E-04
ABCA3	-0.43	2.78E-07	-0.43	1.03E-06	-0.43	8.70E-07
ABCB7	0.37	1.49E-05	0.31	5.92E-04	0.31	5.00E-04
ABCD3	0.38	8.73E-06	0.34	1.52E-04	0.34	1.28E-04
ABCE1	0.42	4.10E-07	0.36	5.48E-05	0.36	4.61E-05
ABHD10	0.39	4.13E-06	0.32	3.81E-04	0.32	3.22E-04
ABHD13	0.32	2.71E-04	0.30	7.78E-04	0.30	6.58E-04
ABHD2	0.39	2.93E-06	0.39	9.86E-06	0.39	8.30E-06
ABITRAM	0.44	1.43E-07	0.42	1.85E-06	0.42	1.55E-06
ACAP2	0.42	7.12E-07	0.43	8.74E-07	0.43	7.36E-07
ACSL3	0.44	1.57E-07	0.45	2.00E-07	0.45	1.69E-07
ACTR2	0.39	3.87E-06	0.39	1.17E-05	0.39	9.85E-06
ACTR6	0.44	1.53E-07	0.39	7.85E-06	0.39	6.61E-06
ADRA2C	-0.35	4.55E-05	-0.35	6.71E-05	-0.35	5.65E-05
ADRB1	0.37	1.37E-05	0.31	5.74E-04	0.31	4.85E-04
AFTPH	0.49	2.56E-09	0.46	1.36E-07	0.46	1.15E-07
AGGF1	0.44	1.13E-07	0.39	8.05E-06	0.39	6.78E-06
AGL	0.35	3.25E-05	0.32	3.48E-04	0.32	2.94E-04
AGPAT2	-0.31	3.18E-04	-0.38	1.89E-05	-0.38	1.59E-05
AHCYL1	0.52	3.45E-10	0.47	5.62E-08	0.47	4.73E-08
AJM1	-0.35	3.90E-05	-0.39	1.01E-05	-0.39	8.51E-06
AK2	0.38	9.38E-06	0.33	2.27E-04	0.33	1.92E-04
AKAP11	0.33	1.19E-04	0.31	6.94E-04	0.31	5.86E-04

AKT2	-0.33	1.47E-04	-0.37	2.63E-05	-0.37	2.21E-05
ALDH1A1	0.32	2.27E-04	0.35	1.05E-04	0.35	8.91E-05
ALKBH8	0.43	2.72E-07	0.46	9.99E-08	0.46	8.41E-08
AMIGO3	-0.33	1.35E-04	-0.37	2.23E-05	-0.37	1.88E-05
AMPH	0.36	1.89E-05	0.35	8.77E-05	0.35	7.39E-05
ANAPC11	-0.32	2.59E-04	-0.35	8.67E-05	-0.35	7.31E-05
ANGEL2	0.38	7.00E-06	0.35	7.76E-05	0.35	6.55E-05
ANK3	0.30	5.26E-04	0.32	3.74E-04	0.32	3.16E-04
ANKDD1A	0.31	4.57E-04	0.31	5.08E-04	0.31	4.29E-04
ANKEF1	0.37	1.48E-05	0.37	3.22E-05	0.37	2.71E-05
ANKRD12	0.37	1.24E-05	0.36	5.56E-05	0.36	4.68E-05
ANKRD13D	-0.35	4.52E-05	-0.32	3.76E-04	-0.32	3.18E-04
ANO6	0.43	3.30E-07	0.41	2.81E-06	0.41	2.37E-06
APIAR	0.39	3.39E-06	0.36	5.98E-05	0.36	5.03E-05
APIG1	0.36	2.81E-05	0.33	1.84E-04	0.33	1.55E-04
APIS3	0.42	4.71E-07	0.40	4.36E-06	0.40	3.67E-06
AP3B1	0.32	1.74E-04	0.31	4.81E-04	0.31	4.07E-04
AP3M1	0.50	9.49E-10	0.47	5.62E-08	0.47	4.73E-08
AP4E1	0.40	2.04E-06	0.38	2.08E-05	0.38	1.75E-05
APAF1	0.48	6.53E-09	0.48	2.89E-08	0.48	2.43E-08
API5	0.50	1.44E-09	0.47	5.78E-08	0.47	4.86E-08
APPBP2	0.36	3.17E-05	0.32	3.27E-04	0.32	2.76E-04
AQR	0.43	2.63E-07	0.40	5.77E-06	0.40	4.86E-06
ARF1	-0.31	3.73E-04	-0.31	5.00E-04	-0.31	4.23E-04
ARFIP1	0.39	2.75E-06	0.41	2.87E-06	0.41	2.42E-06
ARHGAP11A	0.47	1.27E-08	0.43	8.21E-07	0.43	6.91E-07
ARHGDI1A	-0.34	7.49E-05	-0.37	3.62E-05	-0.37	3.05E-05
ARL1	0.37	1.69E-05	0.34	1.66E-04	0.34	1.40E-04
ARL13B	0.38	8.94E-06	0.33	1.89E-04	0.33	1.59E-04

ARL14EP	0.47	1.89E-08	0.44	5.41E-07	0.44	4.56E-07
ARL2	-0.35	5.09E-05	-0.42	1.75E-06	-0.42	1.47E-06
ARL2BP	0.36	2.41E-05	0.32	3.05E-04	0.32	2.56E-04
ARL5A	0.40	2.11E-06	0.37	3.05E-05	0.37	2.57E-05
ARL6IP4	-0.32	2.29E-04	-0.37	2.39E-05	-0.37	2.01E-05
ARL8A	-0.35	3.66E-05	-0.36	4.57E-05	-0.36	3.85E-05
ARMT1	0.35	3.74E-05	0.33	2.69E-04	0.33	2.27E-04
ARPP19	0.37	1.15E-05	0.32	3.08E-04	0.32	2.60E-04
ARPP21	-0.30	5.07E-04	-0.31	7.12E-04	-0.31	6.02E-04
ARRDC4	0.40	2.01E-06	0.39	9.87E-06	0.39	8.31E-06
ASB7	0.39	3.23E-06	0.38	1.76E-05	0.38	1.48E-05
ASCC3	0.41	9.12E-07	0.36	3.99E-05	0.36	3.36E-05
ATF1	0.41	8.61E-07	0.39	8.66E-06	0.39	7.29E-06
ATG4C	0.43	2.47E-07	0.40	5.85E-06	0.40	4.93E-06
ATMIN	0.41	1.32E-06	0.32	3.93E-04	0.32	3.32E-04
ATP11C	0.36	1.84E-05	0.35	7.21E-05	0.35	6.07E-05
ATP6V0C	-0.30	5.16E-04	-0.30	8.21E-04	-0.30	6.94E-04
ATP6V1A	0.43	2.16E-07	0.44	5.08E-07	0.44	4.28E-07
ATP6V1C1	0.34	5.68E-05	0.31	5.82E-04	0.31	4.92E-04
ATRNL	0.42	6.96E-07	0.37	2.48E-05	0.37	2.09E-05
ATRX	0.33	1.25E-04	0.30	8.69E-04	0.30	7.35E-04
AURKAIP1	-0.36	1.98E-05	-0.40	6.68E-06	-0.40	5.62E-06
AXIN1	-0.33	1.42E-04	-0.31	5.01E-04	-0.31	4.24E-04
AZIN1	0.38	8.34E-06	0.32	4.56E-04	0.32	3.85E-04
BABAM1	-0.35	4.41E-05	-0.43	8.64E-07	-0.43	7.27E-07
BAG5	0.40	2.45E-06	0.32	3.41E-04	0.32	2.88E-04
BBS10	0.48	9.13E-09	0.43	6.48E-07	0.43	5.46E-07
BBS12	0.45	8.42E-08	0.42	1.58E-06	0.42	1.33E-06
BBS7	0.32	1.80E-04	0.34	1.08E-04	0.34	9.12E-05

BCL7C	-0.34	5.79E-05	-0.39	8.78E-06	-0.39	7.39E-06
BCLAF3	0.39	2.98E-06	0.40	4.36E-06	0.40	3.67E-06
BIRC2	0.39	4.21E-06	0.36	3.82E-05	0.36	3.22E-05
BLOC1S6	0.37	1.49E-05	0.35	9.59E-05	0.35	8.10E-05
BMPR1B	0.31	4.61E-04	0.32	2.97E-04	0.32	2.51E-04
BNIP3L	0.34	6.15E-05	0.33	1.99E-04	0.33	1.68E-04
BORA	0.40	1.79E-06	0.35	8.36E-05	0.35	7.05E-05
BORCS7	0.46	4.52E-08	0.44	3.92E-07	0.44	3.30E-07
BRAP	0.33	1.10E-04	0.31	5.95E-04	0.31	5.03E-04
BRCC3	0.52	2.48E-10	0.51	2.79E-09	0.51	2.35E-09
BROX	0.37	1.40E-05	0.37	3.22E-05	0.37	2.71E-05
BSCL2	-0.32	1.81E-04	-0.33	2.63E-04	-0.33	2.22E-04
BSG	-0.30	5.32E-04	-0.32	3.36E-04	-0.32	2.83E-04
BTBD1	0.44	1.21E-07	0.40	4.17E-06	0.40	3.51E-06
BTBD10	0.34	6.99E-05	0.31	5.78E-04	0.31	4.89E-04
BTBD7	0.35	3.41E-05	0.32	3.68E-04	0.32	3.11E-04
C12ORF4	0.44	8.87E-08	0.42	1.62E-06	0.42	1.36E-06
C17ORF49	-0.37	1.63E-05	-0.41	3.71E-06	-0.41	3.12E-06
C1ORF131	0.40	2.04E-06	0.35	8.89E-05	0.35	7.49E-05
C2CD5	0.42	4.10E-07	0.39	9.38E-06	0.39	7.90E-06
C2ORF69	0.38	7.31E-06	0.36	5.48E-05	0.36	4.61E-05
C3ORF38	0.34	6.88E-05	0.31	6.28E-04	0.31	5.31E-04
C4ORF33	0.33	1.02E-04	0.30	7.38E-04	0.30	6.24E-04
C5ORF15	0.35	3.77E-05	0.33	2.42E-04	0.33	2.05E-04
C5ORF22	0.47	2.27E-08	0.43	8.88E-07	0.43	7.49E-07
C6ORF120	0.39	3.71E-06	0.37	2.43E-05	0.37	2.05E-05
C6ORF62	0.35	5.20E-05	0.31	5.32E-04	0.31	4.49E-04
C6ORF89	0.42	3.81E-07	0.38	1.35E-05	0.38	1.14E-05
C8ORF82	-0.33	1.59E-04	-0.39	8.92E-06	-0.39	7.51E-06

CAB39	0.35	4.04E-05	0.35	8.21E-05	0.35	6.92E-05
CACFD1	-0.35	4.05E-05	-0.34	1.13E-04	-0.34	9.53E-05
CACNA1H	-0.32	2.15E-04	-0.35	8.80E-05	-0.35	7.43E-05
CACNG4	0.32	2.18E-04	0.31	6.06E-04	0.31	5.12E-04
CALM2	0.36	1.86E-05	0.35	7.28E-05	0.35	6.13E-05
CAND1	0.40	2.25E-06	0.36	4.10E-05	0.36	3.46E-05
CAPN7	0.39	3.23E-06	0.43	6.43E-07	0.43	5.41E-07
CAPZA2	0.35	5.21E-05	0.32	3.03E-04	0.32	2.56E-04
CARD6	0.39	3.14E-06	0.34	1.08E-04	0.34	9.16E-05
CARMIL1	0.31	3.82E-04	0.31	5.55E-04	0.31	4.69E-04
CASP8AP2	0.36	1.82E-05	0.31	4.64E-04	0.31	3.93E-04
CAT	0.34	8.69E-05	0.30	7.24E-04	0.30	6.12E-04
CCDC113	0.36	2.60E-05	0.33	2.47E-04	0.33	2.08E-04
CCDC121	0.46	3.36E-08	0.40	4.02E-06	0.40	3.39E-06
CCDC126	0.36	1.80E-05	0.37	2.55E-05	0.37	2.15E-05
CCDC18	0.32	1.66E-04	0.30	8.72E-04	0.30	7.38E-04
CCDC186	0.37	1.77E-05	0.36	4.39E-05	0.36	3.70E-05
CCDC47	0.39	2.84E-06	0.38	1.26E-05	0.38	1.06E-05
CCDC6	0.46	2.71E-08	0.43	9.52E-07	0.43	8.01E-07
CCDC85B	-0.31	2.91E-04	-0.36	5.30E-05	-0.36	4.46E-05
CCDC88A	0.37	1.46E-05	0.35	1.03E-04	0.35	8.73E-05
CCDC9	-0.38	7.77E-06	-0.40	5.47E-06	-0.40	4.61E-06
CCDC91	0.35	5.31E-05	0.33	2.02E-04	0.33	1.71E-04
CCNC	0.38	7.75E-06	0.36	4.44E-05	0.36	3.73E-05
CCNYL1	0.38	7.95E-06	0.38	1.28E-05	0.38	1.08E-05
CD164	0.46	2.52E-08	0.45	2.74E-07	0.45	2.30E-07
CD3D	-0.33	1.62E-04	-0.31	4.68E-04	-0.31	3.96E-04
CD46	0.37	1.62E-05	0.36	5.78E-05	0.36	4.87E-05
CD80	0.34	8.86E-05	0.34	1.24E-04	0.34	1.05E-04



CDC34	-0.31	4.49E-04	-0.39	1.03E-05	-0.39	8.68E-06
CDC40	0.44	1.08E-07	0.41	3.81E-06	0.41	3.21E-06
CDC42EP4	-0.39	4.07E-06	-0.36	4.51E-05	-0.36	3.80E-05
CDC73	0.39	3.71E-06	0.38	1.28E-05	0.38	1.08E-05
CDK16	-0.30	4.73E-04	-0.31	4.87E-04	-0.31	4.12E-04
CDK2AP2	-0.31	4.28E-04	-0.32	3.22E-04	-0.32	2.72E-04
CEBPZ	0.38	7.39E-06	0.31	6.34E-04	0.31	5.36E-04
CEP135	0.41	9.49E-07	0.38	1.41E-05	0.38	1.18E-05
CEP162	0.46	2.52E-08	0.46	1.68E-07	0.46	1.41E-07
CEP350	0.40	2.37E-06	0.39	7.85E-06	0.39	6.61E-06
CEP57L1	0.35	3.77E-05	0.34	1.09E-04	0.34	9.18E-05
CEP78	0.34	6.51E-05	0.30	7.43E-04	0.30	6.28E-04
CFAP97	0.42	3.81E-07	0.39	7.56E-06	0.39	6.38E-06
CGGBP1	0.36	1.91E-05	0.31	4.85E-04	0.31	4.10E-04
CHIC1	0.35	4.20E-05	0.34	1.47E-04	0.34	1.24E-04
CHM	0.43	1.72E-07	0.44	4.61E-07	0.44	3.88E-07
CHML	0.36	2.60E-05	0.31	4.92E-04	0.31	4.16E-04
CHMP2B	0.42	3.87E-07	0.43	8.21E-07	0.43	6.91E-07
CHURC1	0.35	3.24E-05	0.35	9.16E-05	0.35	7.73E-05
CKAP2	0.32	2.24E-04	0.30	8.76E-04	0.30	7.41E-04
CLASP2	0.38	7.59E-06	0.36	5.18E-05	0.36	4.36E-05
CLCN5	0.34	8.42E-05	0.35	8.89E-05	0.35	7.49E-05
CLIP4	0.30	5.06E-04	0.31	5.78E-04	0.31	4.89E-04
CLN5	0.46	4.08E-08	0.45	3.12E-07	0.45	2.63E-07
CLN6	-0.31	3.27E-04	-0.37	2.23E-05	-0.37	1.88E-05
CLPX	0.48	1.05E-08	0.44	4.06E-07	0.44	3.42E-07
CLTC	0.36	2.83E-05	0.33	2.02E-04	0.33	1.69E-04
CMAS	0.35	3.88E-05	0.31	5.04E-04	0.31	4.26E-04
CMTM7	-0.31	3.69E-04	-0.32	3.59E-04	-0.32	3.03E-04

CMTR2	0.40	2.54E-06	0.37	3.22E-05	0.37	2.71E-05
CNN2	-0.42	6.04E-07	-0.43	6.49E-07	-0.43	5.46E-07
CNOT6	0.36	1.89E-05	0.32	3.21E-04	0.32	2.71E-04
COG3	0.31	3.44E-04	0.31	5.36E-04	0.31	4.54E-04
COG5	0.44	1.57E-07	0.37	3.22E-05	0.37	2.71E-05
COG6	0.43	2.10E-07	0.41	3.06E-06	0.41	2.57E-06
COL6A5	0.31	3.19E-04	0.33	2.38E-04	0.33	2.01E-04
COMMD2	0.41	1.21E-06	0.35	9.62E-05	0.35	8.13E-05
COMMD8	0.34	7.69E-05	0.32	3.32E-04	0.32	2.80E-04
COPB1	0.34	6.23E-05	0.30	7.79E-04	0.30	6.59E-04
COPE	-0.35	4.32E-05	-0.39	1.11E-05	-0.39	9.31E-06
COX15	0.45	6.94E-08	0.37	2.48E-05	0.37	2.09E-05
CPNE3	0.43	2.47E-07	0.42	2.00E-06	0.42	1.68E-06
CPNE8	0.41	8.61E-07	0.39	1.06E-05	0.39	8.95E-06
CPSF2	0.49	1.94E-09	0.46	9.40E-08	0.46	7.91E-08
CRACR2B	-0.31	4.10E-04	-0.35	8.49E-05	-0.35	7.16E-05
CREB1	0.34	9.27E-05	0.33	1.89E-04	0.33	1.59E-04
CREBL2	0.36	3.19E-05	0.36	5.09E-05	0.36	4.29E-05
CREG1	0.40	1.78E-06	0.40	6.01E-06	0.40	5.06E-06
CRNKL1	0.40	1.95E-06	0.32	2.91E-04	0.32	2.46E-04
CSNK1G2	-0.35	4.58E-05	-0.39	9.43E-06	-0.39	7.94E-06
CSNK1G3	0.35	4.49E-05	0.34	1.33E-04	0.34	1.12E-04
CTDNEP1	-0.31	3.27E-04	-0.31	5.32E-04	-0.31	4.50E-04
CTDP1	-0.32	1.82E-04	-0.40	4.83E-06	-0.40	4.07E-06
CUL2	0.40	1.90E-06	0.34	1.12E-04	0.34	9.44E-05
CUL3	0.35	3.79E-05	0.34	1.38E-04	0.34	1.17E-04
CUL5	0.38	6.51E-06	0.37	2.41E-05	0.37	2.03E-05
CWC22	0.39	3.21E-06	0.37	3.02E-05	0.37	2.54E-05
DAGLB	-0.33	1.33E-04	-0.38	2.07E-05	-0.38	1.74E-05

DBR1	0.40	2.49E-06	0.34	1.13E-04	0.34	9.52E-05
DCUN1D1	0.42	4.49E-07	0.40	5.54E-06	0.40	4.67E-06
DDA1	-0.36	2.10E-05	-0.38	1.31E-05	-0.38	1.11E-05
DDX1	0.38	6.18E-06	0.30	7.73E-04	0.30	6.54E-04
DDX18	0.39	4.75E-06	0.32	4.47E-04	0.32	3.78E-04
DEK	0.41	9.05E-07	0.37	2.23E-05	0.37	1.88E-05
DGKZ	-0.34	9.13E-05	-0.33	2.41E-04	-0.33	2.03E-04
DHPS	-0.31	4.58E-04	-0.37	2.65E-05	-0.37	2.23E-05
DHX29	0.46	2.33E-08	0.45	1.68E-07	0.45	1.41E-07
DHX36	0.34	7.49E-05	0.31	5.77E-04	0.31	4.88E-04
DHX40	0.36	2.70E-05	0.30	8.48E-04	0.30	7.17E-04
DHX57	0.44	1.38E-07	0.42	1.33E-06	0.42	1.12E-06
DIP2B	0.41	7.67E-07	0.37	2.65E-05	0.37	2.23E-05
DIS3	0.42	4.10E-07	0.39	1.17E-05	0.39	9.85E-06
DLGAP4	-0.31	3.44E-04	-0.38	1.85E-05	-0.38	1.56E-05
DMXL1	0.35	4.96E-05	0.34	1.62E-04	0.34	1.37E-04
DNAJC24	0.39	2.67E-06	0.37	2.55E-05	0.37	2.15E-05
DNM1L	0.40	1.85E-06	0.36	5.59E-05	0.36	4.70E-05
DOCK1	0.34	9.53E-05	0.31	5.77E-04	0.31	4.88E-04
DOCK8	0.35	3.41E-05	0.35	9.10E-05	0.35	7.67E-05
DOP1A	0.33	9.63E-05	0.35	9.24E-05	0.35	7.82E-05
DPM3	-0.35	4.68E-05	-0.39	7.97E-06	-0.39	6.71E-06
DRAP1	-0.36	1.84E-05	-0.41	3.44E-06	-0.41	2.90E-06
DRD5	0.31	4.56E-04	0.30	7.44E-04	0.30	6.29E-04
DTWD2	0.39	4.30E-06	0.36	5.63E-05	0.36	4.74E-05
DZANK1	0.32	1.95E-04	0.31	6.68E-04	0.31	5.64E-04
EAF1	0.35	3.79E-05	0.34	1.24E-04	0.34	1.05E-04
EDEM3	0.42	4.79E-07	0.39	8.05E-06	0.39	6.77E-06
EDF1	-0.37	1.14E-05	-0.40	4.23E-06	-0.40	3.56E-06

EEA1	0.36	2.77E-05	0.35	7.51E-05	0.35	6.33E-05
EED	0.36	2.32E-05	0.31	6.06E-04	0.31	5.12E-04
EEF1D	-0.38	7.21E-06	-0.37	3.02E-05	-0.37	2.54E-05
EFCAB14	0.39	4.18E-06	0.36	3.88E-05	0.36	3.26E-05
EFEMP2	-0.51	4.29E-10	-0.45	2.88E-07	-0.45	2.42E-07
EGLN2	-0.37	1.24E-05	-0.37	3.12E-05	-0.37	2.63E-05
EIF2AK4	0.39	2.98E-06	0.33	2.18E-04	0.33	1.84E-04
EIF3K	-0.30	4.72E-04	-0.34	1.15E-04	-0.34	9.73E-05
ELF1	0.35	5.09E-05	0.33	2.51E-04	0.33	2.12E-04
ELMOD2	0.43	2.78E-07	0.42	1.18E-06	0.42	9.97E-07
ELOB	-0.32	1.67E-04	-0.36	5.53E-05	-0.36	4.66E-05
ELP4	0.41	8.98E-07	0.39	1.15E-05	0.39	9.70E-06
EMB	0.40	1.92E-06	0.39	9.78E-06	0.39	8.23E-06
EMC2	0.36	2.16E-05	0.35	8.27E-05	0.35	6.97E-05
EMC6	-0.33	1.61E-04	-0.31	6.52E-04	-0.31	5.51E-04
ENOPH1	0.40	2.04E-06	0.32	3.42E-04	0.32	2.88E-04
ENOX2	0.49	2.74E-09	0.49	1.40E-08	0.49	1.18E-08
ENTPD7	0.38	7.40E-06	0.33	2.30E-04	0.33	1.94E-04
EPC2	0.35	4.81E-05	0.35	1.03E-04	0.35	8.73E-05
EPRS1	0.38	7.24E-06	0.33	2.71E-04	0.33	2.28E-04
ERCC4	0.41	7.64E-07	0.39	9.78E-06	0.39	8.23E-06
ERCC6	0.32	2.10E-04	0.31	6.50E-04	0.31	5.50E-04
ERCC6L	0.39	4.18E-06	0.34	1.26E-04	0.34	1.07E-04
ERI1	0.46	3.43E-08	0.41	3.26E-06	0.41	2.74E-06
ERLEC1	0.33	1.28E-04	0.31	6.74E-04	0.31	5.70E-04
ERLIN2	0.39	3.82E-06	0.33	2.58E-04	0.33	2.18E-04
ERO1A	0.44	1.70E-07	0.42	1.85E-06	0.42	1.55E-06
ESCO1	0.35	4.47E-05	0.33	2.02E-04	0.33	1.71E-04
ESF1	0.38	6.34E-06	0.31	4.89E-04	0.31	4.14E-04

ETFDH	0.49	2.42E-09	0.47	5.62E-08	0.47	4.73E-08
ETNK1	0.44	9.20E-08	0.41	3.06E-06	0.41	2.57E-06
EXOC1	0.51	4.29E-10	0.50	8.63E-09	0.50	7.26E-09
EXOC8	0.42	4.34E-07	0.38	1.20E-05	0.38	1.01E-05
EXOG	0.38	7.95E-06	0.36	5.10E-05	0.36	4.29E-05
FAF2	0.42	4.67E-07	0.32	3.02E-04	0.32	2.55E-04
FAM114A2	0.46	2.68E-08	0.42	1.52E-06	0.42	1.28E-06
FAM120A	0.36	1.88E-05	0.31	6.76E-04	0.31	5.72E-04
FAM199X	0.34	7.38E-05	0.31	5.29E-04	0.31	4.48E-04
FAM76B	0.34	6.87E-05	0.32	3.44E-04	0.32	2.90E-04
FAM91A1	0.34	9.26E-05	0.34	1.11E-04	0.34	9.41E-05
FANCM	0.35	4.15E-05	0.34	1.41E-04	0.34	1.19E-04
FAR1	0.33	1.04E-04	0.33	1.87E-04	0.33	1.58E-04
FARSB	0.40	2.04E-06	0.32	2.92E-04	0.32	2.47E-04
FASTKD1	0.40	1.69E-06	0.35	9.75E-05	0.35	8.23E-05
FASTKD3	0.43	3.25E-07	0.42	1.38E-06	0.42	1.16E-06
FAU	-0.30	5.22E-04	-0.34	1.28E-04	-0.34	1.08E-04
FBRS	-0.33	1.30E-04	-0.38	1.27E-05	-0.38	1.07E-05
FBXO11	0.35	5.42E-05	0.34	1.58E-04	0.34	1.33E-04
FBXO28	0.38	8.82E-06	0.33	2.07E-04	0.33	1.75E-04
FBXO30	0.37	1.35E-05	0.31	5.25E-04	0.31	4.44E-04
FBXO34	0.44	1.22E-07	0.37	2.41E-05	0.37	2.03E-05
FBXO45	0.38	7.01E-06	0.31	4.84E-04	0.31	4.10E-04
FBXO48	0.37	1.37E-05	0.34	1.15E-04	0.34	9.68E-05
FEM1B	0.40	2.06E-06	0.39	1.11E-05	0.39	9.38E-06
FEZ2	0.37	1.28E-05	0.35	8.54E-05	0.35	7.20E-05
FGF11	-0.36	2.73E-05	-0.34	1.17E-04	-0.34	9.90E-05
FGF2	0.42	4.79E-07	0.33	2.80E-04	0.33	2.36E-04
FIS1	-0.31	3.84E-04	-0.37	2.54E-05	-0.37	2.14E-05

FKBP2	-0.30	5.01E-04	-0.31	5.94E-04	-0.31	5.03E-04
FKTN	0.37	1.62E-05	0.33	2.37E-04	0.33	2.00E-04
FNTA	0.40	1.95E-06	0.33	1.85E-04	0.33	1.56E-04
FOXC1	0.32	1.92E-04	0.33	2.41E-04	0.33	2.03E-04
FOXN2	0.33	9.69E-05	0.32	3.16E-04	0.32	2.67E-04
FPGT	0.45	6.94E-08	0.42	1.17E-06	0.42	9.83E-07
FRS2	0.32	1.71E-04	0.33	2.65E-04	0.33	2.24E-04
G3BP2	0.41	1.20E-06	0.34	1.33E-04	0.34	1.12E-04
GABPA	0.40	1.57E-06	0.40	4.16E-06	0.40	3.50E-06
GALNT4	0.41	9.77E-07	0.37	2.59E-05	0.37	2.18E-05
GAPT	0.38	8.70E-06	0.34	1.15E-04	0.34	9.73E-05
GCC2	0.39	2.65E-06	0.37	2.32E-05	0.37	1.95E-05
GCLC	0.37	1.62E-05	0.34	1.15E-04	0.34	9.75E-05
GDAP2	0.31	2.95E-04	0.31	5.21E-04	0.31	4.41E-04
GGPS1	0.37	1.68E-05	0.31	7.02E-04	0.31	5.93E-04
GIGYF2	0.40	2.62E-06	0.34	1.08E-04	0.34	9.11E-05
GIT1	-0.30	4.89E-04	-0.39	9.16E-06	-0.39	7.71E-06
GLCE	0.42	6.89E-07	0.42	1.64E-06	0.42	1.38E-06
GLIS3	-0.37	1.06E-05	-0.33	2.62E-04	-0.33	2.21E-04
GLUD1	0.35	4.11E-05	0.32	4.47E-04	0.32	3.78E-04
GMFB	0.45	8.42E-08	0.44	4.61E-07	0.44	3.88E-07
GOLM2	0.44	1.44E-07	0.43	1.03E-06	0.43	8.70E-07
GPAM	0.34	7.31E-05	0.30	8.43E-04	0.30	7.12E-04
GPATCH11	0.40	1.81E-06	0.36	3.81E-05	0.36	3.21E-05
GPATCH2	0.35	3.77E-05	0.30	8.30E-04	0.30	7.02E-04
GPD1L	0.34	6.23E-05	0.36	5.59E-05	0.36	4.71E-05
GPI	-0.38	9.19E-06	-0.39	8.09E-06	-0.39	6.81E-06
GPR180	0.37	1.64E-05	0.34	1.58E-04	0.34	1.33E-04
GSKIP	0.42	4.05E-07	0.43	8.21E-07	0.43	6.91E-07

GSPT2	0.33	1.07E-04	0.30	8.48E-04	0.30	7.17E-04
GSTCD	0.39	2.77E-06	0.33	2.10E-04	0.33	1.77E-04
GTPBP8	0.40	2.30E-06	0.33	2.26E-04	0.33	1.91E-04
GUF1	0.35	3.82E-05	0.30	8.06E-04	0.30	6.82E-04
HACD2	0.41	1.28E-06	0.37	3.16E-05	0.37	2.66E-05
HACD4	0.39	2.95E-06	0.36	5.56E-05	0.36	4.68E-05
HAUS3	0.37	1.65E-05	0.31	4.67E-04	0.31	3.94E-04
HCFC1R1	-0.34	6.97E-05	-0.39	9.67E-06	-0.39	8.12E-06
HCFC2	0.39	3.42E-06	0.39	8.43E-06	0.39	7.09E-06
HCST	-0.31	4.33E-04	-0.33	2.80E-04	-0.33	2.36E-04
HDAC6	-0.30	5.71E-04	-0.33	2.27E-04	-0.33	1.91E-04
HDHD2	0.37	1.35E-05	0.32	4.03E-04	0.32	3.41E-04
HELZ	0.32	2.65E-04	0.31	5.89E-04	0.31	4.98E-04
HERC3	0.35	3.83E-05	0.36	5.93E-05	0.36	4.98E-05
HERC4	0.38	6.27E-06	0.35	8.80E-05	0.35	7.42E-05
HES6	-0.31	3.97E-04	-0.31	6.64E-04	-0.31	5.62E-04
HGF	-0.34	6.02E-05	-0.33	2.51E-04	-0.33	2.12E-04
HINT3	0.39	2.77E-06	0.37	2.36E-05	0.37	1.99E-05
HNMT	0.33	1.07E-04	0.36	3.91E-05	0.36	3.29E-05
HNRNPH2	0.43	2.52E-07	0.38	1.34E-05	0.38	1.13E-05
HOXA10	0.39	3.90E-06	0.36	4.64E-05	0.36	3.90E-05
HOXA11	0.38	7.00E-06	0.40	6.54E-06	0.40	5.51E-06
HOXA11-AS	0.34	8.57E-05	0.32	4.19E-04	0.32	3.54E-04
HOXA2	0.37	1.74E-05	0.36	6.02E-05	0.36	5.07E-05
HOXA3	0.43	3.44E-07	0.39	1.16E-05	0.39	9.75E-06
HOXA4	0.39	3.38E-06	0.36	3.87E-05	0.36	3.26E-05
HOXA5	0.41	1.13E-06	0.38	1.73E-05	0.38	1.46E-05
HOXA6	0.41	9.11E-07	0.38	1.44E-05	0.38	1.21E-05
HOXA7	0.41	7.53E-07	0.38	1.35E-05	0.38	1.14E-05

HOXA9	0.42	3.84E-07	0.38	1.23E-05	0.38	1.03E-05
HOXB2	0.32	2.43E-04	0.31	6.47E-04	0.31	5.47E-04
HOXB3	0.38	7.00E-06	0.38	1.69E-05	0.38	1.42E-05
HOXB4	0.36	1.89E-05	0.36	5.67E-05	0.36	4.77E-05
HOXB5	0.34	8.10E-05	0.36	5.30E-05	0.36	4.46E-05
HOXB6	0.39	2.88E-06	0.40	6.99E-06	0.40	5.88E-06
HOXB7	0.34	6.03E-05	0.37	2.62E-05	0.37	2.20E-05
HOXB9	0.31	2.87E-04	0.32	3.67E-04	0.32	3.10E-04
HPF1	0.40	1.82E-06	0.34	1.32E-04	0.34	1.11E-04
HPS5	0.43	2.33E-07	0.41	2.91E-06	0.41	2.45E-06
HS2ST1	0.35	4.14E-05	0.31	6.05E-04	0.31	5.11E-04
HSD17B12	0.38	5.09E-06	0.33	2.63E-04	0.33	2.22E-04
HSDL2	0.49	2.56E-09	0.45	1.74E-07	0.45	1.46E-07
HSPA13	0.37	1.49E-05	0.36	5.56E-05	0.36	4.68E-05
HTATSF1	0.37	1.21E-05	0.31	5.84E-04	0.31	4.94E-04
IARS2	0.45	5.75E-08	0.41	3.67E-06	0.41	3.09E-06
IBTK	0.41	1.24E-06	0.37	2.48E-05	0.37	2.09E-05
ICE1	0.40	2.19E-06	0.36	5.48E-05	0.36	4.61E-05
ICE2	0.38	7.00E-06	0.35	9.69E-05	0.35	8.19E-05
IDE	0.44	1.21E-07	0.45	1.88E-07	0.45	1.58E-07
IDH1	0.41	9.49E-07	0.37	2.60E-05	0.37	2.19E-05
IFITM1	-0.30	5.83E-04	-0.31	5.45E-04	-0.31	4.61E-04
IFT80	0.37	1.78E-05	0.31	5.16E-04	0.31	4.37E-04
IGFBP7	-0.32	2.66E-04	-0.34	1.40E-04	-0.34	1.19E-04
IGSF10	0.38	7.40E-06	0.36	5.87E-05	0.36	4.94E-05
IKBIP	0.36	2.00E-05	0.34	1.24E-04	0.34	1.05E-04
IMPA1	0.37	1.62E-05	0.30	8.37E-04	0.30	7.08E-04
INAFM1	-0.37	1.73E-05	-0.39	9.34E-06	-0.39	7.86E-06
INIP	0.38	9.38E-06	0.32	3.40E-04	0.32	2.86E-04



INPP5F	0.32	2.66E-04	0.32	3.49E-04	0.32	2.95E-04
INSL3	-0.36	2.50E-05	-0.37	2.84E-05	-0.37	2.39E-05
INSYN2A	0.34	7.98E-05	0.33	2.24E-04	0.33	1.89E-04
INTS7	0.39	3.38E-06	0.33	2.01E-04	0.33	1.70E-04
INTS8	0.45	8.49E-08	0.41	2.20E-06	0.41	1.85E-06
IPO7	0.34	7.80E-05	0.31	4.84E-04	0.31	4.09E-04
IPO8	0.46	3.26E-08	0.46	1.16E-07	0.46	9.73E-08
IRAK4	0.35	3.73E-05	0.31	6.70E-04	0.31	5.68E-04
IREB2	0.36	1.98E-05	0.33	2.72E-04	0.33	2.30E-04
ITCH	0.40	1.86E-06	0.39	8.25E-06	0.39	6.95E-06
ITGB4	-0.38	5.41E-06	-0.42	1.61E-06	-0.42	1.35E-06
ITM2C	-0.30	5.66E-04	-0.31	5.32E-04	-0.31	4.50E-04
ITSN2	0.38	7.51E-06	0.34	1.35E-04	0.34	1.14E-04
IWS1	0.44	1.08E-07	0.36	3.83E-05	0.36	3.23E-05
JAK3	-0.35	4.89E-05	-0.38	1.83E-05	-0.38	1.54E-05
JKAMP	0.46	2.74E-08	0.40	4.98E-06	0.40	4.19E-06
JRKL	0.42	5.57E-07	0.35	6.68E-05	0.35	5.62E-05
KCTD15	-0.38	5.56E-06	-0.39	1.06E-05	-0.39	8.95E-06
KCTD20	0.49	2.56E-09	0.46	1.36E-07	0.46	1.15E-07
KCTD3	0.36	1.89E-05	0.32	3.50E-04	0.32	2.95E-04
KDM1B	0.33	1.39E-04	0.35	6.80E-05	0.35	5.72E-05
KDM5A	0.35	3.68E-05	0.33	2.42E-04	0.33	2.04E-04
KIAA0087	0.42	4.75E-07	0.40	4.15E-06	0.40	3.50E-06
KIAA1107	0.35	4.69E-05	0.31	6.52E-04	0.31	5.51E-04
KIDINS220	0.43	2.10E-07	0.43	8.67E-07	0.43	7.30E-07
KIF20B	0.46	2.52E-08	0.44	5.41E-07	0.44	4.56E-07
KIF5B	0.37	1.74E-05	0.34	1.07E-04	0.34	9.05E-05
KLHL12	0.46	2.74E-08	0.41	2.62E-06	0.41	2.20E-06
KLHL8	0.35	5.42E-05	0.35	8.61E-05	0.35	7.26E-05

KLHL9	0.44	1.57E-07	0.38	1.73E-05	0.38	1.46E-05
KPNA4	0.41	1.01E-06	0.35	6.53E-05	0.35	5.50E-05
KPNB1	0.39	4.18E-06	0.30	8.82E-04	0.30	7.46E-04
KRBOX4	0.37	1.60E-05	0.30	7.95E-04	0.30	6.73E-04
KTN1	0.36	1.89E-05	0.30	8.52E-04	0.30	7.20E-04
LACC1	0.36	2.75E-05	0.37	2.60E-05	0.37	2.19E-05
LAMP2	0.41	9.12E-07	0.40	4.49E-06	0.40	3.78E-06
LAMTOR3	0.41	7.63E-07	0.41	3.74E-06	0.41	3.15E-06
LARP4	0.42	4.02E-07	0.39	9.87E-06	0.39	8.31E-06
LCLAT1	0.39	4.04E-06	0.33	2.33E-04	0.33	1.97E-04
LCT	0.36	2.53E-05	0.32	3.47E-04	0.32	2.93E-04
LGALS8	0.46	3.80E-08	0.46	1.68E-07	0.46	1.41E-07
LIG4	0.41	1.02E-06	0.38	1.18E-05	0.38	9.98E-06
LIMD2	-0.35	3.57E-05	-0.37	2.70E-05	-0.37	2.27E-05
LIN54	0.35	4.47E-05	0.30	8.76E-04	0.30	7.41E-04
LIN9	0.34	7.26E-05	0.32	4.43E-04	0.32	3.74E-04
LINC00899	0.33	1.19E-04	0.30	8.21E-04	0.30	6.94E-04
LIPA	0.40	2.20E-06	0.38	1.45E-05	0.38	1.22E-05
LMAN2	-0.36	2.73E-05	-0.38	1.74E-05	-0.38	1.46E-05
LMBRD1	0.31	3.05E-04	0.32	3.76E-04	0.32	3.18E-04
LMBRD2	0.34	6.45E-05	0.33	1.93E-04	0.33	1.63E-04
LNPK	0.35	4.14E-05	0.36	3.95E-05	0.36	3.32E-05
LNX2	0.39	3.62E-06	0.37	3.15E-05	0.37	2.65E-05
LPP	0.33	1.46E-04	0.33	2.16E-04	0.33	1.83E-04
LRRC40	0.41	1.14E-06	0.37	3.56E-05	0.37	3.00E-05
LRRC58	0.34	7.18E-05	0.32	3.32E-04	0.32	2.80E-04
LRRC75B	-0.30	4.93E-04	-0.33	2.36E-04	-0.33	1.99E-04
LRRC1	0.42	3.59E-07	0.37	3.22E-05	0.37	2.71E-05
LTN1	0.44	1.57E-07	0.39	1.11E-05	0.39	9.31E-06

LY6E	-0.31	4.48E-04	-0.37	3.22E-05	-0.37	2.71E-05
LYRM2	0.54	2.02E-11	0.52	2.08E-09	0.52	1.75E-09
LZIC	0.42	3.84E-07	0.41	3.37E-06	0.41	2.84E-06
M1AP	-0.34	7.49E-05	-0.32	4.55E-04	-0.32	3.85E-04
MALT1	0.32	2.60E-04	0.37	3.40E-05	0.37	2.86E-05
MAN1A2	0.39	3.39E-06	0.38	1.55E-05	0.38	1.31E-05
MAN2A1	0.41	9.17E-07	0.43	9.87E-07	0.43	8.31E-07
MANEA	0.44	1.57E-07	0.42	1.38E-06	0.42	1.16E-06
MAP2K4	0.41	7.67E-07	0.39	9.86E-06	0.39	8.30E-06
MAP2K6	0.33	1.37E-04	0.34	1.13E-04	0.34	9.57E-05
MAP3K2	0.33	1.02E-04	0.36	5.77E-05	0.36	4.86E-05
MAP3K5	0.39	3.68E-06	0.37	3.36E-05	0.37	2.83E-05
MAP3K7	0.46	3.36E-08	0.39	7.10E-06	0.39	5.98E-06
MAPK1	0.33	1.03E-04	0.31	6.94E-04	0.31	5.87E-04
MAPK9	0.50	1.19E-09	0.46	1.16E-07	0.46	9.73E-08
MARCHF7	0.41	8.45E-07	0.39	1.17E-05	0.39	9.88E-06
MARVELD2	0.33	9.61E-05	0.34	1.38E-04	0.34	1.16E-04
MBP	0.32	2.24E-04	0.30	7.41E-04	0.30	6.27E-04
MC1R	-0.32	2.05E-04	-0.32	3.02E-04	-0.32	2.55E-04
MCFD2	0.43	3.03E-07	0.36	4.82E-05	0.36	4.06E-05
MED23	0.35	4.51E-05	0.31	5.39E-04	0.31	4.56E-04
METAP2	0.37	1.68E-05	0.31	5.32E-04	0.31	4.49E-04
METRN	-0.37	1.73E-05	-0.40	6.54E-06	-0.40	5.51E-06
METTL18	0.35	4.14E-05	0.32	3.49E-04	0.32	2.95E-04
METTL4	0.34	8.25E-05	0.30	7.24E-04	0.30	6.12E-04
MFAP3	0.45	7.09E-08	0.43	8.21E-07	0.43	6.91E-07
MFN1	0.34	5.75E-05	0.33	1.92E-04	0.33	1.62E-04
MGME1	0.38	8.27E-06	0.35	8.74E-05	0.35	7.37E-05
MIB2	-0.31	4.17E-04	-0.32	3.40E-04	-0.32	2.87E-04

MIOS	0.43	1.82E-07	0.41	3.20E-06	0.41	2.70E-06
MIR1-1HG-AS1	0.37	1.16E-05	0.31	4.76E-04	0.31	4.03E-04
MKKS	0.45	6.42E-08	0.40	4.81E-06	0.40	4.05E-06
MLH3	0.41	8.65E-07	0.36	4.35E-05	0.36	3.66E-05
MMUT	0.44	1.57E-07	0.39	9.34E-06	0.39	7.86E-06
MOB2	-0.37	1.06E-05	-0.39	1.03E-05	-0.39	8.68E-06
MORC3	0.41	9.46E-07	0.38	1.34E-05	0.38	1.13E-05
MOSMO	0.41	1.14E-06	0.36	5.19E-05	0.36	4.37E-05
MOSPD2	0.31	3.11E-04	0.31	6.91E-04	0.31	5.84E-04
MPND	-0.40	1.57E-06	-0.41	3.26E-06	-0.41	2.74E-06
MPO	-0.30	5.78E-04	-0.31	4.67E-04	-0.31	3.95E-04
MPP7	0.32	2.27E-04	0.33	2.07E-04	0.33	1.75E-04
MR1	0.35	4.69E-05	0.31	5.28E-04	0.31	4.47E-04
MRE11	0.38	7.11E-06	0.35	6.47E-05	0.35	5.44E-05
MRPL19	0.41	9.01E-07	0.36	3.71E-05	0.36	3.12E-05
MRPL50	0.46	3.36E-08	0.41	3.06E-06	0.41	2.57E-06
MRS2	0.38	6.31E-06	0.33	2.40E-04	0.33	2.03E-04
MSANTD4	0.48	6.53E-09	0.45	1.68E-07	0.45	1.41E-07
MT2A	-0.41	7.92E-07	-0.40	4.02E-06	-0.40	3.39E-06
MTFMT	0.41	7.92E-07	0.33	2.71E-04	0.33	2.28E-04
MTMR9	0.36	1.98E-05	0.33	2.82E-04	0.33	2.38E-04
MTR	0.37	1.77E-05	0.33	2.20E-04	0.33	1.86E-04
MYCBP	0.41	1.30E-06	0.35	6.25E-05	0.35	5.26E-05
NAA50	0.39	4.42E-06	0.36	3.99E-05	0.36	3.36E-05
NAB1	0.38	9.22E-06	0.32	3.35E-04	0.32	2.83E-04
NAB2	-0.33	1.15E-04	-0.40	5.25E-06	-0.40	4.42E-06
NANP	0.44	1.15E-07	0.39	8.08E-06	0.39	6.80E-06
NAPA	-0.39	3.68E-06	-0.37	2.97E-05	-0.37	2.50E-05
NBL1	-0.32	1.65E-04	-0.42	1.26E-06	-0.42	1.06E-06

NBN	0.45	7.27E-08	0.42	1.72E-06	0.42	1.45E-06
NBR1	0.43	2.85E-07	0.42	1.26E-06	0.42	1.06E-06
NCBP1	0.39	3.95E-06	0.36	5.94E-05	0.36	4.98E-05
NCLN	-0.30	5.23E-04	-0.37	2.23E-05	-0.37	1.88E-05
NDC1	0.41	9.49E-07	0.37	3.52E-05	0.37	2.97E-05
NDFIP1	0.32	1.97E-04	0.31	5.73E-04	0.31	4.84E-04
NDUFA11	-0.30	5.32E-04	-0.36	4.82E-05	-0.36	4.06E-05
NDUFA13	-0.38	9.32E-06	-0.42	1.18E-06	-0.42	9.97E-07
NDUFAF3	-0.37	1.37E-05	-0.39	9.99E-06	-0.39	8.41E-06
NDUFB11	-0.39	4.81E-06	-0.44	4.52E-07	-0.44	3.81E-07
NDUFB7	-0.33	1.36E-04	-0.38	1.24E-05	-0.38	1.05E-05
NEDD1	0.32	2.07E-04	0.32	3.21E-04	0.32	2.71E-04
NEK6	0.35	3.91E-05	0.33	1.79E-04	0.33	1.51E-04
NEK9	0.43	1.82E-07	0.47	9.10E-08	0.47	7.57E-08
NEPRO	0.41	1.02E-06	0.37	2.11E-05	0.37	1.78E-05
NFYC	-0.33	1.63E-04	-0.37	3.12E-05	-0.37	2.63E-05
NIPAL2	0.38	8.03E-06	0.34	1.66E-04	0.34	1.40E-04
NIPBL	0.40	2.42E-06	0.40	5.77E-06	0.40	4.86E-06
NKG7	-0.32	2.33E-04	-0.31	5.78E-04	-0.31	4.89E-04
NKIRAS2	-0.34	8.67E-05	-0.40	6.95E-06	-0.40	5.85E-06
NKRF	0.40	2.22E-06	0.33	1.91E-04	0.33	1.61E-04
NKX2-3	0.40	2.62E-06	0.38	1.42E-05	0.38	1.20E-05
NLN	0.44	1.48E-07	0.41	3.56E-06	0.41	2.99E-06
NME4	-0.32	2.59E-04	-0.37	2.13E-05	-0.37	1.79E-05
NMNAT1	0.36	2.25E-05	0.32	4.49E-04	0.32	3.79E-04
NOC3L	0.35	4.55E-05	0.32	3.49E-04	0.32	2.95E-04
NOL8	0.37	1.23E-05	0.30	8.26E-04	0.30	6.99E-04
NPAT	0.35	3.61E-05	0.35	1.02E-04	0.35	8.66E-05
NR1H2	-0.34	7.35E-05	-0.36	5.76E-05	-0.36	4.85E-05

NRBP1	-0.32	2.18E-04	-0.37	2.90E-05	-0.37	2.44E-05
NRG4	0.42	5.28E-07	0.38	1.46E-05	0.38	1.23E-05
NSF	0.38	6.03E-06	0.32	3.35E-04	0.32	2.83E-04
NUCKS1	0.34	5.61E-05	0.30	8.37E-04	0.30	7.08E-04
NUDT21	0.46	3.05E-08	0.40	6.62E-06	0.40	5.58E-06
NUFIP2	0.40	1.57E-06	0.39	1.06E-05	0.39	8.89E-06
NUP133	0.40	2.03E-06	0.33	2.47E-04	0.33	2.10E-04
NXPE3	0.44	8.91E-08	0.43	8.84E-07	0.43	7.44E-07
OGFOD3	-0.33	1.29E-04	-0.38	1.28E-05	-0.38	1.08E-05
OIP5-AS1	0.43	3.34E-07	0.36	4.69E-05	0.36	3.95E-05
OPA1	0.44	1.15E-07	0.41	2.60E-06	0.41	2.18E-06
ORC2	0.38	6.69E-06	0.34	1.13E-04	0.34	9.55E-05
ORC3	0.36	1.89E-05	0.32	4.13E-04	0.32	3.49E-04
OSBPL8	0.40	2.19E-06	0.44	3.92E-07	0.44	3.30E-07
OTUD4	0.42	5.26E-07	0.40	4.15E-06	0.40	3.49E-06
OTUD6B	0.37	9.99E-06	0.33	1.88E-04	0.33	1.59E-04
OXR1	0.44	1.62E-07	0.44	3.93E-07	0.44	3.31E-07
P2RY11	-0.35	4.58E-05	-0.36	4.44E-05	-0.36	3.73E-05
P4HA1	0.42	5.97E-07	0.38	1.41E-05	0.38	1.19E-05
PABIR1	0.39	3.08E-06	0.32	3.32E-04	0.32	2.80E-04
PALB2	0.37	9.89E-06	0.32	4.46E-04	0.32	3.77E-04
PAPOLA	0.42	4.10E-07	0.39	8.27E-06	0.39	6.96E-06
PAQR3	0.37	1.69E-05	0.35	1.04E-04	0.35	8.80E-05
PAQR8	0.45	6.94E-08	0.41	3.74E-06	0.41	3.15E-06
PARPBP	0.35	5.37E-05	0.32	3.60E-04	0.32	3.03E-04
PAX6	0.44	9.96E-08	0.39	1.17E-05	0.39	9.85E-06
PBRM1	0.32	1.77E-04	0.31	6.29E-04	0.31	5.31E-04
PBX3	0.37	1.49E-05	0.33	1.78E-04	0.33	1.51E-04
PBX4	-0.30	4.75E-04	-0.30	8.13E-04	-0.30	6.88E-04

PCNP	0.36	2.86E-05	0.32	3.67E-04	0.32	3.10E-04
PDCD6IP	0.42	3.81E-07	0.39	1.05E-05	0.39	8.75E-06
PDE3B	-0.34	9.26E-05	-0.32	4.47E-04	-0.32	3.78E-04
PDE7B	0.35	3.97E-05	0.31	6.39E-04	0.31	5.40E-04
PDGFD	0.40	1.48E-06	0.39	1.05E-05	0.39	8.78E-06
PDHX	0.43	2.08E-07	0.39	1.04E-05	0.39	8.75E-06
PDP1	0.32	2.55E-04	0.33	2.83E-04	0.33	2.39E-04
PDS5A	0.38	6.27E-06	0.34	1.28E-04	0.34	1.08E-04
PEX2	0.34	8.25E-05	0.31	7.11E-04	0.31	6.01E-04
PFN1	-0.32	2.18E-04	-0.34	1.72E-04	-0.34	1.45E-04
PGAP6	-0.31	4.30E-04	-0.31	5.47E-04	-0.31	4.63E-04
PGBD3	0.34	6.73E-05	0.31	4.86E-04	0.31	4.11E-04
PGGT1B	0.30	5.74E-04	0.33	2.85E-04	0.33	2.41E-04
PGM2	0.51	4.37E-10	0.49	2.30E-08	0.49	1.94E-08
PHF6	0.38	6.19E-06	0.33	2.33E-04	0.33	1.97E-04
PHKB	0.41	1.32E-06	0.38	1.27E-05	0.38	1.07E-05
PI4K2B	0.37	9.51E-06	0.35	7.45E-05	0.35	6.28E-05
PIEZO2	0.34	9.24E-05	0.32	3.38E-04	0.32	2.85E-04
PIGN	0.36	2.73E-05	0.30	8.67E-04	0.30	7.34E-04
PIGQ	-0.30	5.57E-04	-0.34	1.29E-04	-0.34	1.09E-04
PIK3C2A	0.37	1.78E-05	0.38	1.46E-05	0.38	1.23E-05
PIK3C3	0.41	9.46E-07	0.39	7.75E-06	0.39	6.52E-06
PIK3CG	0.35	5.37E-05	0.34	1.55E-04	0.34	1.31E-04
PIM3	-0.37	1.41E-05	-0.39	1.06E-05	-0.39	8.93E-06
PIN1	-0.35	3.34E-05	-0.45	1.88E-07	-0.45	1.58E-07
PIP4P1	-0.32	2.67E-04	-0.37	3.13E-05	-0.37	2.64E-05
PLA2G4A	0.52	3.45E-10	0.49	1.45E-08	0.49	1.22E-08
PLEKHA8P1	0.39	4.18E-06	0.32	3.63E-04	0.32	3.07E-04
PLEKHG3	-0.41	7.53E-07	-0.38	1.70E-05	-0.38	1.43E-05

PLIN2	-0.33	1.29E-04	-0.32	2.97E-04	-0.32	2.51E-04
PLRG1	0.45	7.58E-08	0.36	3.91E-05	0.36	3.29E-05
PLS1	0.38	8.50E-06	0.33	2.31E-04	0.33	1.95E-04
PLXNB1	-0.30	4.83E-04	-0.34	1.50E-04	-0.34	1.27E-04
PNMT	-0.30	5.63E-04	-0.32	3.48E-04	-0.32	2.94E-04
PNPLA2	-0.35	3.83E-05	-0.36	3.91E-05	-0.36	3.29E-05
PNPT1	0.37	1.03E-05	0.31	6.27E-04	0.31	5.30E-04
PNRC2	0.47	1.92E-08	0.40	5.77E-06	0.40	4.86E-06
POC1B	0.46	3.36E-08	0.45	1.95E-07	0.45	1.64E-07
POLD3	0.35	4.96E-05	0.30	7.30E-04	0.30	6.17E-04
POLR2B	0.43	2.63E-07	0.45	2.60E-07	0.45	2.19E-07
POT1	0.39	3.59E-06	0.32	3.02E-04	0.32	2.55E-04
POU6F1	-0.37	1.06E-05	-0.36	5.31E-05	-0.36	4.47E-05
PPA1	0.44	1.43E-07	0.40	4.15E-06	0.40	3.50E-06
PPA2	0.36	1.94E-05	0.31	6.36E-04	0.31	5.37E-04
PPAT	0.39	4.30E-06	0.32	2.89E-04	0.32	2.44E-04
PPIB	-0.35	3.33E-05	-0.36	5.42E-05	-0.36	4.56E-05
PPID	0.45	8.42E-08	0.36	4.33E-05	0.36	3.64E-05
PPIG	0.37	1.49E-05	0.31	6.76E-04	0.31	5.74E-04
PPM1B	0.35	5.24E-05	0.31	6.17E-04	0.31	5.22E-04
PPP1CB	0.33	1.49E-04	0.31	5.66E-04	0.31	4.79E-04
PPP1CC	0.38	8.60E-06	0.37	2.80E-05	0.37	2.36E-05
PPP1R21	0.42	3.81E-07	0.38	1.67E-05	0.38	1.41E-05
PPP2R1B	0.35	5.10E-05	0.30	7.76E-04	0.30	6.56E-04
PPP2R5C	0.43	2.47E-07	0.43	1.03E-06	0.43	8.70E-07
PPP2R5E	0.34	7.49E-05	0.33	2.76E-04	0.33	2.33E-04
PPP4C	-0.31	3.50E-04	-0.37	3.52E-05	-0.37	2.97E-05
PPP4R3B	0.47	2.28E-08	0.44	3.49E-07	0.44	2.93E-07
PPWD1	0.39	4.57E-06	0.39	1.08E-05	0.39	9.12E-06



PRDM16	0.40	1.78E-06	0.40	6.09E-06	0.40	5.13E-06
PRDM16-DT	0.37	1.32E-05	0.37	3.41E-05	0.37	2.87E-05
PRDX3	0.39	4.18E-06	0.37	2.57E-05	0.37	2.16E-05
PRF1	-0.30	4.66E-04	-0.31	7.08E-04	-0.31	5.94E-04
PRKAR2B	0.38	7.65E-06	0.38	1.54E-05	0.38	1.30E-05
PRKCSH	-0.34	5.72E-05	-0.39	7.85E-06	-0.39	6.61E-06
PRPF40A	0.40	1.54E-06	0.34	1.08E-04	0.34	9.16E-05
PRR14	-0.34	7.49E-05	-0.39	1.16E-05	-0.39	9.75E-06
PRRT4	-0.40	1.62E-06	-0.41	3.71E-06	-0.41	3.13E-06
PRXL2B	-0.36	3.13E-05	-0.43	8.21E-07	-0.43	6.91E-07
PSMB4	-0.33	1.48E-04	-0.39	1.09E-05	-0.39	9.16E-06
PSTPIP2	0.38	7.63E-06	0.33	1.81E-04	0.33	1.53E-04
PTAR1	0.33	1.27E-04	0.32	4.43E-04	0.32	3.74E-04
PTBP3	0.42	4.51E-07	0.39	7.88E-06	0.39	6.64E-06
PTER	0.43	2.44E-07	0.42	1.62E-06	0.42	1.36E-06
PTOV1	-0.37	1.25E-05	-0.45	2.36E-07	-0.45	1.99E-07
PTPN11	0.37	1.73E-05	0.32	2.97E-04	0.32	2.51E-04
PUS10	0.33	1.45E-04	0.35	7.58E-05	0.35	6.39E-05
PUS7L	0.39	3.15E-06	0.36	5.51E-05	0.36	4.64E-05
QTRT2	0.40	2.25E-06	0.35	9.69E-05	0.35	8.18E-05
RAB11FIP2	0.38	7.85E-06	0.35	8.50E-05	0.35	7.17E-05
RAB14	0.35	3.79E-05	0.30	8.12E-04	0.30	6.87E-04
RAB3GAP1	0.38	7.64E-06	0.35	8.27E-05	0.35	6.97E-05
RAB3GAP2	0.40	2.45E-06	0.34	1.73E-04	0.34	1.46E-04
RAB4B	-0.30	5.33E-04	-0.32	3.78E-04	-0.32	3.19E-04
RAB8B	0.35	3.85E-05	0.35	7.92E-05	0.35	6.68E-05
RABAC1	-0.31	4.44E-04	-0.32	3.31E-04	-0.32	2.79E-04
RABGAP1	0.48	1.05E-08	0.43	9.41E-07	0.43	7.92E-07
RAD50	0.36	2.53E-05	0.30	8.48E-04	0.30	7.17E-04

RALGAPB	0.39	2.98E-06	0.38	1.58E-05	0.38	1.33E-05
RALY	-0.35	3.49E-05	-0.42	1.92E-06	-0.42	1.62E-06
RANBP2	0.35	4.48E-05	0.33	2.65E-04	0.33	2.24E-04
RANBP6	0.43	3.42E-07	0.37	3.02E-05	0.37	2.54E-05
RAPGEF2	0.35	4.06E-05	0.32	3.03E-04	0.32	2.56E-04
RASA2	0.30	5.09E-04	0.30	7.41E-04	0.30	6.27E-04
RASL10A	-0.31	4.31E-04	-0.36	5.92E-05	-0.36	4.98E-05
RBAK	0.33	1.34E-04	0.30	8.29E-04	0.30	7.01E-04
RBBP5	0.36	2.27E-05	0.32	3.96E-04	0.32	3.34E-04
RBBP9	0.39	3.86E-06	0.30	7.94E-04	0.30	6.72E-04
RBFOX3	-0.32	2.27E-04	-0.35	6.84E-05	-0.35	5.75E-05
RBM12	0.40	1.62E-06	0.34	1.36E-04	0.34	1.15E-04
RBM18	0.41	1.27E-06	0.39	1.17E-05	0.39	9.85E-06
RBM41	0.36	1.89E-05	0.33	2.01E-04	0.33	1.69E-04
RBM45	0.41	9.01E-07	0.32	3.62E-04	0.32	3.06E-04
RCHY1	0.45	6.18E-08	0.40	5.77E-06	0.40	4.86E-06
RDM1	0.36	3.03E-05	0.36	5.59E-05	0.36	4.70E-05
RECQL	0.40	2.03E-06	0.39	9.88E-06	0.39	8.31E-06
REXO1	-0.37	9.55E-06	-0.43	1.05E-06	-0.43	8.84E-07
RFXANK	-0.30	5.37E-04	-0.39	7.17E-06	-0.39	6.04E-06
RIOX2	0.40	1.54E-06	0.34	1.52E-04	0.34	1.28E-04
RMDN1	0.40	1.68E-06	0.37	2.57E-05	0.37	2.17E-05
RMI1	0.43	2.12E-07	0.39	8.47E-06	0.39	7.13E-06
RNASEK	-0.31	3.21E-04	-0.30	8.49E-04	-0.30	7.18E-04
RNASEL	0.37	1.22E-05	0.34	1.55E-04	0.34	1.31E-04
RNF13	0.31	3.01E-04	0.32	3.32E-04	0.32	2.80E-04
RNF141	0.45	6.33E-08	0.47	9.10E-08	0.47	7.57E-08
RNF167	-0.32	2.50E-04	-0.35	8.52E-05	-0.35	7.19E-05
RNF2	0.39	2.98E-06	0.34	1.30E-04	0.34	1.10E-04

RNF6	0.37	1.73E-05	0.32	3.32E-04	0.32	2.80E-04
RNGTT	0.38	6.12E-06	0.33	2.25E-04	0.33	1.89E-04
RPAP3	0.43	2.50E-07	0.38	1.20E-05	0.38	1.01E-05
RPE	0.47	2.27E-08	0.45	2.35E-07	0.45	1.98E-07
RPRD1A	0.45	6.20E-08	0.42	1.38E-06	0.42	1.16E-06
RPS19BP1	-0.34	9.53E-05	-0.36	5.42E-05	-0.36	4.56E-05
RPS6KA2	-0.36	2.89E-05	-0.36	4.27E-05	-0.36	3.60E-05
RPS6KA3	0.32	1.66E-04	0.31	6.09E-04	0.31	5.15E-04
RPS6KA5	0.39	4.72E-06	0.40	6.34E-06	0.40	5.34E-06
RPS6KB2	-0.32	2.16E-04	-0.35	9.94E-05	-0.35	8.40E-05
RPS6KC1	0.40	2.59E-06	0.36	5.54E-05	0.36	4.67E-05
RRM2B	0.41	1.32E-06	0.36	4.54E-05	0.36	3.82E-05
RRN3	0.45	6.26E-08	0.40	5.12E-06	0.40	4.31E-06
RTN4IP1	0.40	1.95E-06	0.33	2.75E-04	0.33	2.32E-04
RWDD4	0.32	2.22E-04	0.31	6.48E-04	0.31	5.48E-04
S1PR4	-0.36	1.91E-05	-0.46	1.68E-07	-0.46	1.41E-07
SACM1L	0.37	1.49E-05	0.34	1.37E-04	0.34	1.16E-04
SC5D	0.36	1.81E-05	0.36	5.93E-05	0.36	4.98E-05
SCAF11	0.44	9.90E-08	0.42	1.38E-06	0.42	1.16E-06
SCHIP1	0.40	2.59E-06	0.36	3.88E-05	0.36	3.26E-05
SCLT1	0.32	1.82E-04	0.35	7.51E-05	0.35	6.33E-05
SCOC	0.40	2.42E-06	0.34	1.76E-04	0.34	1.49E-04
SCRN3	0.40	2.10E-06	0.37	2.21E-05	0.37	1.86E-05
SCYL2	0.52	2.96E-10	0.51	2.79E-09	0.51	2.35E-09
SDAD1	0.58	1.81E-13	0.55	1.08E-10	0.55	9.07E-11
SEC13	-0.35	3.95E-05	-0.39	8.47E-06	-0.39	7.13E-06
SEC22B	0.36	1.81E-05	0.35	9.10E-05	0.35	7.67E-05
SEC23A	0.41	8.46E-07	0.38	1.20E-05	0.38	1.01E-05
SEC23B	0.37	1.17E-05	0.35	9.09E-05	0.35	7.67E-05

SEC23IP	0.52	3.45E-10	0.50	1.16E-08	0.50	9.80E-09
SEC24A	0.31	4.57E-04	0.31	6.30E-04	0.31	5.33E-04
SEC63	0.36	2.63E-05	0.32	2.93E-04	0.32	2.47E-04
SEL1L3	0.38	6.19E-06	0.38	1.18E-05	0.38	9.98E-06
SERF2	-0.32	2.16E-04	-0.34	1.33E-04	-0.34	1.12E-04
SERINC1	0.36	2.06E-05	0.36	5.53E-05	0.36	4.66E-05
SERINC3	0.39	4.49E-06	0.36	4.21E-05	0.36	3.54E-05
SERPINF2	-0.36	2.82E-05	-0.35	7.71E-05	-0.35	6.51E-05
SF3B5	-0.38	7.74E-06	-0.42	1.71E-06	-0.42	1.44E-06
SGF29	-0.30	5.67E-04	-0.39	9.43E-06	-0.39	7.94E-06
SGK3	0.40	1.89E-06	0.37	3.22E-05	0.37	2.71E-05
SGPL1	0.39	3.94E-06	0.38	1.30E-05	0.38	1.09E-05
SH3BGRL	0.34	6.96E-05	0.32	3.47E-04	0.32	2.93E-04
SHISAL2A	-0.33	1.43E-04	-0.31	5.70E-04	-0.31	4.82E-04
SHLD2	0.47	1.29E-08	0.46	1.16E-07	0.46	9.73E-08
SHQ1	0.41	8.51E-07	0.32	3.38E-04	0.32	2.85E-04
SIKE1	0.45	8.42E-08	0.41	2.27E-06	0.41	1.91E-06
SIVA1	-0.31	3.55E-04	-0.35	1.03E-04	-0.35	8.69E-05
SKA2	0.39	2.76E-06	0.36	4.35E-05	0.36	3.66E-05
SKAP2	0.40	1.54E-06	0.38	1.46E-05	0.38	1.23E-05
SLC25A12	0.45	8.42E-08	0.41	2.66E-06	0.41	2.24E-06
SLC2A4RG	-0.32	2.42E-04	-0.34	1.20E-04	-0.34	1.02E-04
SLC30A9	0.43	3.38E-07	0.41	3.59E-06	0.41	3.02E-06
SLC35A5	0.35	3.21E-05	0.34	1.55E-04	0.34	1.31E-04
SLC35B1	-0.33	1.49E-04	-0.41	2.87E-06	-0.41	2.42E-06
SLC35B3	0.35	3.44E-05	0.32	3.67E-04	0.32	3.10E-04
SLC35B4	0.48	7.59E-09	0.41	2.66E-06	0.41	2.24E-06
SLC38A9	0.43	2.37E-07	0.42	2.00E-06	0.42	1.68E-06
SLC39A6	0.37	9.62E-06	0.36	5.80E-05	0.36	4.88E-05

SLC39A9	0.48	6.39E-09	0.43	7.48E-07	0.43	6.29E-07
SLC40A1	0.36	3.13E-05	0.33	2.09E-04	0.33	1.76E-04
SLC9A6	0.47	1.92E-08	0.47	8.31E-08	0.47	6.99E-08
SLMAP	0.33	1.37E-04	0.34	1.72E-04	0.34	1.45E-04
SMAD2	0.36	2.35E-05	0.34	1.44E-04	0.34	1.21E-04
SMAD5	0.35	3.53E-05	0.33	2.44E-04	0.33	2.06E-04
SMARCA5	0.50	1.18E-09	0.47	7.79E-08	0.47	6.55E-08
SMC4	0.51	4.11E-10	0.48	2.74E-08	0.48	2.31E-08
SMG1	0.36	1.86E-05	0.31	5.89E-04	0.31	4.98E-04
SMIM15	0.44	1.18E-07	0.40	4.16E-06	0.40	3.50E-06
SMU1	0.34	7.55E-05	0.31	5.26E-04	0.31	4.46E-04
SNAPC3	0.34	9.15E-05	0.30	8.51E-04	0.30	7.20E-04
SNX10	0.42	5.34E-07	0.41	3.74E-06	0.41	3.15E-06
SNX14	0.41	1.36E-06	0.38	1.69E-05	0.38	1.42E-05
SNX22	-0.36	2.00E-05	-0.32	4.33E-04	-0.32	3.66E-04
SOCS4	0.50	9.49E-10	0.47	5.78E-08	0.47	4.86E-08
SOX15	-0.32	2.71E-04	-0.34	1.75E-04	-0.34	1.48E-04
SP1	0.36	2.73E-05	0.31	6.52E-04	0.31	5.51E-04
SP3	0.38	9.28E-06	0.38	1.39E-05	0.38	1.17E-05
SPAG17	0.42	6.06E-07	0.31	6.09E-04	0.31	5.15E-04
SPAG7	-0.32	2.32E-04	-0.40	5.39E-06	-0.40	4.54E-06
SPAST	0.45	8.42E-08	0.43	1.05E-06	0.43	8.84E-07
SPG11	0.43	2.73E-07	0.41	2.15E-06	0.41	1.81E-06
SPRTN	0.34	9.24E-05	0.35	9.60E-05	0.35	8.11E-05
SRFBP1	0.34	8.13E-05	0.30	7.66E-04	0.30	6.48E-04
SRPK1	0.39	4.86E-06	0.31	5.75E-04	0.31	4.86E-04
SSB	0.45	8.42E-08	0.39	7.56E-06	0.39	6.38E-06
SSR1	0.33	1.64E-04	0.30	8.84E-04	0.30	7.48E-04
SSR3	0.32	2.56E-04	0.30	7.17E-04	0.30	6.06E-04

SSR4	-0.32	1.98E-04	-0.32	2.90E-04	-0.32	2.45E-04
STAG2	0.35	5.09E-05	0.34	1.50E-04	0.34	1.27E-04
STAM2	0.41	7.53E-07	0.40	4.83E-06	0.40	4.07E-06
STIM1	-0.31	3.46E-04	-0.36	5.19E-05	-0.36	4.37E-05
STK4	0.33	1.12E-04	0.33	1.96E-04	0.33	1.66E-04
STX12	0.35	4.14E-05	0.34	1.24E-04	0.34	1.05E-04
STX5	-0.36	2.69E-05	-0.35	9.86E-05	-0.35	8.33E-05
STXBP3	0.36	1.88E-05	0.33	1.79E-04	0.33	1.51E-04
SUPT4H1	-0.41	1.32E-06	-0.38	1.73E-05	-0.38	1.46E-05
SYNJ1	0.34	8.63E-05	0.33	2.64E-04	0.33	2.23E-04
SYPL1	0.38	7.74E-06	0.31	5.23E-04	0.31	4.42E-04
SYVN1	-0.30	5.58E-04	-0.34	1.50E-04	-0.34	1.27E-04
TAB1	-0.31	4.35E-04	-0.32	3.20E-04	-0.32	2.70E-04
TAF1A	0.39	4.18E-06	0.37	3.58E-05	0.37	3.01E-05
TAF2	0.40	2.04E-06	0.36	5.51E-05	0.36	4.64E-05
TAF7	0.35	5.24E-05	0.31	7.16E-04	0.31	6.05E-04
TAF9B	0.34	6.52E-05	0.31	7.01E-04	0.31	5.93E-04
TAMALIN	-0.44	1.21E-07	-0.41	2.98E-06	-0.41	2.51E-06
TAOK3	0.40	2.35E-06	0.34	1.70E-04	0.34	1.44E-04
TAS2R60	0.30	5.82E-04	0.31	5.32E-04	0.31	4.50E-04
TASOR2	0.34	9.18E-05	0.31	5.66E-04	0.31	4.79E-04
TBC1D23	0.35	5.37E-05	0.34	1.37E-04	0.34	1.16E-04
TBC1D25	-0.39	3.29E-06	-0.44	5.50E-07	-0.44	4.60E-07
TBC1D5	0.34	5.58E-05	0.32	3.59E-04	0.32	3.03E-04
TBK1	0.34	6.21E-05	0.34	1.72E-04	0.34	1.45E-04
TBL1XR1	0.35	5.29E-05	0.32	4.12E-04	0.32	3.48E-04
TCF25	-0.31	2.88E-04	-0.33	2.03E-04	-0.33	1.71E-04
TDG	0.42	7.20E-07	0.39	1.16E-05	0.39	9.77E-06
TDP2	0.38	7.70E-06	0.33	2.36E-04	0.33	1.99E-04

TECR	-0.33	1.37E-04	-0.41	3.11E-06	-0.41	2.62E-06
TESK1	-0.35	4.47E-05	-0.35	7.87E-05	-0.35	6.63E-05
TFAM	0.41	8.82E-07	0.37	2.57E-05	0.37	2.16E-05
TFB1M	0.38	7.72E-06	0.32	3.66E-04	0.32	3.09E-04
TFCP2	0.43	2.16E-07	0.38	1.65E-05	0.38	1.39E-05
TFEC	0.41	1.28E-06	0.39	8.95E-06	0.39	7.53E-06
TGFB1I1	-0.37	1.69E-05	-0.38	1.90E-05	-0.38	1.60E-05
TGS1	0.37	9.71E-06	0.33	2.85E-04	0.33	2.40E-04
THAP1	0.35	5.01E-05	0.31	6.06E-04	0.31	5.12E-04
THAP12	0.42	3.53E-07	0.39	8.47E-06	0.39	7.13E-06
THAP6	0.35	3.24E-05	0.34	1.28E-04	0.34	1.08E-04
THRA	-0.40	1.89E-06	-0.48	5.31E-08	-0.48	4.47E-08
THUMPD3	0.46	4.44E-08	0.39	8.05E-06	0.39	6.77E-06
TIGD2	0.38	6.18E-06	0.31	6.67E-04	0.31	5.63E-04
TIMM17B	-0.35	3.96E-05	-0.39	7.82E-06	-0.39	6.58E-06
TIPRL	0.40	2.39E-06	0.34	1.22E-04	0.34	1.03E-04
TM9SF3	0.42	7.06E-07	0.40	6.13E-06	0.40	5.16E-06
TMA7	-0.31	2.84E-04	-0.35	6.94E-05	-0.35	5.84E-05
TMED10	0.34	7.61E-05	0.33	2.44E-04	0.33	2.06E-04
TMED5	0.31	3.61E-04	0.31	6.29E-04	0.31	5.31E-04
TMEM106B	0.38	8.06E-06	0.35	1.04E-04	0.35	8.80E-05
TMEM131	0.36	1.89E-05	0.34	1.14E-04	0.34	9.66E-05
TMEM135	0.35	4.48E-05	0.34	1.10E-04	0.34	9.27E-05
TMEM144	0.45	5.75E-08	0.46	1.12E-07	0.46	9.46E-08
TMEM14A	0.35	4.49E-05	0.31	5.96E-04	0.31	5.04E-04
TMEM160	-0.34	6.35E-05	-0.41	3.60E-06	-0.41	3.03E-06
TMEM168	0.39	4.42E-06	0.38	1.37E-05	0.38	1.16E-05
TMEM184C	0.42	4.19E-07	0.38	1.74E-05	0.38	1.47E-05
TMEM19	0.35	3.72E-05	0.32	3.48E-04	0.32	2.93E-04

TMEM192	0.41	1.39E-06	0.35	6.52E-05	0.35	5.49E-05
TMEM209	0.37	1.47E-05	0.33	2.48E-04	0.33	2.10E-04
TMEM255B	-0.40	1.67E-06	-0.34	1.42E-04	-0.34	1.20E-04
TMEM260	0.36	2.08E-05	0.31	4.66E-04	0.31	3.94E-04
TMEM267	0.39	3.93E-06	0.34	1.33E-04	0.34	1.12E-04
TMEM33	0.38	8.80E-06	0.34	1.16E-04	0.34	9.80E-05
TMEM65	0.45	8.42E-08	0.41	2.36E-06	0.41	1.99E-06
TMEM87B	0.43	2.21E-07	0.44	3.92E-07	0.44	3.28E-07
TMIGD2	-0.35	3.68E-05	-0.39	9.77E-06	-0.39	8.22E-06
TMTC3	0.33	1.18E-04	0.34	1.33E-04	0.34	1.12E-04
TMX3	0.51	6.91E-10	0.48	2.74E-08	0.48	2.31E-08
TNFRSF14	-0.37	1.54E-05	-0.35	8.04E-05	-0.35	6.78E-05
TNKS2	0.43	1.90E-07	0.42	1.58E-06	0.42	1.33E-06
TNPO1	0.36	1.81E-05	0.33	2.42E-04	0.33	2.05E-04
TPR	0.39	4.88E-06	0.34	1.18E-04	0.34	9.97E-05
TRAF3IP1	0.41	9.08E-07	0.43	7.04E-07	0.43	5.93E-07
TRAM1	0.38	8.72E-06	0.37	3.22E-05	0.37	2.71E-05
TRAPPC11	0.39	2.77E-06	0.37	3.57E-05	0.37	3.01E-05
TRAPPC13	0.36	2.61E-05	0.33	2.64E-04	0.33	2.23E-04
TRAPPC5	-0.30	5.27E-04	-0.32	3.52E-04	-0.32	2.97E-04
TRAPPC8	0.44	8.91E-08	0.42	1.14E-06	0.42	9.64E-07
TRH	-0.34	6.45E-05	-0.37	2.38E-05	-0.37	2.00E-05
TRIM23	0.33	1.44E-04	0.33	2.47E-04	0.33	2.08E-04
TRIM37	0.35	3.93E-05	0.32	3.96E-04	0.32	3.34E-04
TRIM44	0.34	7.24E-05	0.32	3.54E-04	0.32	2.98E-04
TRIM59	0.40	1.95E-06	0.32	3.50E-04	0.32	2.95E-04
TRIP11	0.33	1.05E-04	0.32	3.92E-04	0.32	3.32E-04
TRIP12	0.39	2.66E-06	0.38	1.96E-05	0.38	1.65E-05
TRIQK	0.33	1.29E-04	0.32	3.66E-04	0.32	3.09E-04



TRIR	-0.45	8.08E-08	-0.47	5.78E-08	-0.47	4.86E-08
TRMT10A	0.35	4.14E-05	0.31	4.70E-04	0.31	3.97E-04
TRMT6	0.38	5.92E-06	0.35	9.76E-05	0.35	8.24E-05
TRPM7	0.40	2.49E-06	0.37	2.13E-05	0.37	1.79E-05
TSC22D4	-0.37	9.50E-06	-0.44	5.41E-07	-0.44	4.56E-07
TSEN54	-0.31	4.30E-04	-0.38	1.18E-05	-0.38	9.98E-06
TSLP	0.35	4.52E-05	0.35	7.71E-05	0.35	6.51E-05
TSSC4	-0.30	5.06E-04	-0.35	8.93E-05	-0.35	7.53E-05
TTC21B	0.36	2.44E-05	0.35	7.71E-05	0.35	6.51E-05
TTC27	0.41	1.23E-06	0.37	2.41E-05	0.37	2.03E-05
TTC30A	0.33	1.09E-04	0.31	5.43E-04	0.31	4.59E-04
TTC30B	0.38	6.15E-06	0.34	1.59E-04	0.34	1.34E-04
TUBB4A	-0.36	3.15E-05	-0.35	6.84E-05	-0.35	5.75E-05
TXNDC16	0.36	2.86E-05	0.38	1.20E-05	0.38	1.01E-05
U2SURP	0.40	2.38E-06	0.36	4.49E-05	0.36	3.78E-05
UBALD2	-0.30	5.56E-04	-0.34	1.06E-04	-0.34	8.95E-05
UBE2K	0.38	8.42E-06	0.31	5.66E-04	0.31	4.79E-04
UBE2M	-0.33	1.30E-04	-0.40	4.87E-06	-0.40	4.10E-06
UBE2S	-0.34	5.68E-05	-0.37	2.21E-05	-0.37	1.86E-05
UBE4A	0.35	5.09E-05	0.30	7.24E-04	0.30	6.12E-04
UBLCP1	0.43	3.37E-07	0.41	3.60E-06	0.41	3.03E-06
UBQLN2	0.36	2.25E-05	0.30	8.29E-04	0.30	7.01E-04
UBR3	0.35	4.90E-05	0.36	4.22E-05	0.36	3.55E-05
UBTD2	0.36	2.26E-05	0.31	5.01E-04	0.31	4.24E-04
UBXN1	-0.36	2.78E-05	-0.36	4.64E-05	-0.36	3.90E-05
UBXN2B	0.44	1.62E-07	0.45	2.66E-07	0.45	2.24E-07
UBXN4	0.46	2.33E-08	0.41	2.91E-06	0.41	2.45E-06
UBXN6	-0.30	5.87E-04	-0.34	1.30E-04	-0.34	1.10E-04
UCA1	-0.36	2.62E-05	-0.30	8.52E-04	-0.30	7.20E-04

UCHL5	0.35	3.79E-05	0.32	3.64E-04	0.32	3.08E-04
UFL1	0.42	5.44E-07	0.40	5.85E-06	0.40	4.93E-06
UHRF1BP1L	0.45	6.42E-08	0.46	1.68E-07	0.46	1.41E-07
USP1	0.36	1.81E-05	0.33	2.41E-04	0.33	2.03E-04
USP25	0.36	2.06E-05	0.36	4.10E-05	0.36	3.46E-05
USP33	0.33	1.11E-04	0.34	1.18E-04	0.34	9.96E-05
USP38	0.37	1.27E-05	0.32	3.05E-04	0.32	2.58E-04
USP40	0.38	8.87E-06	0.32	3.88E-04	0.32	3.28E-04
USP47	0.35	4.60E-05	0.31	6.33E-04	0.31	5.33E-04
USP7	0.34	8.15E-05	0.34	1.55E-04	0.34	1.31E-04
USP8	0.31	3.10E-04	0.33	1.91E-04	0.33	1.61E-04
USP9X	0.34	8.07E-05	0.33	1.89E-04	0.33	1.59E-04
UTP20	0.40	2.46E-06	0.34	1.44E-04	0.34	1.22E-04
UTP23	0.39	3.14E-06	0.35	6.72E-05	0.35	5.66E-05
UTP25	0.36	3.16E-05	0.30	7.77E-04	0.30	6.57E-04
UTP3	0.47	1.89E-08	0.42	1.18E-06	0.42	9.93E-07
VAV3	0.39	4.62E-06	0.35	6.97E-05	0.35	5.87E-05
VCPIP1	0.35	5.27E-05	0.32	3.48E-04	0.32	2.94E-04
VIRMA	0.37	1.74E-05	0.31	6.52E-04	0.31	5.51E-04
VNN1	0.36	2.27E-05	0.35	9.59E-05	0.35	8.10E-05
VPS26A	0.41	8.45E-07	0.40	6.09E-06	0.40	5.13E-06
VPS41	0.44	9.90E-08	0.43	1.03E-06	0.43	8.70E-07
VPS45	0.41	1.20E-06	0.37	2.55E-05	0.37	2.15E-05
VPS4B	0.38	8.71E-06	0.35	1.05E-04	0.35	8.87E-05
VPS50	0.45	5.75E-08	0.44	3.26E-07	0.44	2.75E-07
VPS54	0.39	2.94E-06	0.38	1.44E-05	0.38	1.21E-05
VRK2	0.44	1.57E-07	0.40	6.25E-06	0.40	5.26E-06
VTA1	0.44	1.57E-07	0.36	5.18E-05	0.36	4.36E-05
VWF	0.34	8.60E-05	0.32	3.64E-04	0.32	3.08E-04

WAPL	0.34	9.53E-05	0.31	6.27E-04	0.31	5.30E-04
WASHC4	0.33	1.64E-04	0.33	2.77E-04	0.33	2.34E-04
WASHC5	0.56	1.93E-12	0.54	2.44E-10	0.54	2.05E-10
WDR11	0.39	4.30E-06	0.38	1.75E-05	0.38	1.47E-05
WDR3	0.38	7.00E-06	0.31	7.11E-04	0.31	6.01E-04
WDR36	0.49	2.14E-09	0.44	3.92E-07	0.44	3.30E-07
WDR44	0.31	3.55E-04	0.32	2.91E-04	0.32	2.46E-04
WDR75	0.45	7.58E-08	0.41	2.27E-06	0.41	1.91E-06
WNT7B	0.38	9.00E-06	0.33	2.72E-04	0.33	2.30E-04
XPO1	0.45	7.09E-08	0.41	3.35E-06	0.41	2.82E-06
XRN2	0.37	1.66E-05	0.34	1.50E-04	0.34	1.27E-04
YIPF4	0.35	4.07E-05	0.30	8.27E-04	0.30	7.00E-04
YJU2	-0.31	3.78E-04	-0.38	2.09E-05	-0.38	1.76E-05
YME1L1	0.43	2.44E-07	0.36	5.12E-05	0.36	4.31E-05
YWHAB	0.33	1.06E-04	0.31	4.85E-04	0.31	4.11E-04
ZAP70	-0.31	4.12E-04	-0.31	5.89E-04	-0.31	4.98E-04
ZBTB1	0.32	1.73E-04	0.31	4.80E-04	0.31	4.06E-04
ZBTB17	-0.34	7.90E-05	-0.37	3.51E-05	-0.37	2.96E-05
ZBTB24	0.47	1.92E-08	0.44	5.08E-07	0.44	4.28E-07
ZBTB33	0.44	1.12E-07	0.42	1.88E-06	0.42	1.58E-06
ZBTB38	0.31	2.94E-04	0.33	1.89E-04	0.33	1.59E-04
ZBTB41	0.37	1.74E-05	0.36	5.18E-05	0.36	4.36E-05
ZBTB6	0.49	2.54E-09	0.45	1.71E-07	0.45	1.44E-07
ZC3H3	-0.32	2.56E-04	-0.38	1.84E-05	-0.38	1.55E-05
ZC3H7A	0.45	6.26E-08	0.42	2.08E-06	0.42	1.75E-06
ZDHHC12	-0.34	5.70E-05	-0.39	7.24E-06	-0.39	6.09E-06
ZDHHC13	0.46	2.74E-08	0.45	2.25E-07	0.45	1.90E-07
ZFAND6	0.34	6.07E-05	0.35	8.89E-05	0.35	7.49E-05
ZFPL1	-0.36	2.13E-05	-0.40	3.95E-06	-0.40	3.33E-06

ZFR	0.34	7.65E-05	0.31	5.90E-04	0.31	4.99E-04
ZFX	0.32	2.70E-04	0.32	2.97E-04	0.32	2.51E-04
ZHX1	0.37	1.56E-05	0.32	4.11E-04	0.32	3.47E-04
ZMAT5	-0.32	2.24E-04	-0.36	4.24E-05	-0.36	3.57E-05
ZMPSTE24	0.36	1.98E-05	0.33	2.03E-04	0.33	1.72E-04
ZMYM4	0.41	1.32E-06	0.38	2.03E-05	0.38	1.71E-05
ZNF146	0.39	2.95E-06	0.33	2.76E-04	0.33	2.33E-04
ZNF148	0.35	5.38E-05	0.32	2.97E-04	0.32	2.51E-04
ZNF182	0.39	4.29E-06	0.35	7.87E-05	0.35	6.63E-05
ZNF230	0.38	5.37E-06	0.36	4.57E-05	0.36	3.84E-05
ZNF24	0.39	2.66E-06	0.36	4.71E-05	0.36	3.96E-05
ZNF252P	0.47	1.20E-08	0.44	3.93E-07	0.44	3.31E-07
ZNF267	0.38	8.04E-06	0.37	2.79E-05	0.37	2.35E-05
ZNF322	0.36	2.16E-05	0.38	1.55E-05	0.38	1.30E-05
ZNF330	0.45	7.84E-08	0.36	6.14E-05	0.36	5.17E-05
ZNF37A	0.35	5.09E-05	0.30	7.23E-04	0.30	6.11E-04
ZNF41	0.39	4.29E-06	0.35	7.35E-05	0.35	6.20E-05
ZNF420	0.37	1.66E-05	0.33	2.53E-04	0.33	2.13E-04
ZNF441	0.34	6.88E-05	0.30	8.11E-04	0.30	6.86E-04
ZNF449	0.38	6.40E-06	0.39	7.85E-06	0.39	6.61E-06
ZNF518B	0.35	4.96E-05	0.36	5.82E-05	0.36	4.90E-05
ZNF561	0.40	1.43E-06	0.32	3.86E-04	0.32	3.26E-04
ZNF638	0.35	3.24E-05	0.32	3.27E-04	0.32	2.76E-04
ZNF654	0.48	7.07E-09	0.45	2.00E-07	0.45	1.69E-07
ZNF658	0.44	1.17E-07	0.41	2.79E-06	0.41	2.35E-06
ZNF674	0.40	2.20E-06	0.37	2.62E-05	0.37	2.20E-05
ZNF75D	0.40	1.95E-06	0.38	1.22E-05	0.38	1.02E-05
ZNF761	0.41	1.27E-06	0.35	6.81E-05	0.35	5.73E-05
ZNF770	0.38	8.03E-06	0.37	3.22E-05	0.37	2.71E-05

ZNF780A	0.39	3.55E-06	0.39	7.63E-06	0.39	6.42E-06
ZNF787	-0.31	3.55E-04	-0.35	7.22E-05	-0.35	6.08E-05
ZNF81	0.38	8.72E-06	0.34	1.15E-04	0.34	9.67E-05
ZNF813	0.38	7.75E-06	0.32	4.06E-04	0.32	3.43E-04
ZSCAN29	0.36	1.91E-05	0.31	5.77E-04	0.31	4.88E-04

\*,  $q$ -Value < 0.001 and |Spearman's Correlation|  $\geq$  0.3 as cut-off criteria. SPCL, Spearman's Correlation.