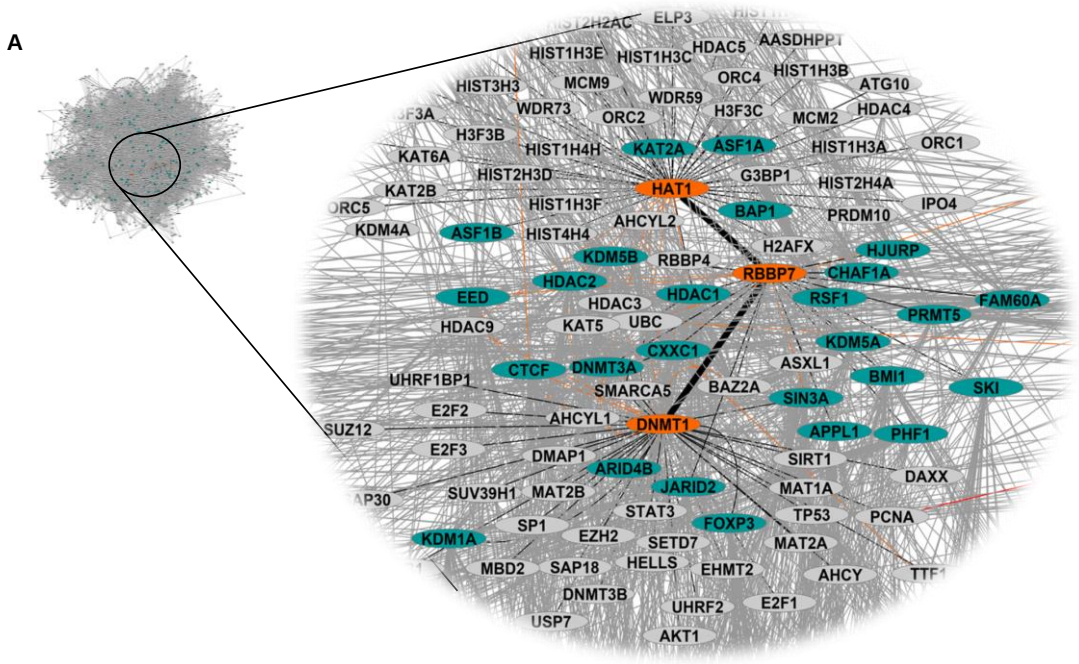


**Figure S1. Predicted AMPK-regulated epigenetic network.** Bioinformatics display demonstrating DNMT1, RBBP7, and HAT1 as central nodes (orange) in epigenetic regulation. Green nodes represent other proteins containing an AMPK phosphorylation consensus sequence, and gray nodes represent proteins of close association.

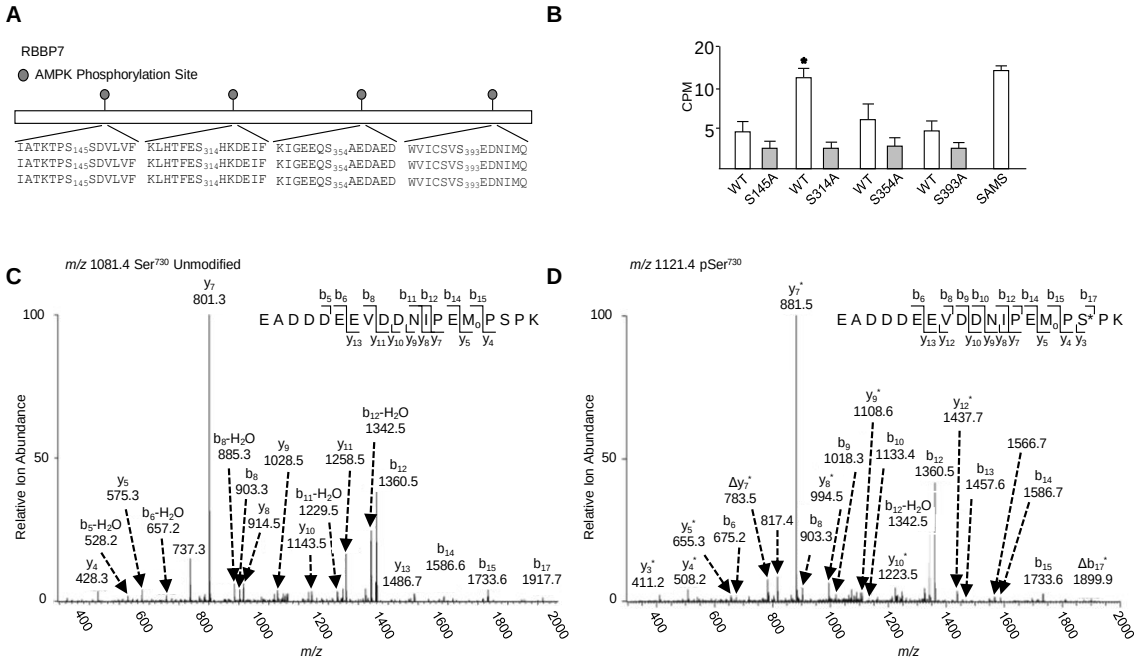


**Figure S2. Phosphorylation of RBBP7 and DNMT1 by AMPK.**(A) Illustration of AMPK consensus sequences on RBBP7. (B) Kinase assays using recombinant target RBBP7 peptides in the presence or absence of activated recombinant AMPKα2β1γ1. N=2 independent experiments. (C) The product-ion spectrum (MS/MS) of the $[M + 2H]^{2+}$ ions of unmodified peptide with residues 714-732 from the tryptic digestion mixture of recombinant DNMT1. (D) MS/MS of the $[M + 2H]^{2+}$ ion of the monophosphorylated peptide containing residues 714-732 of DNMT1 with $Ser^{730}$ being phosphorylated by AMPK. Methionine oxidation is labeled as (o), an asterisk (*) indicates those ions bearing a phosphate group, and neutral loss of an $H_3PO_4$ is designated by a triangle (Δ). N=2 independent experiments.

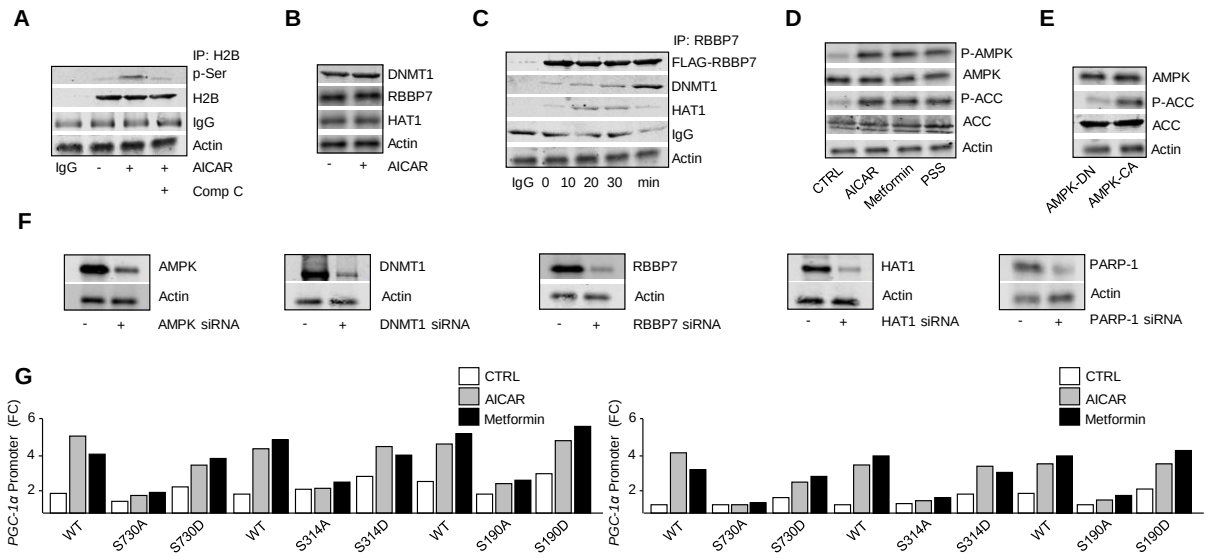


**Figure S3. Confirmation of pharmacologically induced AMPK activation and siRNA efficacy and time course analysis of RBBP7 interaction with DNMT1 and HAT1. (A)** H2B immunoprecipitation followed by immunoblotting. IgG represents an immunoprecipitation control. N=2 independent experiments. (B) Immunoblot of DNMT, RBBP7, and HAT1 in HUVECs treated with AICAR or left untreated. N=4 independent experiments. (C) CoIP-immunoblots in HUVECs transfected with WT RBBP7 treated with or without AICAR. IgG represents an immunoprecipitation control. N=2 independent experiments. (D-E) Immunoblots demonstrating AMPK activation and phosphorylation of ACC upon indicated treatments. N=2 independent experiments. (F) Immunoblots demonstrating knockdown efficiency (> 60%) for the respective siRNAs. N > 3 independent experiments and performed on all experiments using siRNA. (G) ChIP using CREB antibody in HUVECS transfected with indicated forms of DNMT1, RBBP7, and HAT1 and treated with or without AICAR or metformin. N=2 independent experiments. Significance of $P < 0.05$ is represented by (*).

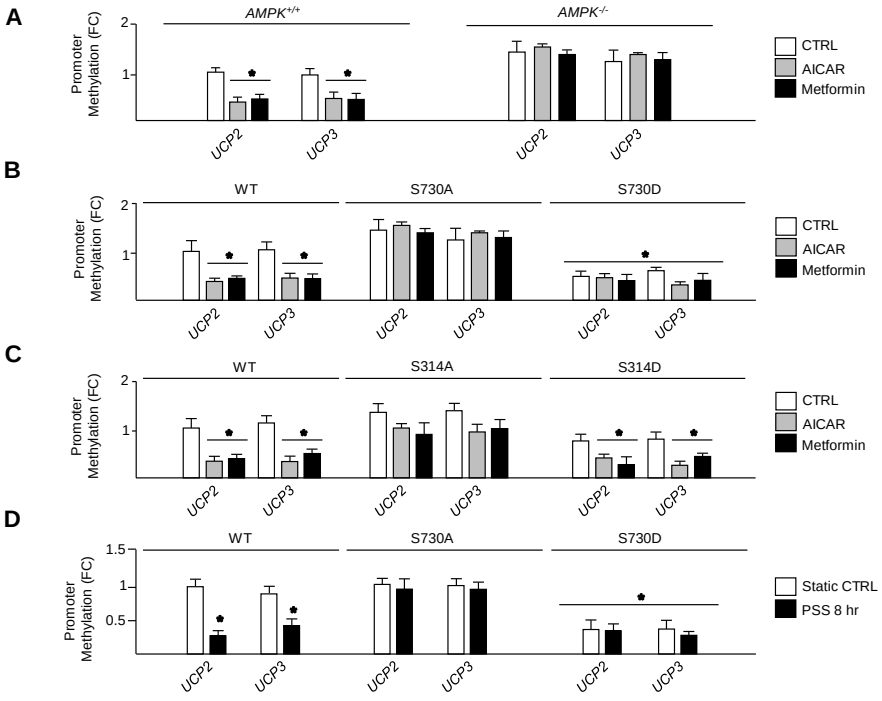


**Figure S4. AMPK activation decreased *UCP2* and *UCP3* promoter methylation.** (A to D) Methylation specific qPCR analysis of promoter methylation in (A) AICAR- or metformin-treated *AMPK*$^{+/+}$ and *AMPK*$^{-/-}$ MEFs; (B, C) HUVECs transfected with indicated forms of DNMT1 or RBBP7 and treated as indicated; (D) HUVECs transfected with DNMT1-S730, -S730A, or -S730D and subjected to PSS. N=4 independent experiments for (A-C) and N=3 independent experiments for (D). Significance of $P < 0.05$ is represented by (*).

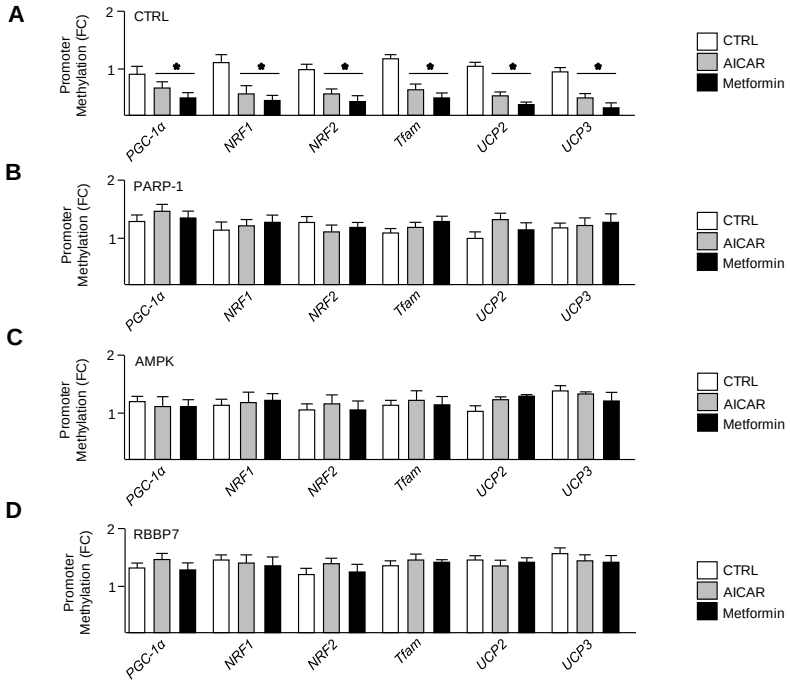


**Figure S5. AMPK activation decreased promoter methylation in an AMPK- and RBBP7-dependent manner.** (A to D) Methylation specific qPCR analysis of promoter methylation in AICAR- or metformin-treated HUVECs transfected with control siRNA (A), PARP-1 siRNA (B), AMPK siRNA (C) or RBBP7 siRNA (D). N=4 independent experiments for (A) to (D). Significance of $P < 0.05$ is represented by (*).

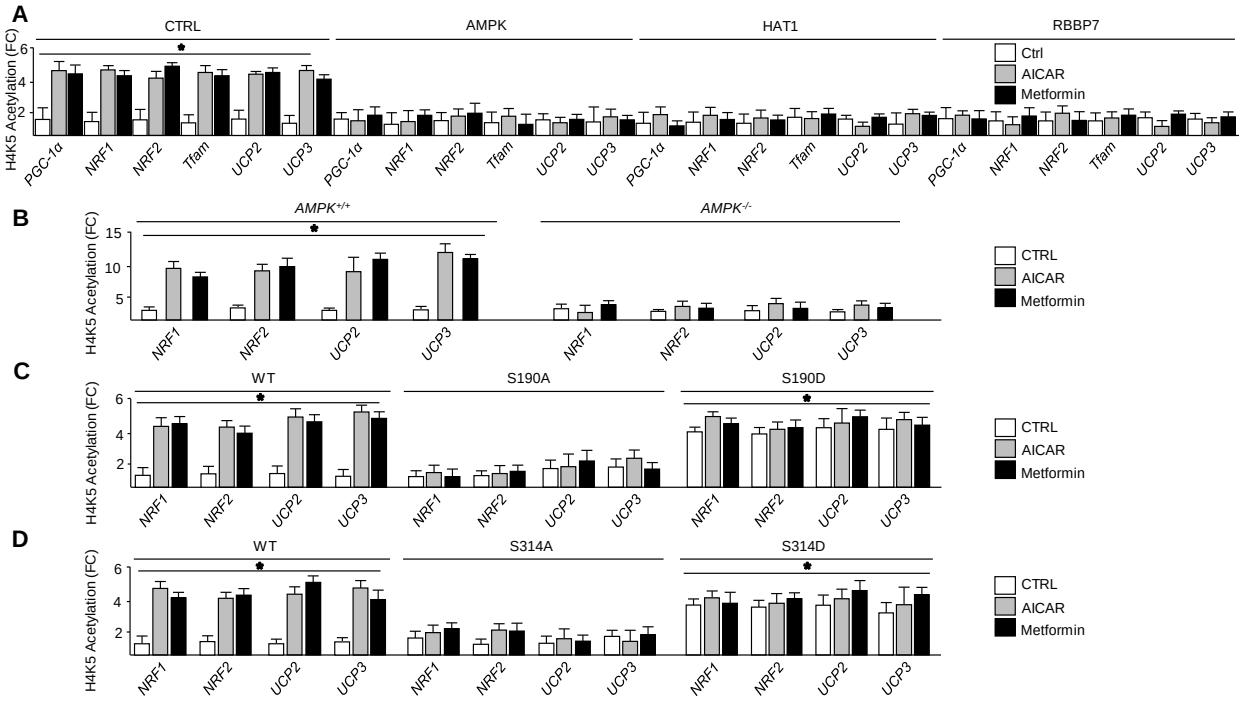


**Figure S6. AMPK activation enhanced *NRF1*, *NFR2*, *UCP*2, and *UCP3* promoter histone acetylation through HAT1 and RBBP7**. (A) H4K5 acetylation in AICAR- or metformin-treated HUVECs transfected with control, AMPK, HAT1 or RBBP7 siRNA. N=4 independent experiments. (B) H4K5 acetylation in $AMPK^{+/+}$ or $AMPK^{-/-}$ MEFs treated with or without AICAR or metformin compared with untreated $AMPK^{+/+}$ group. N=4 independent experiments. (C) H4K5 acetylation in HUVECs expressing indicated forms of HAT1 treated as indicted or left untreated. N=4 independent experiments. (D) H4K5 acetylation in HUVECs expressing the indicated forms of RBBP7 and treated as indicated. N=4 independent experiments for (D). Dashed lines (A, C, & D) indicate control values of the reference group in which the cells were transfected with WT plasmids and not treated. Significance of $P < 0.05$ is represented by (*).

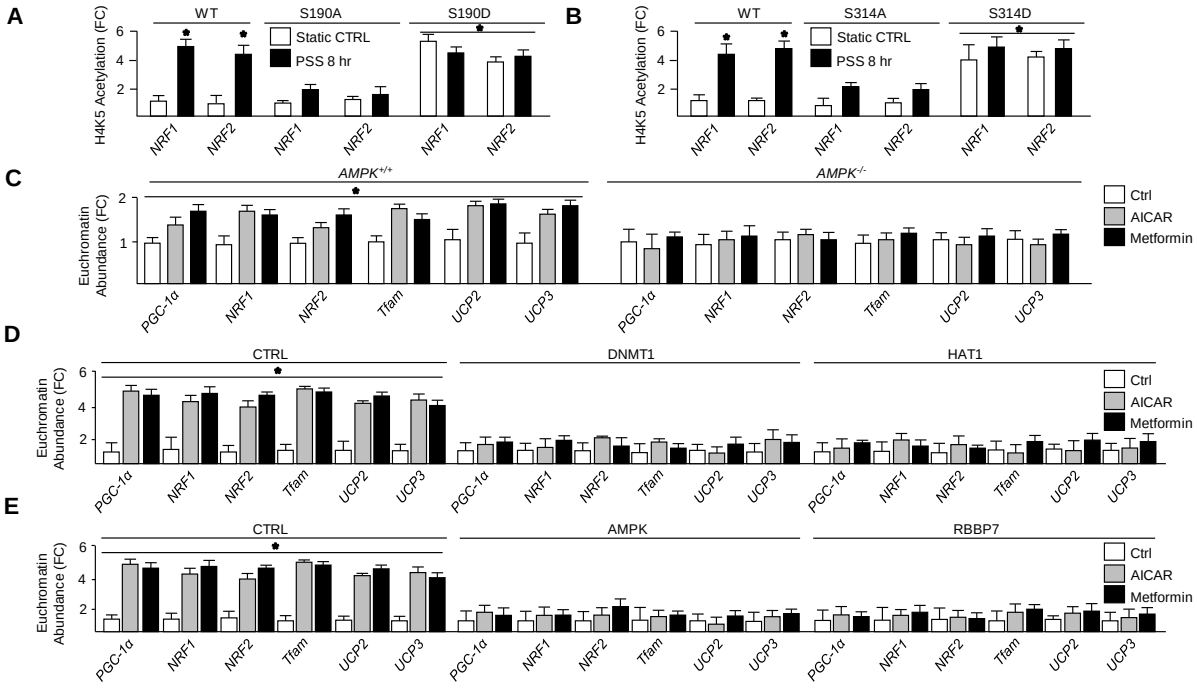


**Figure S7. AMPK activation decreased nucleosomal compaction of *PGC-1α, NRF1, NRF2, Tfam, UCP2,* and *UCP3* genes.** (A-B) H4K5 acetylation in HUVECs expressing indicated forms of HAT1 or RBBP7 and treated with PSS. N=3 independent experiments. (C-E) FAIRE analysis in HUVECs transfected with various siRNAs as indicated and then treated with or without AICAR or metformin. N=4 independent experiments. Significance of $P < 0.05$ is represented by (*).

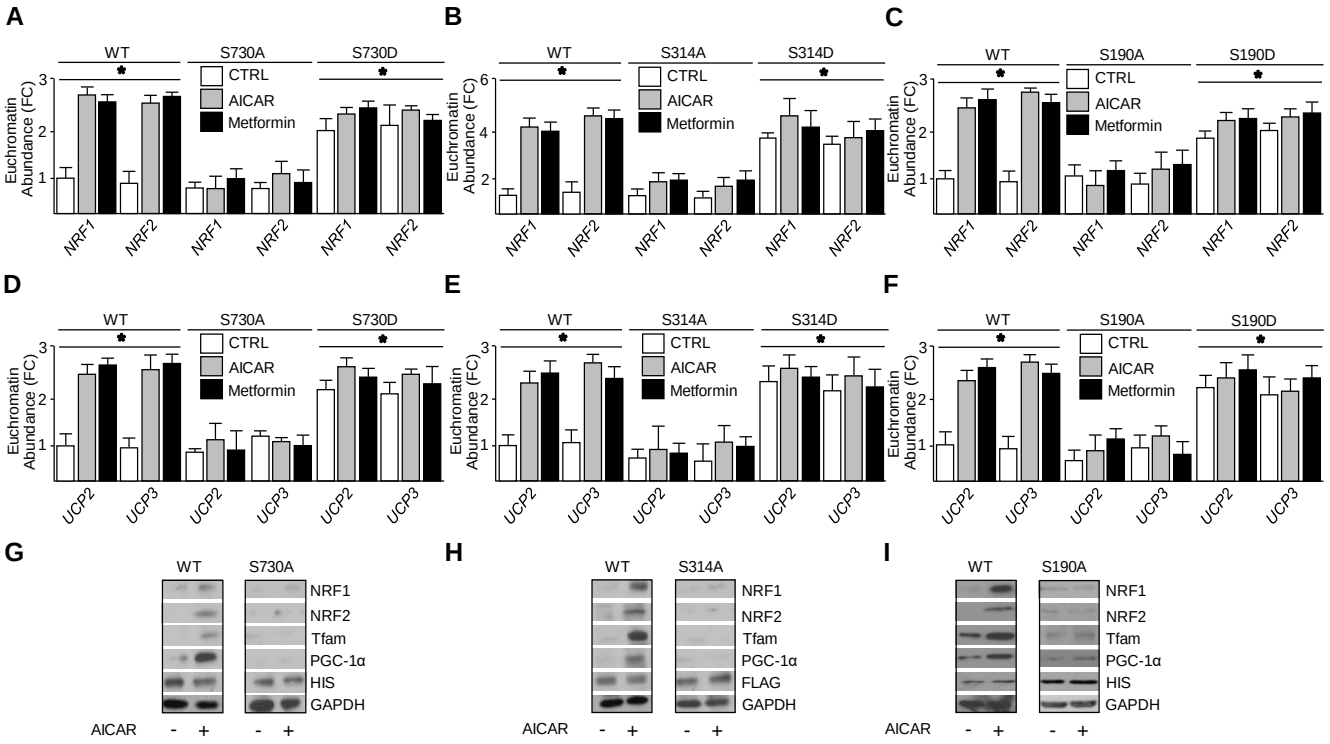


**Figure S8. AMPK activation decreased nucleosomal compaction in promoters of *NRF1*, *NFR2*, *UCP2*, and *UCP3* resulting in increased translation.** (A-F) FAIRE analysis in HUVECs transfected with plasmids encoding various forms of DNMT1, HAT1, or RBBP7 as indicated and then treated with or without AICAR or metformin. N=4 independent experiments. Dashed lines in A to F indicate control values of the reference group in which the cells were transfected with WT plasmids and not treated. (G-I) Immunoblots of cell lysates from HUVECs transfected with indicated forms of DNMT1 (G), RBBP7 (H), and HAT1 (I) and treated with or without AICAR. N=4 independent experiments. Significance of $P < 0.05$ is represented by (*).

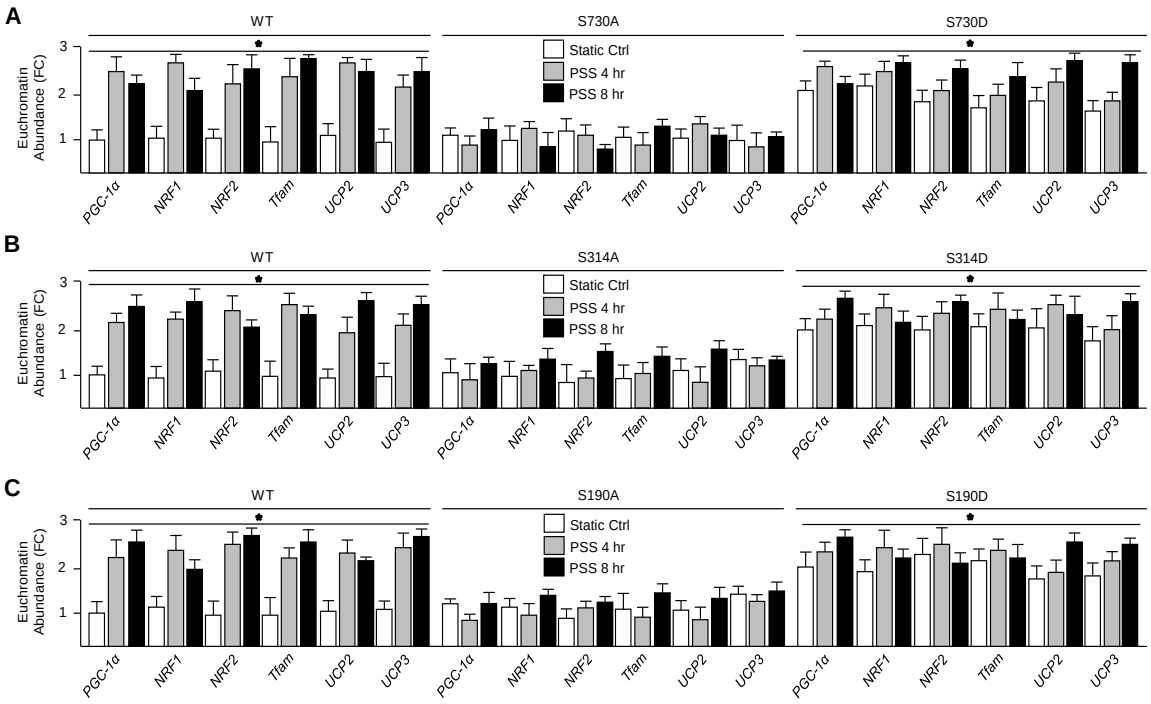


**Figure S9. Pulsatile shear stress decreased nucleosomal compaction of a metabolic transcriptome**. HUVECs were transfected with indicated forms of DNMT1 (A), RBBP7 (B), or HAT1 (C). The transfected cells were then subjected to PSS for 4 or 8 hr or kept as static control. N=3 independent experiments. Dashed lines indicate control values of cells under static conditions. Significance of $P < 0.05$ is represented by (*).

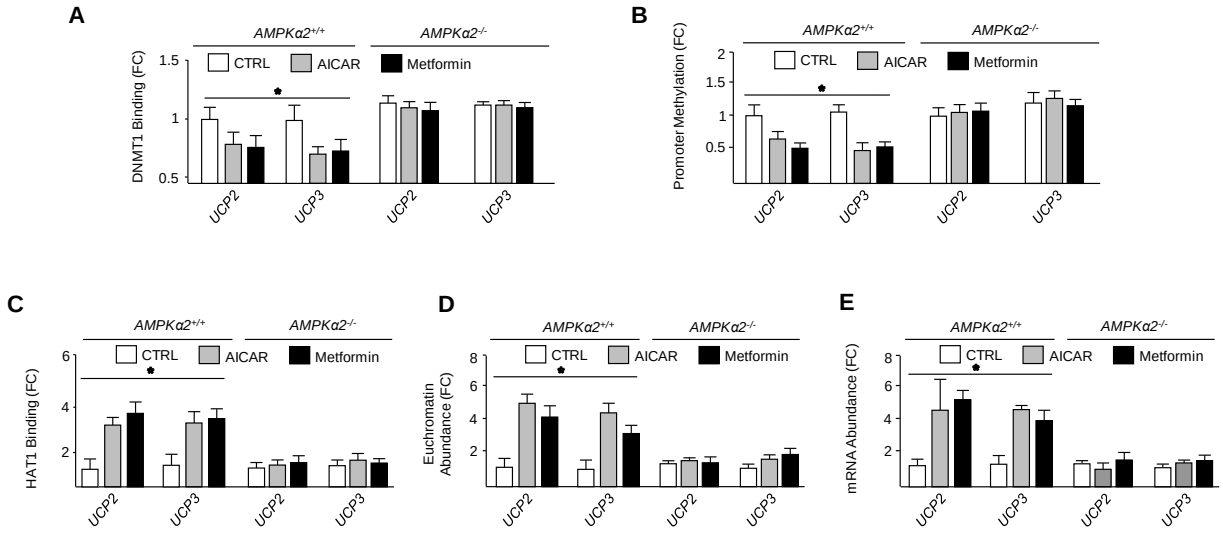


**Figure S10. AICAR regulated nucleosomal remodeling and gene expression of *UCP2* and *UCP3* through AMPKα2 in vivo.** Aortae were isolated from *AMPKα2*$^{+/+}$ and *AMPKα2*$^{-/-}$ mice administered AICAR or metformin. (A) DNMT1 binding to promoters; (B) Methylation status; (C) HAT1 binding to promoters; (D) Euchromatin abundance; and (E) Abundance of the indicated mRNAs. N= 12 mice per genotype and treatment. Dashed lines indicate control values for the non-treated *AMPK*$^{+/+}$ group. Significance of $P < 0.05$ is represented by (*).

| Gene Symbol | Gene Name | ensembl_peptide_id | go_id |
|---|---|---|---|
| **ACTB** | actin, beta | ENSP00000349960 | GO:0031492 |
| **ACTL6A** | actin like 6A | ENSP00000394014 | GO:0031492 |
| **ACTL6B** | actin like 6B | ENSP00000160382 | GO:0070603 |
| **AEBP2** | AE binding protein 2 | ENSP00000266508 | GO:0045814 |
| **AIRE** | autoimmune regulator | ENSP00000291582 | GO:0042393 |
| **AK6** | adenylate kinase 6 | ENSP00000421873 | GO:0071339 |
| **ALDH1L1** | aldehyde dehydrogenase 1 family member L1 | ENSP00000273450 | GO:0008168 |
| **ALDH1L2** | aldehyde dehydrogenase 1 family member L2 | ENSP00000258494 | GO:0008168 |
| **ALKBH8** | alkB homolog 8, tRNA methyltransferase | ENSP00000260318 | GO:0016300 |
| **AMT** | aminomethyltransferase | ENSP00000273588 | GO:0004047 |
| **ANKRA2** | ankyrin repeat, family A (RFXANK-like), 2 | ENSP00000296785 | GO:0042826 |
| **ANP32B** | acidic nuclear phosphoprotein 32 family member B | ENSP00000345848 | GO:0006334 |
| **ANP32E** | acidic nuclear phosphoprotein 32 family member E | ENSP00000393718 | GO:0043486 |
| **APBB1** | amyloid beta (A4) precursor protein-binding, family B, member 1 (Fe65) | ENSP00000299402 | GO:0043967 |
| **APPL1** | adaptor protein, phosphotyrosine interaction, PH domain and leucine zipper containing 1 | ENSP00000288266 | GO:0016581 |

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|---|---|---|---|
| **APPL2** | adaptor protein, phosphotyrosine interaction, PH domain and leucine zipper containing 2 | ENSP00000258530 | GO:0016581 |
| **ARID1A** | AT-rich interaction domain 1A | ENSP00000320485 | GO:0042766 |
| **ARID2** | AT-rich interaction domain 2 | ENSP00000335044 | GO:0016568 |
| **ARID4A** | AT-rich interaction domain 4A | ENSP00000347602 | GO:0080182 |
| **ARID4B** | AT-rich interaction domain 4B | ENSP00000264184 | GO:0045814 |
| **ARMT1** | acidic residue methyltransferase 1 | ENSP00000356263 | GO:0051998 |
| **ARRB1** | arrestin, beta 1 | ENSP00000353124 | GO:0035066 |
| **AS3MT** | arsenite methyltransferase | ENSP00000358896 | GO:0030792 |
| **ASF1A** | anti-silencing function 1A histone chaperone | ENSP00000229595 | GO:0016568 |
| **ASF1B** | anti-silencing function 1B histone chaperone | ENSP00000263382 | GO:0016568 |
| **ASH1L** | ash1 (absent, small, or homeotic)-like (Drosophila) | ENSP00000357330 | GO:0046975 |
| **ASH2L** | ash2 (absent, small, or homeotic)-like (Drosophila) | ENSP00000340896 | GO:0042800 |
| **ASMT** | acetylserotonin O-methyltransferase | ENSP00000370627 | GO:0017096 |
| **ATAD2** | ATPase family, AAA domain containing 2 | ENSP00000287394 | GO:0016568 |
| **ATF2** | activating transcription factor 2 | ENSP00000264110 | GO:0016573 |
| **ATF7IP** | activating transcription factor 7 interacting protein | ENSP00000440440 | GO:0006306 |
| **ATM** | ATM serine/threonine kinase | ENSP00000435747 | GO:0016572 |

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|---|---|---|---|
| **ATR** | ATR serine/threonine kinase | ENSP00000343741 | GO:0005694 |
| **ATRX** | alpha thalassemia/mental retardation syndrome X-linked | ENSP00000362441 | GO:0070603 |
| **ATXN3** | ataxin 3 | ENSP00000478320 | GO:0070932 |
| **ATXN7** | ataxin 7 | ENSP00000295900 | GO:0030914 |
| **ATXN7L3** | ataxin 7-like 3 | ENSP00000374035 | GO:0000124 |
| **AURKA** | aurora kinase A | ENSP00000360407 | GO:0035174 |
| **AURKB** | aurora kinase B | ENSP00000313950 | GO:0016570 |
| **AUTS2** | autism susceptibility candidate 2 | ENSP00000344087 | GO:2000620 |
| **BABAM1** | BRISC and BRCA1 A complex member 1 | ENSP00000471605 | GO:0016568 |
| **BAG6** | BCL2 associated athanogene 6 | ENSP00000354875 | GO:0016568 |
| **BANF1** | barrier to autointegration factor 1 | ENSP00000310275 | GO:0005694 |
| **BANP** | BTG3 associated nuclear protein | ENSP00000347125 | GO:0016568 |
| **BAP1** | BRCA1 associated protein 1 | ENSP00000417132 | GO:0035517 |
| **BARD1** | BRCA1 associated RING domain 1 | ENSP00000260947 | GO:0070531 |
| **BAZ1A** | bromodomain adjacent to zinc finger domain 1A | ENSP00000351555 | GO:0008623 |
| **BAZ1B** | bromodomain adjacent to zinc finger domain 1B | ENSP00000342434 | GO:0016572 |
| **BCL6** | B-cell CLL/lymphoma 6 | ENSP00000384371 | GO:0031065 |

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|---|---|---|---|
| **BCOR** | BCL6 corepressor | ENSP00000367705 | GO:0000415 |
| **BCORL1** | BCL6 corepressor-like 1 | ENSP00000218147 | GO:0016568 |
| **BEND3** | BEN domain containing 3 | ENSP00000358038 | GO:0006306 |
| **BHLHE41** | basic helix-loop-helix family member e41 | ENSP00000242728 | GO:0042826 |
| **BHMT2** | betaine--homocysteine S-methyltransferase 2 | ENSP00000255192 | GO:0061627 |
| **BMI1** | BMI1 proto-oncogene, polycomb ring finger | ENSP00000365851 | GO:0016568 |
| **BRCA1** | breast cancer 1 | ENSP00000312236 | GO:0035067 |
| **BRCA2** | breast cancer 2 | ENSP00000369497 | GO:0010484 |
| **BRCC3** | BRCA1/BRCA2-containing complex subunit 3 | ENSP00000328641 | GO:0070537 |
| **BRD1** | bromodomain containing 1 | ENSP00000216267 | GO:0070776 |
| **BRD2** | bromodomain containing 2 | ENSP00000363958 | GO:0016568 |
| **BRD3** | bromodomain containing 3 | ENSP00000305918 | GO:0016568 |
| **BRD4** | bromodomain containing 4 | ENSP00000263377 | GO:0070577 |
| **BRD7** | bromodomain containing 7 | ENSP00000378180 | GO:0035066 |
| **BRD8** | bromodomain containing 8 | ENSP00000230901 | GO:0035267 |
| **BRD9** | bromodomain containing 9 | ENSP00000419765 | GO:0016568 |
| **BRDT** | bromodomain, testis-specific | ENSP00000354568 | GO:0001207 |

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|---|---|---|---|
| **BRE** | brain and reproductive organ-expressed (TNFRSF1A modulator) | ENSP00000343412 | GO:0016568 |
| **BRMS1** | breast cancer metastasis suppressor 1 | ENSP00000353042 | GO:0070822 |
| **BRMS1L** | breast cancer metastasis-suppressor 1-like | ENSP00000216807 | GO:0070822 |
| **BRPF1** | bromodomain and PHD finger containing 1 | ENSP00000373340 | GO:0070776 |
| **BRPF3** | bromodomain and PHD finger containing 3 | ENSP00000345419 | GO:0070776 |
| **CABIN1** | calcineurin binding protein 1 | ENSP00000263119 | GO:0016568 |
| **CAMK2D** | calcium/calmodulin-dependent protein kinase II delta | ENSP00000339740 | GO:1901725 |
| **CAMTA2** | calmodulin binding transcription activator 2 | ENSP00000321813 | GO:0042826 |
| **CARM1** | coactivator associated arginine methyltransferase 1 | ENSP00000325690 | GO:0016571 |
| **CARNMT1** | carnosine N-methyltransferase 1 | ENSP00000366030 | GO:0030735 |
| **CASP3** | caspase 3 | ENSP00000311032 | GO:0006309 |
| **CBX1** | chromobox 1 | ENSP00000377060 | GO:1990226 |
| **CBX2** | chromobox 2 | ENSP00000308750 | GO:0016568 |
| **CBX3** | chromobox 3 | ENSP00000336687 | GO:0035985 |
| **CBX4** | chromobox 4 | ENSP00000269397 | GO:0016568 |
| **CBX5** | chromobox 5 | ENSP00000209875 | GO:0035097 |
| **CBX6** | chromobox 6 | ENSP00000384490 | GO:0016568 |

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|---|---|---|---|
| **CBX8** | chromobox 8 | ENSP00000269385 | GO:0016574 |
| **CCND1** | cyclin D1 | ENSP00000227507 | GO:0042826 |
| **CCNH** | cyclin H | ENSP00000256897 | GO:0045814 |
| **CD3EAP** | CD3e molecule, epsilon associated protein | ENSP00000310966 | GO:0045814 |
| **CDAN1** | codanin 1 | ENSP00000348564 | GO:0031497 |
| **CDC73** | cell division cycle 73 | ENSP00000356405 | GO:0033523 |
| **CDCA2** | cell division cycle associated 2 | ENSP00000328228 | GO:0005694 |
| **CDCA5** | cell division cycle associated 5 | ENSP00000275517 | GO:0005694 |
| **CDK1** | cyclin-dependent kinase 1 | ENSP00000362915 | GO:0016572 |
| **CDK2** | cyclin-dependent kinase 2 | ENSP00000243067 | GO:0016572 |
| **CDK7** | cyclin-dependent kinase 7 | ENSP00000256443 | GO:0045814 |
| **CDK9** | cyclin-dependent kinase 9 | ENSP00000362361 | GO:0031056 |
| **CDYL** | chromodomain protein, Y-like | ENSP00000330512 | GO:0016573 |
| **CDYL2** | chromodomain protein, Y-like 2 | ENSP00000476295 | GO:0035064 |
| **CECR2** | cat eye syndrome chromosome region, candidate 2 | ENSP00000341219 | GO:0006309 |
| **CENPE** | centromere protein E | ENSP00000265148 | GO:0005694 |
| **CENPH** | centromere protein H | ENSP00000283006 | GO:0006334 |

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|---|---|---|---|
| **CENPI** | centromere protein I | ENSP00000362017 | GO:0006334 |
| **CENPL** | centromere protein L | ENSP00000323543 | GO:0006334 |
| **CENPM** | centromere protein M | ENSP00000215980 | GO:0006334 |
| **CENPN** | centromere protein N | ENSP00000299572 | GO:0006334 |
| **CENPO** | centromere protein O | ENSP00000370214 | GO:0006334 |
| **CENPT** | centromere protein T | ENSP00000457810 | GO:0006334 |
| **CENPU** | centromere protein U | ENSP00000281453 | GO:0006334 |
| **CENPV** | centromere protein V | ENSP00000299736 | GO:0031508 |
| **CHAF1A** | chromatin assembly factor 1 subunit A | ENSP00000301280 | GO:0033186 |
| **CHAF1B** | chromatin assembly factor 1 subunit B | ENSP00000315700 | GO:0033186 |
| **CHD1** | chromodomain helicase DNA binding protein 1 | ENSP00000483667 | GO:0035064 |
| **CHD2** | chromodomain helicase DNA binding protein 2 | ENSP00000377747 | GO:0016568 |
| **CHD3** | chromodomain helicase DNA binding protein 3 | ENSP00000332628 | GO:0016568 |
| **CHD4** | chromodomain helicase DNA binding protein 4 | ENSP00000349508 | GO:0031492 |
| **CHD5** | chromodomain helicase DNA binding protein 5 | ENSP00000262450 | GO:0061628 |
| **CHD6** | chromodomain helicase DNA binding protein 6 | ENSP00000362319 | GO:0016568 |
| **CHD7** | chromodomain helicase DNA binding protein 7 | ENSP00000392028 | GO:0016568 |

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|---|---|---|---|
| **CHD8** | chromodomain helicase DNA binding protein 8 | ENSP00000406288 | GO:0071339 |
| **CHD9** | chromodomain helicase DNA binding protein 9 | ENSP00000381522 | GO:0016568 |
| **CHRAC1** | chromatin accessibility complex 1 | ENSP00000220913 | GO:0008623 |
| **CHTOP** | chromatin target of PRMT1 | ENSP00000357679 | GO:0031062 |
| **CIAPIN1** | cytokine induced apoptosis inhibitor 1 | ENSP00000377914 | GO:0008168 |
| **CIR1** | corepressor interacting with RBPJ, 1 | ENSP00000339723 | GO:0000118 |
| **CLNS1A** | chloride channel, nucleotide-sensitive, 1A | ENSP00000263309 | GO:0034709 |
| **CLOCK** | clock circadian regulator | ENSP00000308741 | GO:0016573 |
| **CMTR1** | cap methyltransferase 1 | ENSP00000362550 | GO:0004483 |
| **CMTR2** | cap methyltransferase 2 | ENSP00000337512 | GO:0004483 |
| **COMT** | catechol-O-methyltransferase | ENSP00000207636 | GO:0008171 |
| **COMTD1** | catechol-O-methyltransferase domain containing 1 | ENSP00000361616 | GO:0008171 |
| **COPRS** | coordinator of PRMT5, differentiation stimulator | ENSP00000304327 | GO:0043985 |
| **COQ3** | coenzyme Q3 methyltransferase | ENSP00000254759 | GO:0008689 |
| **COQ5** | coenzyme Q5, methyltransferase | ENSP00000288532 | GO:0008168 |
| **CPA4** | carboxypeptidase A4 | ENSP00000222482 | GO:0016573 |
| **CPSF2** | cleavage and polyadenylation specific factor 2 | ENSP00000298875 | GO:0006398 |

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|---|---|---|---|
| **CREB1** | cAMP responsive element binding protein 1 | ENSP00000387699 | GO:0035035 |
| **CREBBP** | CREB binding protein | ENSP00000262367 | GO:0016573 |
| **CREBZF** | CREB/ATF bZIP transcription factor | ENSP00000434281 | GO:0045814 |
| **CRY1** | cryptochrome circadian clock 1 | ENSP00000008527 | GO:0042826 |
| **CSNK2A1** | casein kinase 2, alpha 1 polypeptide | ENSP00000339247 | GO:0016580 |
| **CSRP2BP** | CSRP2 binding protein | ENSP00000392318 | GO:0016573 |
| **CTBP1** | C-terminal binding protein 1 | ENSP00000290921 | GO:1903758 |
| **CTCF** | CCCTC-binding factor (zinc finger protein) | ENSP00000264010 | GO:0040030 |
| **CTCFL** | CCCTC-binding factor (zinc finger protein)-like | ENSP00000392034 | GO:0016571 |
| **CTR9** | CTR9 homolog, Paf1/RNA polymerase II complex component | ENSP00000431458 | GO:0016570 |
| **CTSL** | cathepsin L | ENSP00000345344 | GO:0042393 |
| **CUL4B** | cullin 4B | ENSP00000360373 | GO:0035518 |
| **CXXC1** | CXXC finger protein 1 | ENSP00000285106 | GO:0042800 |
| **DACT1** | dishevelled-binding antagonist of beta-catenin 1 | ENSP00000337439 | GO:0042826 |
| **DAPK3** | death-associated protein kinase 3 | ENSP00000442973 | GO:0016568 |
| **DAXX** | death-domain associated protein | ENSP00000266000 | GO:0070603 |
| **DCP2** | decapping mRNA 2 | ENSP00000373715 | GO:0071044 |

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|---|---|---|---|
| **DDB1** | damage-specific DNA binding protein 1 | ENSP00000301764 | GO:0035518 |
| **DDB2** | damage-specific DNA binding protein 2 | ENSP00000256996 | GO:0035518 |
| **DDX20** | DEAD (Asp-Glu-Ala-Asp) box polypeptide 20 | ENSP00000358716 | GO:0042826 |
| **DEK** | DEK proto-oncogene | ENSP00000244776 | GO:0016568 |
| **DFFA** | DNA fragmentation factor, 45kDa, alpha polypeptide | ENSP00000366235 | GO:0006309 |
| **DFFB** | DNA fragmentation factor, 40kDa, beta polypeptide (caspase-activated DNase) | ENSP00000339524 | GO:0006309 |
| **DHX36** | DEAH (Asp-Glu-Ala-His) box polypeptide 36 | ENSP00000309296 | GO:0042826 |
| **DICER1** | dicer 1, ribonuclease type III | ENSP00000343745 | GO:0006309 |
| **DIMT1** | DIM1 dimethyladenosine transferase 1 homolog | ENSP00000199320 | GO:0052909 |
| **DMAP1** | DNA methyltransferase 1 associated protein 1 | ENSP00000354697 | GO:0006306 |
| **DMC1** | DNA meiotic recombinase 1 | ENSP00000216024 | GO:0005694 |
| **DMRTC2** | DMRT-like family C2 | ENSP00000269945 | GO:1900111 |
| **DNAJC2** | DnaJ heat shock protein family (Hsp40) member C2 | ENSP00000249270 | GO:0016568 |
| **DNASE1L3** | deoxyribonuclease I-like 3 | ENSP00000378053 | GO:0006309 |
| **DNMT1** | DNA (cytosine-5-)-methyltransferase 1 | ENSP00000345739 | GO:0045814 |
| **DNMT3A** | DNA (cytosine-5-)-methyltransferase 3 alpha | ENSP00000264709 | GO:0045814 |
| **DNMT3B** | DNA (cytosine-5-)-methyltransferase 3 beta | ENSP00000201963 | GO:0045814 |

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|---|---|---|---|
| **DNMT3L** | DNA (cytosine-5-)-methyltransferase 3-like | ENSP00000270172 | GO:0040029 |
| **DNTTIP1** | deoxynucleotidyltransferase, terminal, interacting protein 1 | ENSP00000361705 | GO:0031491 |
| **DOT1L** | DOT1-like histone H3K79 methyltransferase | ENSP00000381657 | GO:0031151 |
| **DPF3** | D4, zinc and double PHD fingers, family 3 | ENSP00000370614 | GO:0016568 |
| **DPH5** | diphthamide biosynthesis 5 | ENSP00000339630 | GO:0008168 |
| **DPPA3** | developmental pluripotency associated 3 | ENSP00000339250 | GO:0016568 |
| **DPY30** | dpy-30, histone methyltransferase complex regulatory subunit | ENSP00000345837 | GO:0042800 |
| **DTL** | denticleless E3 ubiquitin protein ligase homolog (Drosophila) | ENSP00000355958 | GO:0005694 |
| **DTX3L** | deltex 3 like, E3 ubiquitin ligase | ENSP00000296161 | GO:0010390 |
| **DYDC1** | DPY30 domain containing 1 | ENSP00000361278 | GO:0042800 |
| **DYDC2** | DPY30 domain containing 2 | ENSP00000361273 | GO:0042800 |
| **E2F6** | E2F transcription factor 6 | ENSP00000302159 | GO:0071339 |
| **ECE2** | endothelin converting enzyme 2 | ENSP00000314295 | GO:0008168 |
| **EED** | embryonic ectoderm development | ENSP00000263360 | GO:0045814 |
| **EEF2KMT** | eukaryotic elongation factor 2 lysine methyltransferase | ENSP00000389710 | GO:0016279 |
| **EGR1** | early growth response 1 | ENSP00000239938 | GO:0035035 |
| **EHMT1** | euchromatic histone-lysine N-methyltransferase 1 | ENSP00000417328 | GO:0016568 |

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|---|---|---|---|
| **EHMT2** | euchromatic histone-lysine N-methyltransferase 2 | ENSP00000392305 | GO:0016571 |
| **EID1** | EP300 interacting inhibitor of differentiation 1 | ENSP00000431162 | GO:0035065 |
| **ELK4** | ELK4, ETS-domain protein (SRF accessory protein 1) | ENSP00000289703 | GO:0070932 |
| **ELL** | elongation factor RNA polymerase II | ENSP00000262809 | GO:0035363 |
| **ELP2** | elongator acetyltransferase complex subunit 2 | ENSP00000257191 | GO:0000123 |
| **ELP3** | elongator acetyltransferase complex subunit 3 | ENSP00000256398 | GO:0010484 |
| **ELP4** | elongator acetyltransferase complex subunit 4 | ENSP00000298937 | GO:0004402 |
| **EMG1** | EMG1 N1-specific pseudouridine methyltransferase | ENSP00000470560 | GO:0070037 |
| **ENDOG** | endonuclease G | ENSP00000361725 | GO:0006309 |
| **EP300** | E1A binding protein p300 | ENSP00000263253 | GO:0016573 |
| **EP400** | E1A binding protein p400 | ENSP00000374213 | GO:0035267 |
| **EPAS1** | endothelial PAS domain protein 1 | ENSP00000263734 | GO:0035035 |
| **EPC1** | enhancer of polycomb homolog 1 (Drosophila) | ENSP00000263062 | GO:0045814 |
| **EPC2** | enhancer of polycomb homolog 2 (Drosophila) | ENSP00000258484 | GO:0016568 |
| **ERCC2** | excision repair cross-complementation group 2 | ENSP00000375809 | GO:0045814 |
| **ERCC3** | excision repair cross-complementation group 3 | ENSP00000285398 | GO:0045814 |
| **ERI1** | exoribonuclease 1 | ENSP00000429615 | GO:0071207 |

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|---|---|---|---|
| **ESCO2** | establishment of sister chromatid cohesion N-acetyltransferase 2 | ENSP00000306999 | GO:0031618 |
| **EXOSC10** | exosome component 10 | ENSP00000307307 | GO:0071044 |
| **EXOSC4** | exosome component 4 | ENSP00000315476 | GO:0071044 |
| **EYA1** | EYA transcriptional coactivator and phosphatase 1 | ENSP00000373392 | GO:0016576 |
| **EYA2** | EYA transcriptional coactivator and phosphatase 2 | ENSP00000333640 | GO:0016576 |
| **EYA3** | EYA transcriptional coactivator and phosphatase 3 | ENSP00000362970 | GO:0016576 |
| **EYA4** | EYA transcriptional coactivator and phosphatase 4 | ENSP00000347434 | GO:0016568 |
| **EZH1** | enhancer of zeste 1 polycomb repressive complex 2 subunit | ENSP00000404658 | GO:0018024 |
| **EZH2** | enhancer of zeste 2 polycomb repressive complex 2 subunit | ENSP00000223193 | GO:0045814 |
| **FAAP20** | Fanconi anemia core complex associated protein 20 | ENSP00000367808 | GO:0005694 |
| **FAM175A** | family with sequence similarity 175 member A | ENSP00000369857 | GO:0016568 |
| **FAM208A** | family with sequence similarity 208 member A | ENSP00000347845 | GO:0005694 |
| **FAM60A** | family with sequence similarity 60 member A | ENSP00000443697 | GO:0016580 |
| **FBL** | fibrillarin | ENSP00000221801 | GO:1990259 |
| **FBXO11** | F-box protein 11 | ENSP00000384823 | GO:0016274 |
| **FDXACB1** | ferredoxin-fold anticodon binding domain containing 1 | ENSP00000260257 | GO:0070042 |
| **FKBP6** | FK506 binding protein 6 | ENSP00000252037 | GO:0043046 |

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|---|---|---|---|
| **FLCN** | folliculin | ENSP00000285071 | GO:0035065 |
| **FOS** | FBJ murine osteosarcoma viral oncogene homolog | ENSP00000306245 | GO:0006306 |
| **FOXA2** | forkhead box A2 | ENSP00000366319 | GO:0016568 |
| **FOXA3** | forkhead box A3 | ENSP00000304004 | GO:0016568 |
| **FOXL2** | forkhead box L2 | ENSP00000333188 | GO:0006309 |
| **FOXP3** | forkhead box P3 | ENSP00000365380 | GO:0035066 |
| **FSHR** | follicle stimulating hormone receptor | ENSP00000384708 | GO:0035093 |
| **FTSJ1** | FtsJ RNA methyltransferase homolog 1 (E. coli) | ENSP00000019019 | GO:0008175 |
| **FTSJ2** | FtsJ RNA methyltransferase homolog 2 (E. coli) | ENSP00000242257 | GO:0008650 |
| **FTSJ3** | FtsJ homolog 3 (E. coli) | ENSP00000396673 | GO:0016435 |
| **GAMT** | guanidinoacetate N-methyltransferase | ENSP00000252288 | GO:0030731 |
| **GART** | phosphoribosylglycinamide formyltransferase, phosphoribosylglycinamide synthetase, phosphoribosylaminoimidazole synthetase | ENSP00000354388 | GO:0008168 |
| **GATA2** | GATA binding protein 2 | ENSP00000345681 | GO:0035065 |
| **GATA3** | GATA binding protein 3 | ENSP00000368632 | GO:0051569 |
| **GATAD2A** | GATA zinc finger domain containing 2A | ENSP00000351552 | GO:0006306 |
| **GATAD2B** | GATA zinc finger domain containing 2B | ENSP00000357644 | GO:0031492 |
| **GCM1** | glial cells missing homolog 1 (Drosophila) | ENSP00000259803 | GO:0042826 |

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|---|---|---|---|
| **GCSH** | glycine cleavage system protein H (aminomethyl carrier) | ENSP00000319531 | GO:0005960 |
| **GFI1** | growth factor independent 1 transcription repressor | ENSP00000359357 | GO:0051569 |
| **GK** | glycerol kinase | ENSP00000401720 | GO:0042393 |
| **GLDC** | glycine dehydrogenase (decarboxylating) | ENSP00000370737 | GO:0005960 |
| **GLI3** | GLI family zinc finger 3 | ENSP00000379258 | GO:0035035 |
| **GLMN** | glomulin, FKBP associated protein | ENSP00000359385 | GO:0040029 |
| **GLYR1** | glyoxylate reductase 1 homolog (Arabidopsis) | ENSP00000322716 | GO:0035064 |
| **GMNN** | geminin, DNA replication inhibitor | ENSP00000348902 | GO:0042826 |
| **GNAS** | GNAS complex locus | ENSP00000360141 | GO:0006306 |
| **GNMT** | glycine N-methyltransferase | ENSP00000361894 | GO:0017174 |
| **GRHL2** | grainyhead-like transcription factor 2 | ENSP00000251808 | GO:0044030 |
| **GSG2** | germ cell associated 2 (haspin) | ENSP00000325290 | GO:2000751 |
| **GSK3B** | glycogen synthase kinase 3 beta | ENSP00000324806 | GO:0044027 |
| **GTF2H1** | general transcription factor IIH subunit 1 | ENSP00000393638 | GO:0045814 |
| **GTF2H2C** | GTF2H2 family member C | ENSP00000480548 | GO:0045814 |
| **GTF2H3** | general transcription factor IIH subunit 3 | ENSP00000228955 | GO:0045814 |
| **GTF2H4** | general transcription factor IIH subunit 4 | ENSP00000401105 | GO:0045814 |

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|---|---|---|---|
| **H1FOO** | H1 histone family member O, oocyte specific | ENSP00000319799 | GO:0016584 |
| **H1FX** | H1 histone family member X | ENSP00000329662 | GO:0000786 |
| **H2AFX** | H2A histone family member X | ENSP00000434024 | GO:0000786 |
| **H2AFY** | H2A histone family member Y | ENSP00000302572 | GO:0045815 |
| **H2AFY2** | H2A histone family member Y2 | ENSP00000362352 | GO:0045814 |
| **H2AFZ** | H2A histone family member Z | ENSP00000296417 | GO:0000786 |
| **H2BFM** | H2B histone family member M | ENSP00000347119 | GO:0000788 |
| **H3F3B** | H3 histone, family 3B (H3.3B) | ENSP00000465403 | GO:0000786 |
| **HAT1** | histone acetyltransferase 1 | ENSP00000264108 | GO:0016568 |
| **HDAC1** | histone deacetylase 1 | ENSP00000362649 | GO:0045814 |
| **HDAC10** | histone deacetylase 10 | ENSP00000216271 | GO:0016568 |
| **HDAC11** | histone deacetylase 11 | ENSP00000295757 | GO:0016568 |
| **HDAC2** | histone deacetylase 2 | ENSP00000430008 | GO:0045814 |
| **HDAC3** | histone deacetylase 3 | ENSP00000302967 | GO:0016568 |
| **HDAC4** | histone deacetylase 4 | ENSP00000264606 | GO:0040029 |
| **HDAC5** | histone deacetylase 5 | ENSP00000225983 | GO:0040029 |
| **HDAC8** | histone deacetylase 8 | ENSP00000362655 | GO:0016568 |

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| **HDAC9** | histone deacetylase 9 | ENSP00000383912 | GO:0016568 |
| **HELLS** | helicase, lymphoid-specific | ENSP00000239027 | GO:0010216 |
| **HEMK1** | HemK methyltransferase family member 1 | ENSP00000404843 | GO:0006306 |
| **HENMT1** | HEN1 methyltransferase homolog 1 (Arabidopsis) | ENSP00000359048 | GO:0008171 |
| **HES1** | hes family bHLH transcription factor 1 | ENSP00000232424 | GO:0042826 |
| **HEY2** | hes-related family bHLH transcription factor with YRPW motif 2 | ENSP00000357348 | GO:0016580 |
| **HIC1** | hypermethylated in cancer 1 | ENSP00000314080 | GO:0042826 |
| **HIF1A** | hypoxia inducible factor 1, alpha subunit (basic helix-loop-helix transcription factor) | ENSP00000323326 | GO:0035035 |
| **HINFP** | histone H4 transcription factor | ENSP00000318085 | GO:0042393 |
| **HIPK4** | homeodomain interacting protein kinase 4 | ENSP00000291823 | GO:0016572 |
| **HIRA** | histone cell cycle regulator | ENSP00000263208 | GO:0016568 |
| **HIST1H1A** | histone cluster 1, H1a | ENSP00000244573 | GO:0000786 |
| **HIST1H1D** | histone cluster 1, H1d | ENSP00000244534 | GO:0000786 |
| **HIST1H2AA** | histone cluster 1, H2aa | ENSP00000297012 | GO:0000786 |
| **HIST1H2AH** | histone cluster 1, H2ah | ENSP00000366679 | GO:0000786 |
| **HIST2H2AB** | histone cluster 2, H2ab | ENSP00000332790 | GO:0000786 |
| **HIST2H2AC** | histone cluster 2, H2ac | ENSP00000332194 | GO:0000786 |

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| **HIST2H2BE** | histone cluster 2, H2be | ENSP00000358151 | GO:0000788 |
| **HJURP** | Holliday junction recognition protein | ENSP00000401944 | GO:0006334 |
| **HLCS** | holocarboxylase synthetase (biotin-(proprionyl-CoA-carboxylase (ATP-hydrolysing)) ligase) | ENSP00000338387 | GO:0016570 |
| **HLTF** | helicase-like transcription factor | ENSP00000308944 | GO:0016568 |
| **HMG20B** | high mobility group 20B | ENSP00000328269 | GO:0016568 |
| **HMGB3** | high mobility group box 3 | ENSP00000359393 | GO:0005694 |
| **HMGN1** | high mobility group nucleosome binding domain 1 | ENSP00000370123 | GO:0031492 |
| **HMGN3** | high mobility group nucleosomal binding domain 3 | ENSP00000482613 | GO:0031492 |
| **HNF1A** | HNF1 homeobox A | ENSP00000438804 | GO:0016573 |
| **HNMT** | histamine N-methyltransferase | ENSP00000333259 | GO:0046539 |
| **HNRNPD** | heterogeneous nuclear ribonucleoprotein D | ENSP00000313199 | GO:0042826 |
| **HORMAD1** | HORMA domain containing 1 | ENSP00000326489 | GO:0005694 |
| **HORMAD2** | HORMA domain containing 2 | ENSP00000336984 | GO:0005694 |
| **HOXA10** | homeobox A10 | ENSP00000283921 | GO:0042826 |
| **HP1BP3** | heterochromatin protein 1, binding protein 3 | ENSP00000312625 | GO:0000786 |
| **HR** | hair growth associated | ENSP00000370826 | GO:0042826 |
| **HSF4** | heat shock transcription factor 4 | ENSP00000430947 | GO:0033169 |

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|---|---|---|---|
| **HSP90AB1** | heat shock protein 90kDa alpha family class B member 1 | ENSP00000360709 | GO:0042826 |
| **HSPA1A** | heat shock protein family A (Hsp70) member 1A | ENSP00000382915 | GO:0042826 |
| **ICE1** | interactor of little elongation complex ELL subunit 1 | ENSP00000296564 | GO:0035363 |
| **ICE2** | interactor of little elongation complex ELL subunit 2 | ENSP00000261520 | GO:0035363 |
| **ICMT** | isoprenylcysteine carboxyl methyltransferase | ENSP00000343552 | GO:0004671 |
| **IKBKAP** | inhibitor of kappa light polypeptide gene enhancer in B-cells, kinase complex-associated protein | ENSP00000363779 | GO:0000123 |
| **IKZF1** | IKAROS family zinc finger 1 | ENSP00000331614 | GO:0016568 |
| **IL1B** | interleukin 1 beta | ENSP00000263341 | GO:0033129 |
| **IL33** | interleukin 33 | ENSP00000370842 | GO:0005694 |
| **INCENP** | inner centromere protein | ENSP00000278849 | GO:0005721 |
| **ING1** | inhibitor of growth family member 1 | ENSP00000328436 | GO:0016568 |
| **ING2** | inhibitor of growth family member 2 | ENSP00000307183 | GO:0016568 |
| **ING3** | inhibitor of growth family member 3 | ENSP00000388506 | GO:0016568 |
| **ING4** | inhibitor of growth family member 4 | ENSP00000473635 | GO:0016573 |
| **ING5** | inhibitor of growth family member 5 | ENSP00000416878 | GO:0016573 |
| **INMT** | indolethylamine N-methyltransferase | ENSP00000013222 | GO:0030748 |
| **INO80C** | INO80 complex subunit C | ENSP00000334473 | GO:0071339 |

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|---|---|---|---|
| **INTS7** | integrator complex subunit 7 | ENSP00000355959 | GO:0005694 |
| **IPO4** | importin 4 | ENSP00000346453 | GO:0006336 |
| **IPO7** | importin 7 | ENSP00000369042 | GO:0042393 |
| **IPO9** | importin 9 | ENSP00000354742 | GO:0042393 |
| **ISL1** | ISL LIM homeobox 1 | ENSP00000230658 | GO:0035066 |
| **ITGB3BP** | integrin beta 3 binding protein (beta3-endonexin) | ENSP00000271002 | GO:0006334 |
| **IWS1** | IWS1 homolog (S. cerevisiae) | ENSP00000295321 | GO:2001253 |
| **JADE1** | jade family PHD finger 1 | ENSP00000388015 | GO:0000123 |
| **JADE2** | jade family PHD finger 2 | ENSP00000378451 | GO:0000123 |
| **JADE3** | jade family PHD finger 3 | ENSP00000481850 | GO:0000123 |
| **JARID2** | jumonji and AT-rich interaction domain containing 2 | ENSP00000341280 | GO:0045814 |
| **JMJD1C** | jumonji domain containing 1C | ENSP00000382204 | GO:0016568 |
| **JMJD6** | jumonji domain containing 6 | ENSP00000380750 | GO:0070079 |
| **KANSL1L** | KAT8 regulatory NSL complex subunit 1 like | ENSP00000281772 | GO:0000123 |
| **KANSL3** | KAT8 regulatory NSL complex subunit 3 | ENSP00000396749 | GO:0046972 |
| **KAT2A** | K(lysine) acetyltransferase 2A | ENSP00000225916 | GO:0016573 |
| **KAT2B** | K(lysine) acetyltransferase 2B | ENSP00000263754 | GO:0016573 |

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| **KAT6A** | K(lysine) acetyltransferase 6A | ENSP00000265713 | GO:0000786 |
| **KAT6B** | K(lysine) acetyltransferase 6B | ENSP00000287239 | GO:0000786 |
| **KAT7** | K(lysine) acetyltransferase 7 | ENSP00000409477 | GO:0016573 |
| **KAT8** | K(lysine) acetyltransferase 8 | ENSP00000406037 | GO:0016573 |
| **KDM1A** | lysine (K)-specific demethylase 1A | ENSP00000349049 | GO:0033184 |
| **KDM1B** | lysine (K)-specific demethylase 1B | ENSP00000297792 | GO:0044030 |
| **KDM2A** | lysine (K)-specific demethylase 2A | ENSP00000309302 | GO:0008168 |
| **KDM2B** | lysine (K)-specific demethylase 2B | ENSP00000366269 | GO:0035518 |
| **KDM3A** | lysine (K)-specific demethylase 3A | ENSP00000386660 | GO:0033169 |
| **KDM3B** | lysine (K)-specific demethylase 3B | ENSP00000326563 | GO:0016568 |
| **KDM4A** | lysine (K)-specific demethylase 4A | ENSP00000361473 | GO:0070544 |
| **KDM4B** | lysine (K)-specific demethylase 4B | ENSP00000371178 | GO:0016568 |
| **KDM4C** | lysine (K)-specific demethylase 4C | ENSP00000370707 | GO:0033169 |
| **KDM5A** | lysine (K)-specific demethylase 5A | ENSP00000382688 | GO:0016568 |
| **KDM6B** | lysine (K)-specific demethylase 6B | ENSP00000254846 | GO:0071558 |
| **KDM8** | lysine (K)-specific demethylase 8 | ENSP00000286096 | GO:0070544 |
| **KLF2** | Kruppel-like factor 2 | ENSP00000248071 | GO:0040029 |

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| **KLF4** | Kruppel-like factor 4 (gut) | ENSP00000363804 | GO:0042826 |
| **KMT2A** | lysine (K)-specific methyltransferase 2A | ENSP00000436786 | GO:0006306 |
| **KMT2C** | lysine (K)-specific methyltransferase 2C | ENSP00000262189 | GO:0042800 |
| **KMT2E** | lysine (K)-specific methyltransferase 2E | ENSP00000312379 | GO:0006306 |
| **KPNB1** | karyopherin (importin) beta 1 | ENSP00000290158 | GO:0006309 |
| **L3MBTL1** | l(3)mbt-like 1 (Drosophila) | ENSP00000362227 | GO:0016568 |
| **L3MBTL2** | l(3)mbt-like 2 (Drosophila) | ENSP00000216237 | GO:0016568 |
| **L3MBTL3** | l(3)mbt-like 3 (Drosophila) | ENSP00000431962 | GO:0016568 |
| **L3MBTL4** | l(3)mbt-like 4 (Drosophila) | ENSP00000382975 | GO:0016568 |
| **LAS1L** | LAS1-like, ribosome biogenesis factor | ENSP00000363937 | GO:0071339 |
| **LCMT1** | leucine carboxyl methyltransferase 1 | ENSP00000370353 | GO:0018423 |
| **LCMT2** | leucine carboxyl methyltransferase 2 | ENSP00000307214 | GO:0008175 |
| **LDB1** | LIM domain binding 1 | ENSP00000354616 | GO:0043973 |
| **LEF1** | lymphoid enhancer-binding factor 1 | ENSP00000265165 | GO:0043967 |
| **LEO1** | LEO1 homolog, Paf1/RNA polymerase II complex component | ENSP00000299601 | GO:0016570 |
| **LIF** | leukemia inhibitory factor | ENSP00000249075 | GO:1901676 |
| **LOC101927446** | uncharacterized LOC101927446 | ENSP00000222511 | GO:0005694 |

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|---|---|---|---|
| **LOXL2** | lysyl oxidase like 2 | ENSP00000373783 | GO:0016570 |
| **LRMP** | lymphoid-restricted membrane protein | ENSP00000346442 | GO:0005694 |
| **LRWD1** | leucine-rich repeats and WD repeat domain containing 1 | ENSP00000292616 | GO:0016568 |
| **LSM1** | LSM1 homolog, mRNA degradation associated | ENSP00000310596 | GO:0071044 |
| **LSM10** | LSM10, U7 small nuclear RNA associated | ENSP00000319341 | GO:0071208 |
| **LSM11** | LSM11, U7 small nuclear RNA associated | ENSP00000286307 | GO:0006398 |
| **M1AP** | meiosis 1 associated protein | ENSP00000290536 | GO:0031497 |
| **MAEL** | maelstrom spermatogenic transposon silencer | ENSP00000356844 | GO:0043046 |
| **MAP1S** | microtubule associated protein 1S | ENSP00000325313 | GO:0010848 |
| **MAP3K12** | mitogen-activated protein kinase kinase kinase 12 | ENSP00000267079 | GO:0016572 |
| **MAP3K7** | mitogen-activated protein kinase kinase kinase 7 | ENSP00000358331 | GO:0005671 |
| **MAPK8** | mitogen-activated protein kinase 8 | ENSP00000353483 | GO:0035033 |
| **MAX** | MYC associated factor X | ENSP00000351175 | GO:0071339 |
| **MBD1** | methyl-CpG binding domain protein 1 | ENSP00000269469 | GO:0010385 |
| **MBD2** | methyl-CpG binding domain protein 2 | ENSP00000256429 | GO:0045814 |
| **MBD3** | methyl-CpG binding domain protein 3 | ENSP00000156825 | GO:0031492 |
| **MBIP** | MAP3K12 binding inhibitory protein 1 | ENSP00000324444 | GO:0005671 |

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|---|---|---|---|
| **MBTD1** | mbt domain containing 1 | ENSP00000365561 | GO:0016568 |
| **MCM2** | minichromosome maintenance complex component 2 | ENSP00000265056 | GO:0006334 |
| **MDC1** | mediator of DNA damage checkpoint 1 | ENSP00000373060 | GO:0005694 |
| **MEAF6** | MYST/Esa1-associated factor 6 | ENSP00000296214 | GO:0035267 |
| **MECOM** | MDS1 and EVI1 complex locus | ENSP00000264674 | GO:0000118 |
| **MED24** | mediator complex subunit 24 | ENSP00000377686 | GO:0016573 |
| **MEF2A** | myocyte enhancer factor 2A | ENSP00000346389 | GO:0035035 |
| **MEF2B** | myocyte enhancer factor 2B | ENSP00000402154 | GO:0042826 |
| **MEF2C** | myocyte enhancer factor 2C | ENSP00000340874 | GO:0042826 |
| **MEF2D** | myocyte enhancer factor 2D | ENSP00000271555 | GO:0042826 |
| **MEIOB** | meiosis specific with OB domains | ENSP00000314484 | GO:0005694 |
| **MEN1** | menin 1 | ENSP00000366530 | GO:0035097 |
| **METTL11B** | methyltransferase like 11B | ENSP00000408058 | GO:0071885 |
| **METTL14** | methyltransferase like 14 | ENSP00000373474 | GO:0036396 |
| **METTL15** | methyltransferase like 15 | ENSP00000307251 | GO:0071424 |
| **METTL16** | methyltransferase like 16 | ENSP00000263092 | GO:0052907 |
| **METTL17** | methyltransferase like 17 | ENSP00000343041 | GO:0008168 |

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| **METTL18** | methyltransferase like 18 | ENSP00000307077 | GO:0008168 |
| **METTL20** | methyltransferase like 20 | ENSP00000396123 | GO:0016279 |
| **METTL21A** | methyltransferase like 21A | ENSP00000389684 | GO:0016279 |
| **METTL21C** | methyltransferase like 21C | ENSP00000267273 | GO:0016279 |
| **METTL22** | methyltransferase like 22 | ENSP00000163678 | GO:0008168 |
| **METTL23** | methyltransferase like 23 | ENSP00000341543 | GO:0008168 |
| **METTL24** | methyltransferase like 24 | ENSP00000344071 | GO:0008168 |
| **METTL25** | methyltransferase like 25 | ENSP00000248306 | GO:0008168 |
| **METTL3** | methyltransferase like 3 | ENSP00000298717 | GO:0036396 |
| **METTL4** | methyltransferase like 4 | ENSP00000320349 | GO:0008168 |
| **METTL5** | methyltransferase like 5 | ENSP00000260953 | GO:0008168 |
| **METTL7B** | methyltransferase like 7B | ENSP00000377796 | GO:0008168 |
| **METTL8** | methyltransferase like 8 | ENSP00000480056 | GO:0016573 |
| **MGA** | MGA, MAX dimerization protein | ENSP00000456141 | GO:0071339 |
| **MGMT** | O-6-methylguanine-DNA methyltransferase | ENSP00000302111 | GO:0006306 |
| **MIS18A** | MIS18 kinetochore protein A | ENSP00000290130 | GO:0006334 |
| **MIS18BP1** | MIS18 binding protein 1 | ENSP00000309790 | GO:0006334 |

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|---|---|---|---|
| **MLH1** | mutL homolog 1 | ENSP00000231790 | GO:0005694 |
| **MMS22L** | MMS22 like, DNA repair protein | ENSP00000275053 | GO:0035101 |
| **MNAT1** | MNAT CDK-activating kinase assembly factor 1 | ENSP00000261245 | GO:0045814 |
| **MORF4L2** | mortality factor 4 like 2 | ENSP00000413664 | GO:0016568 |
| **MPHOSPH10** | M-phase phosphoprotein 10 (U3 small nucleolar ribonucleoprotein) | ENSP00000244230 | GO:0005694 |
| **MPHOSPH8** | M-phase phosphoprotein 8 | ENSP00000355388 | GO:0000788 |
| **MRM1** | mitochondrial rRNA methyltransferase 1 | ENSP00000478520 | GO:0070039 |
| **MSH6** | mutS homolog 6 | ENSP00000234420 | GO:0035064 |
| **MSL1** | male-specific lethal 1 homolog (Drosophila) | ENSP00000381543 | GO:0072487 |
| **MSL2** | male-specific lethal 2 homolog (Drosophila) | ENSP00000311827 | GO:0072487 |
| **MSL3** | male-specific lethal 3 homolog (Drosophila) | ENSP00000370067 | GO:0016568 |
| **MTA1** | metastasis associated 1 | ENSP00000333633 | GO:0040029 |
| **MTA2** | metastasis associated 1 family member 2 | ENSP00000278823 | GO:0031492 |
| **MTA3** | metastasis associated 1 family member 3 | ENSP00000383973 | GO:0016581 |
| **MTF2** | metal response element binding transcription factor 2 | ENSP00000359321 | GO:0045814 |
| **MTHFR** | methylenetetrahydrofolate reductase (NAD(P)H) | ENSP00000365770 | GO:0031060 |
| **MTPAP** | mitochondrial poly(A) polymerase | ENSP00000263063 | GO:0071044 |

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| **MTR** | 5-methyltetrahydrofolate-homocysteine methyltransferase | ENSP00000355535 | GO:0008898 |
| **MTRR** | 5-methyltetrahydrofolate-homocysteine methyltransferase reductase | ENSP00000264668 | GO:0006306 |
| **MUC1** | mucin 1, cell surface associated | ENSP00000338983 | GO:0090240 |
| **MUM1** | melanoma associated antigen (mutated) 1 | ENSP00000394925 | GO:0031491 |
| **MYOCD** | myocardin | ENSP00000341835 | GO:0035065 |
| **MYOD1** | myogenic differentiation 1 | ENSP00000250003 | GO:0043967 |
| **MYSM1** | Myb-like, SWIRM and MPN domains 1 | ENSP00000418734 | GO:0035522 |
| **N6AMT1** | N-6 adenine-specific DNA methyltransferase 1 (putative) | ENSP00000286764 | GO:0008276 |
| **N6AMT2** | N-6 adenine-specific DNA methyltransferase 2 (putative) | ENSP00000372206 | GO:0016279 |
| **NAA50** | N(alpha)-acetyltransferase 50, NatE catalytic subunit | ENSP00000240922 | GO:0010485 |
| **NAA60** | N(alpha)-acetyltransferase 60, NatF catalytic subunit | ENSP00000385903 | GO:0006334 |
| **NACC2** | NACC family member 2, BEN and BTB (POZ) domain containing | ENSP00000360818 | GO:0016575 |
| **NAP1L1** | nucleosome assembly protein 1-like 1 | ENSP00000409795 | GO:0006334 |
| **NAP1L3** | nucleosome assembly protein 1-like 3 | ENSP00000362171 | GO:0006334 |
| **NAP1L4** | nucleosome assembly protein 1-like 4 | ENSP00000382523 | GO:0006334 |
| **NASP** | nuclear autoantigenic sperm protein (histone-binding) | ENSP00000255120 | GO:0006336 |
| **NCAPD3** | non-SMC condensin II complex subunit D3 | ENSP00000433681 | GO:0031618 |

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| **NCAPG2** | non-SMC condensin II complex subunit G2 | ENSP00000348657 | GO:0035064 |
| **NCAPH2** | non-SMC condensin II complex subunit H2 | ENSP00000299821 | GO:0005694 |
| **NCBP1** | nuclear cap binding protein subunit 1 | ENSP00000364289 | GO:0008334 |
| **NCBP2** | nuclear cap binding protein subunit 2 | ENSP00000326806 | GO:0008334 |
| **NCL** | nucleolin | ENSP00000318195 | GO:0042393 |
| **NCOA1** | nuclear receptor coactivator 1 | ENSP00000385195 | GO:0016573 |
| **NCOA2** | nuclear receptor coactivator 2 | ENSP00000399968 | GO:0016573 |
| **NCOA3** | nuclear receptor coactivator 3 | ENSP00000361065 | GO:0016573 |
| **NCOA6** | nuclear receptor coactivator 6 | ENSP00000363929 | GO:0035097 |
| **NCOR2** | nuclear receptor corepressor 2 | ENSP00000348551 | GO:0000118 |
| **NDUFAF5** | NADH dehydrogenase (ubiquinone) complex I, assembly factor 5 | ENSP00000367346 | GO:0008168 |
| **NDUFAF7** | NADH dehydrogenase (ubiquinone) complex I, assembly factor 7 | ENSP00000002125 | GO:0008168 |
| **NEIL1** | nei-like DNA glycosylase 1 | ENSP00000347170 | GO:0005694 |
| **NEK11** | NIMA-related kinase 11 | ENSP00000372857 | GO:0016572 |
| **NELFA** | negative elongation factor complex member A | ENSP00000372335 | GO:0051571 |
| **NFE2** | nuclear factor, erythroid 2 | ENSP00000312436 | GO:0006337 |
| **NKD1** | naked cuticle homolog 1 (Drosophila) | ENSP00000268459 | GO:0000159 |

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| **NKX3-1** | NK3 homeobox 1 | ENSP00000370253 | GO:0042826 |
| **NNMT** | nicotinamide N-methyltransferase | ENSP00000441434 | GO:0008112 |
| **NOC2L** | NOC2-like nucleolar associated transcriptional repressor | ENSP00000317992 | GO:0031497 |
| **NOP2** | NOP2 nucleolar protein | ENSP00000371858 | GO:0008168 |
| **NOP56** | NOP56 ribonucleoprotein | ENSP00000370589 | GO:1990226 |
| **NOS1** | nitric oxide synthase 1 | ENSP00000320758 | GO:0035066 |
| **NPM1** | nucleophosmin (nucleolar phosphoprotein B23, numatrin) | ENSP00000341168 | GO:0006334 |
| **NPM2** | nucleophosmin/nucleoplasmin 2 | ENSP00000370941 | GO:0042393 |
| **NR2C1** | nuclear receptor subfamily 2 group C member 1 | ENSP00000333275 | GO:0042826 |
| **NR2E1** | nuclear receptor subfamily 2 group E member 1 | ENSP00000357979 | GO:0042826 |
| **NR3C1** | nuclear receptor subfamily 3 group C member 1 | ENSP00000377977 | GO:0016568 |
| **NSD1** | nuclear receptor binding SET domain protein 1 | ENSP00000343209 | GO:0016571 |
| **NSFL1C** | NSFL1 (p97) cofactor (p47) | ENSP00000216879 | GO:0005694 |
| **NSUN2** | NOP2/Sun RNA methyltransferase family member 2 | ENSP00000264670 | GO:0016428 |
| **NSUN5** | NOP2/Sun RNA methyltransferase family member 5 | ENSP00000252594 | GO:0008168 |
| **NSUN6** | NOP2/Sun RNA methyltransferase family member 6 | ENSP00000366519 | GO:0008168 |
| **NSUN7** | NOP2/Sun RNA methyltransferase family member 7 | ENSP00000319127 | GO:0008168 |

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| **NTMT1** | N-terminal Xaa-Pro-Lys N-methyltransferase 1 | ENSP00000361559 | GO:0071885 |
| **NUDT21** | nudix hydrolase 21 | ENSP00000300291 | GO:0042826 |
| **NUMA1** | nuclear mitotic apparatus protein 1 | ENSP00000260051 | GO:0005694 |
| **NUSAP1** | nucleolar and spindle associated protein 1 | ENSP00000260359 | GO:0005694 |
| **OCLN** | occludin | ENSP00000347379 | GO:0008757 |
| **OGT** | O-linked N-acetylglucosamine (GlcNAc) transferase | ENSP00000362805 | GO:0070688 |
| **OTUB1** | OTU deubiquitinase, ubiquitin aldehyde binding 1 | ENSP00000402551 | GO:1901315 |
| **PADI2** | peptidyl arginine deiminase, type II | ENSP00000364630 | GO:0036413 |
| **PADI4** | peptidyl arginine deiminase, type IV | ENSP00000364597 | GO:0016568 |
| **PAF1** | PAF1 homolog, Paf1/RNA polymerase II complex component | ENSP00000221265 | GO:0016570 |
| **PAPD4** | PAP associated domain containing 4 | ENSP00000296783 | GO:0071044 |
| **PAPD5** | PAP associated domain containing 5 | ENSP00000396995 | GO:0071044 |
| **PARP1** | poly(ADP-ribose) polymerase 1 | ENSP00000355759 | GO:0042826 |
| **PARP10** | poly(ADP-ribose) polymerase family member 10 | ENSP00000325618 | GO:0010847 |
| **PAX5** | paired box 5 | ENSP00000350844 | GO:0051573 |
| **PAX6** | paired box 6 | ENSP00000368424 | GO:0035035 |
| **PAX7** | paired box 7 | ENSP00000364524 | GO:0031062 |

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| **PAXBP1** | PAX3 and PAX7 binding protein 1 | ENSP00000328992 | GO:0031062 |
| **PAXIP1** | PAX interacting (with transcription-activation domain) protein 1 | ENSP00000384048 | GO:0035066 |
| **PCGF2** | polycomb group ring finger 2 | ENSP00000478517 | GO:0035102 |
| **PCGF6** | polycomb group ring finger 6 | ENSP00000338845 | GO:0035102 |
| **PCMT1** | protein-L-isoaspartate (D-aspartate) O-methyltransferase | ENSP00000356348 | GO:0004719 |
| **PCMTD1** | protein-L-isoaspartate (D-aspartate) O-methyltransferase domain containing 1 | ENSP00000353739 | GO:0004719 |
| **PCMTD2** | protein-L-isoaspartate (D-aspartate) O-methyltransferase domain containing 2 | ENSP00000299468 | GO:0004719 |
| **PCNA** | proliferating cell nuclear antigen | ENSP00000368438 | GO:0043626 |
| **PDRG1** | p53 and DNA damage regulated 1 | ENSP00000202017 | GO:0016272 |
| **PDS5A** | PDS5 cohesin associated factor A | ENSP00000303427 | GO:0005694 |
| **PDS5B** | PDS5 cohesin associated factor B | ENSP00000313851 | GO:0005694 |
| **PELP1** | proline, glutamate and leucine rich protein 1 | ENSP00000461625 | GO:0071339 |
| **PER1** | period circadian clock 1 | ENSP00000314420 | GO:0043967 |
| **PER2** | period circadian clock 2 | ENSP00000254657 | GO:0070932 |
| **PES1** | pescadillo ribosomal biogenesis factor 1 | ENSP00000384252 | GO:0005694 |
| **PFDN1** | prefoldin subunit 1 | ENSP00000261813 | GO:0016272 |
| **PFDN2** | prefoldin subunit 2 | ENSP00000356989 | GO:0016272 |

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| **PFDN5** | prefoldin subunit 5 | ENSP00000266964 | GO:0016272 |
| **PFDN6** | prefoldin subunit 6 | ENSP00000378563 | GO:0016272 |
| **PHB** | prohibitin | ENSP00000300408 | GO:0016575 |
| **PHC1** | polyhomeotic homolog 1 (Drosophila) | ENSP00000440674 | GO:0016574 |
| **PHC2** | polyhomeotic homolog 2 (Drosophila) | ENSP00000257118 | GO:0035102 |
| **PHC3** | polyhomeotic homolog 3 (Drosophila) | ENSP00000420271 | GO:0035102 |
| **PHF1** | PHD finger protein 1 | ENSP00000363636 | GO:0045814 |
| **PHF12** | PHD finger protein 12 | ENSP00000268756 | GO:0016580 |
| **PHF13** | PHD finger protein 13 | ENSP00000366876 | GO:0016568 |
| **PHF19** | PHD finger protein 19 | ENSP00000310372 | GO:0045814 |
| **PHF2** | PHD finger protein 2 | ENSP00000352185 | GO:0032454 |
| **PHF20** | PHD finger protein 20 | ENSP00000363124 | GO:0071339 |
| **PHF21A** | PHD finger protein 21A | ENSP00000323152 | GO:0016568 |
| **PHF21B** | PHD finger protein 21B | ENSP00000324403 | GO:0042393 |
| **PHF8** | PHD finger protein 8 | ENSP00000319473 | GO:0035575 |
| **PHIP** | pleckstrin homology domain interacting protein | ENSP00000275034 | GO:0070577 |
| **PICK1** | protein interacting with PRKCA 1 | ENSP00000385205 | GO:0043045 |

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| **PIWIL2** | piwi-like RNA-mediated gene silencing 2 | ENSP00000349208 | GO:0043046 |
| **PIWIL4** | piwi-like RNA-mediated gene silencing 4 | ENSP00000299001 | GO:0043046 |
| **PKN1** | protein kinase N1 | ENSP00000242783 | GO:0035407 |
| **PKN2** | protein kinase N2 | ENSP00000359544 | GO:0042826 |
| **PLA2G4A** | phospholipase A2 group IVA | ENSP00000356436 | GO:0035035 |
| **PLD6** | phospholipase D family member 6 | ENSP00000317177 | GO:0043046 |
| **PML** | promyelocytic leukemia | ENSP00000268058 | GO:0031065 |
| **PNMT** | phenylethanolamine N-methyltransferase | ENSP00000269582 | GO:0004603 |
| **POLQ** | polymerase (DNA directed), theta | ENSP00000264233 | GO:0005694 |
| **POLR1A** | polymerase (RNA) I polypeptide A | ENSP00000263857 | GO:0045814 |
| **POLR1B** | polymerase (RNA) I polypeptide B | ENSP00000263331 | GO:0045814 |
| **POLR1C** | polymerase (RNA) I polypeptide C | ENSP00000307212 | GO:0045814 |
| **POLR1E** | polymerase (RNA) I polypeptide E | ENSP00000367023 | GO:0045814 |
| **POLR2E** | polymerase (RNA) II (DNA directed) polypeptide E, 25kDa | ENSP00000464739 | GO:0045814 |
| **POLR2K** | polymerase (RNA) II (DNA directed) polypeptide K, 7.0kDa | ENSP00000342889 | GO:0045814 |
| **POLR2L** | polymerase (RNA) II (DNA directed) polypeptide L, 7.6kDa | ENSP00000432807 | GO:0045814 |
| **PPARGC1A** | peroxisome proliferator-activated receptor gamma, coactivator 1 alpha | ENSP00000264867 | GO:0035066 |

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| **PPHLN1** | periphilin 1 | ENSP00000351066 | GO:0005694 |
| **PPM1F** | protein phosphatase, Mg2+/Mn2+ dependent 1F | ENSP00000263212 | GO:0016576 |
| **PPP1CC** | protein phosphatase 1, catalytic subunit, gamma isozyme | ENSP00000341779 | GO:0070688 |
| **PPP1R7** | protein phosphatase 1 regulatory subunit 7 | ENSP00000272983 | GO:0005694 |
| **PPP2R1A** | protein phosphatase 2 regulatory subunit A, alpha | ENSP00000324804 | GO:0000159 |
| **PPP2R2A** | protein phosphatase 2 regulatory subunit B, alpha | ENSP00000325074 | GO:0000159 |
| **PPP2R2B** | protein phosphatase 2 regulatory subunit B, beta | ENSP00000336591 | GO:0000159 |
| **PPP2R2D** | protein phosphatase 2 regulatory subunit B, delta | ENSP00000399970 | GO:0000159 |
| **PPP2R3A** | protein phosphatase 2 regulatory subunit B'', alpha | ENSP00000264977 | GO:0000159 |
| **PPP2R4** | protein phosphatase 2A regulatory subunit 4 | ENSP00000337448 | GO:0000159 |
| **PPP2R5A** | protein phosphatase 2 regulatory subunit B', alpha | ENSP00000261461 | GO:0000159 |
| **PPP2R5C** | protein phosphatase 2 regulatory subunit B', gamma | ENSP00000262239 | GO:0000159 |
| **PPP2R5D** | protein phosphatase 2 regulatory subunit B', delta | ENSP00000377669 | GO:0000159 |
| **PPP2R5E** | protein phosphatase 2 regulatory subunit B', epsilon | ENSP00000337641 | GO:0000159 |
| **PPP5C** | protein phosphatase 5, catalytic subunit | ENSP00000012443 | GO:0016576 |
| **PRDM1** | PR domain containing 1, with ZNF domain | ENSP00000358085 | GO:0008168 |
| **PRDM10** | PR domain containing 10 | ENSP00000302669 | GO:0008168 |

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| **PRDM11** | PR domain containing 11 | ENSP00000394314 | GO:0008168 |
| **PRDM12** | PR domain containing 12 | ENSP00000253008 | GO:0008168 |
| **PRDM13** | PR domain containing 13 | ENSP00000358217 | GO:0016571 |
| **PRDM14** | PR domain containing 14 | ENSP00000276594 | GO:0040029 |
| **PRDM15** | PR domain containing 15 | ENSP00000381556 | GO:0008168 |
| **PRDM2** | PR domain containing 2, with ZNF domain | ENSP00000235372 | GO:0018024 |
| **PRDM4** | PR domain containing 4 | ENSP00000228437 | GO:1990226 |
| **PRDM5** | PR domain containing 5 | ENSP00000264808 | GO:0008168 |
| **PRDM6** | PR domain containing 6 | ENSP00000384725 | GO:0018024 |
| **PRDM9** | PR domain containing 9 | ENSP00000296682 | GO:0005694 |
| **PRKAA1** | protein kinase, AMP-activated, alpha 1 catalytic subunit | ENSP00000346148 | GO:0035174 |
| **PRKAA2** | protein kinase, AMP-activated, alpha 2 catalytic subunit | ENSP00000360290 | GO:0035404 |
| **PRKCA** | protein kinase C, alpha | ENSP00000408695 | GO:0035408 |
| **PRKCB** | protein kinase C, beta | ENSP00000305355 | GO:0035408 |
| **PRKCD** | protein kinase C, delta | ENSP00000378217 | GO:0016572 |
| **PRKD1** | protein kinase D1 | ENSP00000333568 | GO:1901727 |
| **PRKD2** | protein kinase D2 | ENSP00000291281 | GO:1901727 |

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| **PRM3** | protamine 3 | ENSP00000325638 | GO:0000786 |
| **PRMT1** | protein arginine methyltransferase 1 | ENSP00000375724 | GO:0016571 |
| **PRMT2** | protein arginine methyltransferase 2 | ENSP00000291705 | GO:0016571 |
| **PRMT3** | protein arginine methyltransferase 3 | ENSP00000331879 | GO:0035242 |
| **PRMT5** | protein arginine methyltransferase 5 | ENSP00000319169 | GO:0044030 |
| **PRMT6** | protein arginine methyltransferase 6 | ENSP00000359095 | GO:0016571 |
| **PRMT7** | protein arginine methyltransferase 7 | ENSP00000343103 | GO:0016571 |
| **PYGO2** | pygopus family PHD finger 2 | ENSP00000357442 | GO:0035065 |
| **RAC1** | ras-related C3 botulinum toxin substrate 1 (rho family, small GTP binding protein Rac1) | ENSP00000348461 | GO:0042826 |
| **RAD1** | RAD1 checkpoint DNA exonuclease | ENSP00000313467 | GO:0005694 |
| **RAD21** | RAD21 cohesin complex component | ENSP00000297338 | GO:0005694 |
| **RAD9A** | RAD9 checkpoint clamp component A | ENSP00000311360 | GO:0042826 |
| **RAG1** | recombination activating gene 1 | ENSP00000299440 | GO:0010390 |
| **RAG2** | recombination activating gene 2 | ENSP00000308620 | GO:0016568 |
| **RARA** | retinoic acid receptor, alpha | ENSP00000254066 | GO:0042826 |
| **RBBP4** | retinoblastoma binding protein 4 | ENSP00000362584 | GO:0045814 |
| **RBBP5** | retinoblastoma binding protein 5 | ENSP00000264515 | GO:0042800 |

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| **RBBP6** | retinoblastoma binding protein 6 | ENSP00000316291 | GO:0005694 |
| **RBBP7** | retinoblastoma binding protein 7 | ENSP00000369424 | GO:0045814 |
| **RBL1** | retinoblastoma-like 1 | ENSP00000343646 | GO:0016568 |
| **RBL2** | retinoblastoma-like 2 | ENSP00000262133 | GO:0016568 |
| **RBM19** | RNA binding motif protein 19 | ENSP00000442053 | GO:0005694 |
| **RCBTB1** | regulator of chromosome condensation (RCC1) and BTB (POZ) domain containing protein 1 | ENSP00000367552 | GO:0016568 |
| **RCC1** | regulator of chromosome condensation 1 | ENSP00000362937 | GO:0031492 |
| **RELA** | v-rel avian reticuloendotheliosis viral oncogene homolog A | ENSP00000311508 | GO:0042826 |
| **RERE** | arginine-glutamic acid dipeptide (RE) repeats | ENSP00000338629 | GO:0000118 |
| **REST** | RE1-silencing transcription factor | ENSP00000311816 | GO:0070933 |
| **RFXANK** | regulatory factor X associated ankyrin containing protein | ENSP00000305071 | GO:0042826 |
| **RHNO1** | RAD9-HUS1-RAD1 interacting nuclear orphan 1 | ENSP00000438590 | GO:0005694 |
| **RING1** | ring finger protein 1 | ENSP00000372699 | GO:0035518 |
| **RNF168** | ring finger protein 168, E3 ubiquitin protein ligase | ENSP00000320898 | GO:0031491 |
| **RNF169** | ring finger protein 169 | ENSP00000299563 | GO:0031491 |
| **RNF2** | ring finger protein 2 | ENSP00000356480 | GO:0016574 |
| **RNF20** | ring finger protein 20 | ENSP00000373772 | GO:0016574 |

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| **RNF4** | ring finger protein 4 | ENSP00000315212 | GO:0031491 |
| **RNF40** | ring finger protein 40, E3 ubiquitin protein ligase | ENSP00000325677 | GO:2001168 |
| **RNF8** | ring finger protein 8, E3 ubiquitin protein ligase | ENSP00000362578 | GO:0070535 |
| **RNMT** | RNA (guanine-7-) methyltransferase | ENSP00000446426 | GO:0004482 |
| **RNMTL1** | RNA methyltransferase like 1 | ENSP00000306080 | GO:0008173 |
| **RPS6KA4** | ribosomal protein S6 kinase, 90kDa, polypeptide 4 | ENSP00000333896 | GO:0033129 |
| **RPS6KA5** | ribosomal protein S6 kinase, 90kDa, polypeptide 5 | ENSP00000402787 | GO:0033129 |
| **RRNAD1** | ribosomal RNA adenine dimethylase domain containing 1 | ENSP00000357199 | GO:0008649 |
| **RRP8** | ribosomal RNA processing 8, methyltransferase, homolog (yeast) | ENSP00000254605 | GO:0045814 |
| **RSF1** | remodeling and spacing factor 1 | ENSP00000311513 | GO:0016584 |
| **RTF1** | RTF1 homolog, Paf1/RNA polymerase II complex component | ENSP00000374280 | GO:0016570 |
| **RUVBL1** | RuvB-like AAA ATPase 1 | ENSP00000318297 | GO:0006334 |
| **SALL1** | spalt-like transcription factor 1 | ENSP00000251020 | GO:0016575 |
| **SALL2** | spalt-like transcription factor 2 | ENSP00000483562 | GO:0016581 |
| **SAP130** | Sin3A associated protein 130kDa | ENSP00000259235 | GO:0045814 |
| **SAP30** | Sin3A associated protein 30kDa | ENSP00000296504 | GO:0045814 |
| **SAP30BP** | SAP30 binding protein | ENSP00000347592 | GO:0045814 |

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| **SAP30L** | SAP30-like | ENSP00000297109 | GO:0045814 |
| **SART3** | squamous cell carcinoma antigen recognized by T-cells 3 | ENSP00000228284 | GO:0006334 |
| **SATB1** | SATB homeobox 1 | ENSP00000399518 | GO:0016571 |
| **SATB2** | SATB homeobox 2 | ENSP00000401112 | GO:0000118 |
| **SENP3** | SUMO1/sentrin/SMT3 specific peptidase 3 | ENSP00000314029 | GO:0071339 |
| **SET** | SET nuclear proto-oncogene | ENSP00000318012 | GO:0006337 |
| **SETD1B** | SET domain containing 1B | ENSP00000267197 | GO:0008168 |
| **SETD2** | SET domain containing 2 | ENSP00000386759 | GO:0034728 |
| **SETD3** | SET domain containing 3 | ENSP00000327436 | GO:0046975 |
| **SETD4** | SET domain containing 4 | ENSP00000382159 | GO:0016279 |
| **SETD6** | SET domain containing 6 | ENSP00000219315 | GO:0016279 |
| **SETD7** | SET domain containing (lysine methyltransferase) 7 | ENSP00000274031 | GO:0016568 |
| **SETDB1** | SET domain, bifurcated 1 | ENSP00000271640 | GO:0018024 |
| **SETDB2** | SET domain, bifurcated 2 | ENSP00000258672 | GO:0018024 |
| **SETMAR** | SET domain and mariner transposase fusion gene | ENSP00000373354 | GO:0046975 |
| **SFMBT1** | Scm-like with four mbt domains 1 | ENSP00000378235 | GO:0016568 |
| **SFMBT2** | Scm-like with four mbt domains 2 | ENSP00000355109 | GO:0042393 |

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| **SGF29** | SAGA complex associated factor 29 | ENSP00000316114 | GO:0070461 |
| **SHMT1** | serine hydroxymethyltransferase 1 (soluble) | ENSP00000318805 | GO:0004372 |
| **SHMT2** | serine hydroxymethyltransferase 2 (mitochondrial) | ENSP00000333667 | GO:0004372 |
| **SHPRH** | SNF2 histone linker PHD RING helicase, E3 ubiquitin protein ligase | ENSP00000356473 | GO:0000786 |
| **SIN3A** | SIN3 transcription regulator family member A | ENSP00000378402 | GO:0045814 |
| **SIRT2** | sirtuin 2 | ENSP00000249396 | GO:0035035 |
| **SIRT3** | sirtuin 3 | ENSP00000372191 | GO:0032041 |
| **SIRT6** | sirtuin 6 | ENSP00000305310 | GO:1990619 |
| **SIRT7** | sirtuin 7 | ENSP00000329466 | GO:0097372 |
| **SKOR2** | SKI family transcriptional corepressor 2 | ENSP00000483333 | GO:0042826 |
| **SLC50A1** | solute carrier family 50 (sugar efflux transporter), member 1 | ENSP00000306146 | GO:0045815 |
| **SLF1** | SMC5-SMC6 complex localization factor 1 | ENSP00000265140 | GO:0000786 |
| **SLMAP** | sarcolemma associated protein | ENSP00000295951 | GO:0016272 |
| **SMARCA1** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily a, member 1 | ENSP00000360162 | GO:0031491 |
| **SMARCA2** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily a, member 2 | ENSP00000371629 | GO:0042393 |
| **SMARCA4** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily a, member 4 | ENSP00000343896 | GO:0006337 |
| **SMARCA5** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily a, member 5 | ENSP00000283131 | GO:0045814 |

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| **SMARCAD1** | SWI/SNF-related, matrix-associated actin-dependent regulator of chromatin, subfamily a, containing DEAD/H box 1 | ENSP00000346217 | GO:0016568 |
| **SMARCC1** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily c, member 1 | ENSP00000254480 | GO:0006337 |
| **SMARCC2** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily c, member 2 | ENSP00000267064 | GO:0006337 |
| **SMARCD2** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 2 | ENSP00000318451 | GO:0006337 |
| **SMARCD3** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 3 | ENSP00000262188 | GO:0006337 |
| **SMARCE1** | SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily e, member 1 | ENSP00000323967 | GO:0006337 |
| **SMC1A** | structural maintenance of chromosomes 1A | ENSP00000323421 | GO:0005694 |
| **SMC1B** | structural maintenance of chromosomes 1B | ENSP00000350036 | GO:0005694 |
| **SMC2** | structural maintenance of chromosomes 2 | ENSP00000363925 | GO:0005694 |
| **SMC3** | structural maintenance of chromosomes 3 | ENSP00000354720 | GO:0005694 |
| **SMC4** | structural maintenance of chromosomes 4 | ENSP00000349961 | GO:0005694 |
| **SMCHD1** | structural maintenance of chromosomes flexible hinge domain containing 1 | ENSP00000326603 | GO:0060821 |
| **SMG5** | SMG5 nonsense mediated mRNA decay factor | ENSP00000355261 | GO:0042826 |
| **SMYD1** | SET and MYND domain containing 1 | ENSP00000393453 | GO:0018024 |
| **SMYD2** | SET and MYND domain containing 2 | ENSP00000355924 | GO:0016571 |
| **SMYD4** | SET and MYND domain containing 4 | ENSP00000304360 | GO:0008168 |
| **SMYD5** | SMYD family member 5 | ENSP00000374152 | GO:0008168 |

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|---|---|---|---|
| **SNAI2** | snail family zinc finger 2 | ENSP00000380034 | GO:0035066 |
| **SNCA** | synuclein alpha | ENSP00000338345 | GO:0035067 |
| **SNRPB** | small nuclear ribonucleoprotein polypeptides B and B1 | ENSP00000370746 | GO:0034709 |
| **SNRPD1** | small nuclear ribonucleoprotein D1 polypeptide | ENSP00000300413 | GO:0034709 |
| **SNRPD2** | small nuclear ribonucleoprotein D2 polypeptide | ENSP00000342374 | GO:0034709 |
| **SNRPD3** | small nuclear ribonucleoprotein D3 polypeptide | ENSP00000215829 | GO:0034709 |
| **SNRPF** | small nuclear ribonucleoprotein polypeptide F | ENSP00000266735 | GO:0034709 |
| **SNW1** | SNW domain containing 1 | ENSP00000261531 | GO:0051571 |
| **SOX9** | SRY-box 9 | ENSP00000245479 | GO:0006334 |
| **SP1** | Sp1 transcription factor | ENSP00000329357 | GO:0035035 |
| **SP2** | Sp2 transcription factor | ENSP00000365931 | GO:0042826 |
| **SPATA22** | spermatogenesis associated 22 | ENSP00000268981 | GO:0005694 |
| **SPI1** | Spi-1 proto-oncogene | ENSP00000227163 | GO:0044027 |
| **SPO11** | SPO11 meiotic protein covalently bound to DSB | ENSP00000316034 | GO:0005694 |
| **SPRTN** | SprT-like N-terminal domain | ENSP00000008440 | GO:0005694 |
| **SPTY2D1** | SPT2 chromatin protein domain containing 1 | ENSP00000337991 | GO:0010847 |
| **SRCAP** | Snf2-related CREBBP activator protein | ENSP00000262518 | GO:0016573 |

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|---|---|---|---|
| **SREBF1** | sterol regulatory element binding transcription factor 1 | ENSP00000348069 | GO:0031065 |
| **SRF** | serum response factor | ENSP00000265354 | GO:0042826 |
| **SSB** | Sjogren syndrome antigen B | ENSP00000260956 | GO:0008334 |
| **SSRP1** | structure specific recognition protein 1 | ENSP00000278412 | GO:0005694 |
| **STAG1** | stromal antigen 1 | ENSP00000236698 | GO:0005694 |
| **STAG2** | stromal antigen 2 | ENSP00000218089 | GO:0005694 |
| **STK38** | serine/threonine kinase 38 | ENSP00000229812 | GO:0070688 |
| **STRN** | striatin | ENSP00000263918 | GO:0000159 |
| **STRN4** | striatin 4 | ENSP00000263280 | GO:0000159 |
| **SUDS3** | SDS3 homolog, SIN3A corepressor complex component | ENSP00000443988 | GO:0045814 |
| **SUPT7L** | SPT7-like STAGA complex gamma subunit | ENSP00000336750 | GO:0030914 |
| **SUV39H2** | suppressor of variegation 3-9 homolog 2 | ENSP00000319208 | GO:0046974 |
| **SYCE3** | synaptonemal complex central element protein 3 | ENSP00000385480 | GO:0005694 |
| **SYCP1** | synaptonemal complex protein 1 | ENSP00000358535 | GO:0005694 |
| **SYCP3** | synaptonemal complex protein 3 | ENSP00000266743 | GO:0035093 |
| **SYNCRIP** | synaptotagmin binding, cytoplasmic RNA interacting protein | ENSP00000347380 | GO:0071204 |
| **TADA1** | transcriptional adaptor 1 | ENSP00000356848 | GO:0070461 |

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|---|---|---|---|
| **TADA2A** | transcriptional adaptor 2A | ENSP00000481091 | GO:0016573 |
| **TADA2B** | transcriptional adaptor 2B | ENSP00000308022 | GO:0035066 |
| **TADA3** | transcriptional adaptor 3 | ENSP00000307684 | GO:0005671 |
| **TAF10** | TATA-box binding protein associated factor 10 | ENSP00000299424 | GO:0000125 |
| **TAF1C** | TATA-box binding protein associated factor, RNA polymerase I, C | ENSP00000345305 | GO:0045814 |
| **TAF1D** | TATA-box binding protein associated factor, RNA polymerase I, D | ENSP00000314971 | GO:0045814 |
| **TAF2** | TATA-box binding protein associated factor 2 | ENSP00000367406 | GO:0033276 |
| **TAF5** | TATA-box binding protein associated factor 5 | ENSP00000358854 | GO:0016568 |
| **TAF5L** | TATA-box binding protein associated factor 5 like | ENSP00000355635 | GO:0033276 |
| **TAF6** | TATA-box binding protein associated factor 6 | ENSP00000389575 | GO:0071339 |
| **TAF6L** | TATA-box binding protein associated factor 6 like | ENSP00000294168 | GO:0030914 |
| **TAF7** | TATA-box binding protein associated factor 7 | ENSP00000312709 | GO:0035067 |
| **TAL1** | T-cell acute lymphocytic leukemia 1 | ENSP00000360951 | GO:0033193 |
| **TBL1X** | transducin (beta)-like 1X-linked | ENSP00000217964 | GO:0000118 |
| **TBL1XR1** | transducin (beta)-like 1 X-linked receptor 1 | ENSP00000405574 | GO:0000118 |
| **TBP** | TATA-box binding protein | ENSP00000230354 | GO:0045814 |
| **TCF21** | transcription factor 21 | ENSP00000356857 | GO:0042826 |

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|---|---|---|---|
| **TDG** | thymine DNA glycosylase | ENSP00000376611 | GO:0040029 |
| **TDRD1** | tudor domain containing 1 | ENSP00000251864 | GO:0043046 |
| **TDRD12** | tudor domain containing 12 | ENSP00000390621 | GO:0043046 |
| **TDRD3** | tudor domain containing 3 | ENSP00000367126 | GO:0016568 |
| **TDRD5** | tudor domain containing 5 | ENSP00000356586 | GO:0043046 |
| **TDRKH** | tudor and KH domain containing | ENSP00000357817 | GO:0043046 |
| **TET1** | tet methylcytosine dioxygenase 1 | ENSP00000362748 | GO:0040029 |
| **TET2** | tet methylcytosine dioxygenase 2 | ENSP00000265149 | GO:0040029 |
| **TET3** | tet methylcytosine dioxygenase 3 | ENSP00000386869 | GO:0040029 |
| **TEX10** | testis expressed 10 | ENSP00000364037 | GO:0071339 |
| **TFAP2C** | transcription factor AP-2 gamma (activating enhancer binding protein 2 gamma) | ENSP00000201031 | GO:0040029 |
| **TFAP4** | transcription factor AP-4 (activating enhancer binding protein 4) | ENSP00000204517 | GO:0042826 |
| **TFB2M** | transcription factor B2, mitochondrial | ENSP00000355471 | GO:0008649 |
| **TGFB1** | transforming growth factor beta 1 | ENSP00000221930 | GO:0035066 |
| **TGS1** | trimethylguanosine synthase 1 | ENSP00000260129 | GO:0008168 |
| **THAP7** | THAP domain containing 7 | ENSP00000215742 | GO:0005694 |
| **THUMPD2** | THUMP domain containing 2 | ENSP00000368001 | GO:0008168 |

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|---|---|---|---|
| **THUMPD3** | THUMP domain containing 3 | ENSP00000395893 | GO:0008168 |
| **TLK1** | tousled like kinase 1 | ENSP00000354089 | GO:0016568 |
| **TLK2** | tousled like kinase 2 | ENSP00000275780 | GO:0016568 |
| **TONSL** | tonsoku-like, DNA repair protein | ENSP00000386239 | GO:0035101 |
| **TOP1MT** | topoisomerase (DNA) I, mitochondrial | ENSP00000328835 | GO:0005694 |
| **TOP3A** | topoisomerase (DNA) III alpha | ENSP00000321636 | GO:0005694 |
| **TOPBP1** | topoisomerase (DNA) II binding protein 1 | ENSP00000260810 | GO:0005694 |
| **TPMT** | thiopurine S-methyltransferase | ENSP00000312304 | GO:0008119 |
| **TRAF6** | TNF receptor associated factor 6 | ENSP00000433623 | GO:0042826 |
| **TRDMT1** | tRNA aspartic acid methyltransferase 1 | ENSP00000367030 | GO:0008175 |
| **TRIM16** | tripartite motif containing 16 | ENSP00000462903 | GO:0043967 |
| **TRIM24** | tripartite motif containing 24 | ENSP00000340507 | GO:0070577 |
| **TRIM28** | tripartite motif containing 28 | ENSP00000253024 | GO:0043045 |
| **TRIM37** | tripartite motif containing 37 | ENSP00000376784 | GO:0036353 |
| **TRIM68** | tripartite motif containing 68 | ENSP00000300747 | GO:0035035 |
| **TRIP12** | thyroid hormone receptor interactor 12 | ENSP00000283943 | GO:1901315 |
| **TRIP4** | thyroid hormone receptor interactor 4 | ENSP00000261884 | GO:0035035 |

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|---|---|---|---|
| **TRMT1** | tRNA methyltransferase 1 | ENSP00000221504 | GO:0004809 |
| **TRMT10A** | tRNA methyltransferase 10A | ENSP00000378343 | GO:0008168 |
| **TRMT10B** | tRNA methyltransferase 10B | ENSP00000297994 | GO:0008168 |
| **TRMT10C** | tRNA methyltransferase 10C, mitochondrial RNase P subunit | ENSP00000312356 | GO:0008168 |
| **TRMT11** | tRNA methyltransferase 11 homolog | ENSP00000333934 | GO:0004809 |
| **TRMT112** | tRNA methyltransferase 11-2 homolog (S. cerevisiae) | ENSP00000309433 | GO:0008276 |
| **TRMT13** | tRNA methyltransferase 13 homolog (S. cerevisiae) | ENSP00000359160 | GO:0008175 |
| **TRMT1L** | tRNA methyltransferase 1 like | ENSP00000356476 | GO:0004809 |
| **TRMT2A** | tRNA methyltransferase 2 homolog A | ENSP00000252136 | GO:0008173 |
| **TRMT44** | tRNA methyltransferase 44 homolog (S. cerevisiae) | ENSP00000374387 | GO:0016300 |
| **TRMT5** | tRNA methyltransferase 5 | ENSP00000261249 | GO:0052906 |
| **TRMT6** | tRNA methyltransferase 6 | ENSP00000203001 | GO:0031515 |
| **TRPS1** | trichorhinophalangeal syndrome I | ENSP00000220888 | GO:0031063 |
| **TSPYL1** | TSPY-like 1 | ENSP00000357597 | GO:0006334 |
| **TSPYL4** | TSPY-like 4 | ENSP00000410943 | GO:0006334 |
| **TSPYL5** | TSPY-like 5 | ENSP00000322802 | GO:0006334 |
| **TTF1** | transcription termination factor, RNA polymerase I | ENSP00000333920 | GO:0045814 |

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|---|---|---|---|
| **TWIST1** | twist family bHLH transcription factor 1 | ENSP00000242261 | GO:0033128 |
| **TWISTNB** | TWIST neighbor | ENSP00000222567 | GO:0045814 |
| **TYW3** | tRNA-yW synthesizing protein 3 homolog | ENSP00000359904 | GO:0008168 |
| **UBAP2L** | ubiquitin associated protein 2 like | ENSP00000345308 | GO:0005671 |
| **UBE2A** | ubiquitin conjugating enzyme E2A | ENSP00000360613 | GO:0033522 |
| **UBE2B** | ubiquitin conjugating enzyme E2B | ENSP00000265339 | GO:0031056 |
| **UBE2E1** | ubiquitin conjugating enzyme E2E 1 | ENSP00000303709 | GO:0033523 |
| **UBE2U** | ubiquitin conjugating enzyme E2U (putative) | ENSP00000360116 | GO:0016574 |
| **UBN1** | ubinuclein 1 | ENSP00000262376 | GO:0016568 |
| **UBR2** | ubiquitin protein ligase E3 component n-recognin 2 | ENSP00000361990 | GO:0033522 |
| **UBR5** | ubiquitin protein ligase E3 component n-recognin 5 | ENSP00000220959 | GO:1901315 |
| **UBTF** | upstream binding transcription factor, RNA polymerase I | ENSP00000302640 | GO:0045814 |
| **UCN** | urocortin | ENSP00000296099 | GO:0031064 |
| **UHRF1** | ubiquitin-like with PHD and ring finger domains 1 | ENSP00000479617 | GO:0044729 |
| **UHRF1BP1** | UHRF1 binding protein 1 | ENSP00000192788 | GO:0042826 |
| **UHRF2** | ubiquitin-like with PHD and ring finger domains 2, E3 ubiquitin protein ligase | ENSP00000276893 | GO:0010216 |
| **UIMC1** | ubiquitin interaction motif containing 1 | ENSP00000366434 | GO:0070537 |

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|---|---|---|---|
| **UPF1** | UPF1 regulator of nonsense transcripts homolog (yeast) | ENSP00000262803 | GO:0071044 |
| **USF1** | upstream transcription factor 1 | ENSP00000356999 | GO:0042826 |
| **USP15** | ubiquitin specific peptidase 15 | ENSP00000258123 | GO:0061649 |
| **USP16** | ubiquitin specific peptidase 16 | ENSP00000382857 | GO:0035522 |
| **USP21** | ubiquitin specific peptidase 21 | ENSP00000289865 | GO:0016578 |
| **USP22** | ubiquitin specific peptidase 22 | ENSP00000261497 | GO:0016574 |
| **USP27X** | ubiquitin specific peptidase 27, X-linked | ENSP00000483631 | GO:0000124 |
| **USP3** | ubiquitin specific peptidase 3 | ENSP00000369681 | GO:0016578 |
| **USP49** | ubiquitin specific peptidase 49 | ENSP00000362097 | GO:0035616 |
| **USP51** | ubiquitin specific peptidase 51 | ENSP00000423333 | GO:0000124 |
| **USP7** | ubiquitin specific peptidase 7 (herpes virus-associated) | ENSP00000343535 | GO:0010216 |
| **UTP3** | UTP3, small subunit (SSU) processome component, homolog (S. cerevisiae) | ENSP00000254803 | GO:0016568 |
| **UVSSA** | UV stimulated scaffold protein A | ENSP00000423340 | GO:0005694 |
| **VBP1** | von Hippel-Lindau binding protein 1 | ENSP00000286428 | GO:0016272 |
| **VEGFA** | vascular endothelial growth factor A | ENSP00000361148 | GO:1901727 |
| **VPRBP** | Vpr (HIV-1) binding protein | ENSP00000338857 | GO:1990245 |
| **VPS72** | vacuolar protein sorting 72 homolog (S. cerevisiae) | ENSP00000346464 | GO:0043486 |

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|---|---|---|---|
| **VRK1** | vaccinia related kinase 1 | ENSP00000216639 | GO:0031493 |
| **WAC** | WW domain containing adaptor with coiled-coil | ENSP00000311106 | GO:0071894 |
| **WBP2** | WW domain binding protein 2 | ENSP00000467579 | GO:0045815 |
| **WBSCR22** | Williams Beuren syndrome chromosome region 22 | ENSP00000265758 | GO:0016568 |
| **WBSCR27** | Williams Beuren syndrome chromosome region 27 | ENSP00000297873 | GO:0008757 |
| **WDR4** | WD repeat domain 4 | ENSP00000328671 | GO:0008176 |
| **WDR5** | WD repeat domain 5 | ENSP00000351446 | GO:0042800 |
| **WDR61** | WD repeat domain 61 | ENSP00000453801 | GO:2001162 |
| **WDR75** | WD repeat domain 75 | ENSP00000314193 | GO:0016573 |
| **WDR77** | WD repeat domain 77 | ENSP00000235090 | GO:0034709 |
| **WDR82** | WD repeat domain 82 | ENSP00000296490 | GO:0042800 |
| **WDTC1** | WD and tetratricopeptide repeats 1 | ENSP00000317971 | GO:0042393 |
| **WHSC1** | Wolf-Hirschhorn syndrome candidate 1 | ENSP00000329167 | GO:0042799 |
| **WHSC1L1** | Wolf-Hirschhorn syndrome candidate 1-like 1 | ENSP00000313410 | GO:0016571 |
| **WIZ** | widely interspaced zinc finger motifs | ENSP00000263381 | GO:0070984 |
| **WTAP** | Wilms tumor 1 associated protein | ENSP00000336911 | GO:0036396 |
| **XBP1** | X-box binding protein 1 | ENSP00000216037 | GO:0031062 |

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|---|---|---|---|
| **XRN1** | 5'-3' exoribonuclease 1 | ENSP00000264951 | GO:0071044 |
| **YBX1** | Y-box binding protein 1 | ENSP00000361626 | GO:0071204 |
| **YEATS2** | YEATS domain containing 2 | ENSP00000306983 | GO:0005671 |
| **YEATS4** | YEATS domain containing 4 | ENSP00000247843 | GO:0035267 |
| **YWHAB** | tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, beta | ENSP00000300161 | GO:0042826 |
| **YWHAE** | tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, epsilon | ENSP00000461762 | GO:0042826 |
| **ZBTB38** | zinc finger and BTB domain containing 38 | ENSP00000426387 | GO:0005694 |
| **ZBTB4** | zinc finger and BTB domain containing 4 | ENSP00000369973 | GO:0005694 |
| **ZBTB7A** | zinc finger and BTB domain containing 7A | ENSP00000323670 | GO:0035035 |
| **ZC3H8** | zinc finger CCCH-type containing 8 | ENSP00000386488 | GO:0035363 |
| **ZCCHC4** | zinc finger, CCHC domain containing 4 | ENSP00000303468 | GO:0008168 |
| **ZFP57** | ZFP57 zinc finger protein | ENSP00000409118 | GO:0043045 |
| **ZFR** | zinc finger RNA binding protein | ENSP00000265069 | GO:0005694 |
| **ZMYND11** | zinc finger, MYND-type containing 11 | ENSP00000371003 | GO:0016568 |
| **ZMYND8** | zinc finger, MYND-type containing 8 | ENSP00000262975 | GO:0042393 |
| **ZZZ3** | zinc finger, ZZ-type containing 3 | ENSP00000359837 | GO:0005671 |

**Table S1.** AMPK phosphorylation sequence containing proteins predicted to be involved in epigenetic regulation.

**Human Promoter Primers**

| Gene | Forward Sequence | Reverse Sequence |
|---|---|---|
| **P38** | TCTTTTGACTCTTTCCCCGAC | AGACCAAAGGCAGAAACTCC |
| **P65** | AGCTCTTGATGCACTGTCAG | ACGTTAAAATGTCCTACCCACC |
| **PGC-1a** | AAAACGCAAACTACACAACCC | AGGCTCCCAGAAAACAAGTG |
| **NRF1** | CGCAATCTCCAGCTATTTCAG | CAATGTCGCTCCTTATTTCTGC |
| **NRF2** | TCCTACACCAACGCCTTTC | TGAGCTTCCGAAAATCCCC |
| **Tfam** | GCCTCTCCCGTTACTATTTCTG | CGAGGCACTATGGGAAATCTG |
| **UCP2** | TCTTGTCTTTCTGTCTTTCCTCTC | GCCTGGTTCGCCTTTAATTG |
| **UCP3** | TCCCACCTCCACTTCAAAAC | CCATGCTAGAAGTCCGAAGG |
| **β-Actin** | CGACCAGTGTTTGCCTTTTATG | ATGGTGAGCTGCGAGAATAG |

**Mouse Promoter Primers**

| Gene | Forward Sequence | Reverse Sequence |
|---|---|---|
| **P38** | GTCACCTGAACGAAACTTGC | TCGGTATTTTAAGCTCTTCGGG |
| **P65** | TCTGCCCCTCTACCCTAAG | GACTGAATTCCACACGTTTTCC |
| **PGC-1a** | CCACAGAACACAAAACGACAG | AAACACGCTGAAGTCCTCTG |

| | | |
|---|---|---|
| **NRF1** | GTCCGCGACTTGCTCAG | CAATGTCGCTCCTTATTTCTGC |
| **NRF2** | GCCCTAACCCCGAAACTG | CACTCCCTGATTTGGACCTG |
| **Tfam** | CAGTCCATAGGCACCGTATTG | CAAGGCAGAAGGAGAGCG |
| **UCP2** | CCTTCCCTGGAGTCCTAATTTG | TCTCCCTGTGTCCCTACTTC |
| **UCP3** | TCACGGAAGCTAAACCAGATC | ATAGATGTGGAAGTCAAGGCC |
| **GAPDH** | CCCTGTTCTCCCATTTTACTCG | GCTTATCCAGTCCTAGCTCAAG |

**Human mRNA Primers**

| Gene | Forward Sequence | Reverse Sequence |
|---|---|---|
| **P38** | TGAACAAGACAATCTGGGAGG | GCCAGTCCAAAATCCAGAATC |
| **P65** | GCCCCTATGTGGAGATCATTG | GATGGGATGAGAAAGGACAGG |
| **PGC1α** | GAGGAATATCAGCACGAGAGG | GCATCACAGGTATAACGGTAGG |
| **NRF1** | GCTTCAGAATTGCCAACCAC | GTTTCCCCAGACAAGACGATC |
| **NRF2** | ACATCCAGTCAGAAACCAGTG | ATGTCCTGTTGCATACCGTC |
| **Tfam** | GTTGTGATTGCTGGAGTTGTG | CTCCGCCCTATAAGCATCTTG |
| **UCP2** | GCTAAAGTCCGGTTACAGATCC | TCTTGTAGGCATTGACGGTG |
| **UCP3** | GACCTCGTTACCTTTCCACTG | TCCCGCTGTATTTTCTGTCG |
| **β-Actin** | CATGTACGTTGCTATCCAGGC | CTCCTTAATGTCACGCACGAT |

**Mouse mRNA Primers**

| Gene | Forward Sequence | Reverse Sequence |
|---|---|---|
| **P38** | CCAGATGCCGAAGATGAACT | GATAGGTGGACAGACGAACAG |
| **P65** | GTTTCCCCTCATCTTTCCCTC | GCATTCAAGTCATAGTCCCCG |
| **PGC1α** | CACCAAACCCACAGAAAACAG | GTACAACTCAGATTGCTCGGG |
| **NRF1** | CTCAAGTATTCCACAGGTCGG | TTTGTTCCACCTCTCCATCAG |
| **NRF2** | CTGTAGGAAAAGGAAGCTGGAG | TCTCCCAAATGGTGCCTAAG |
| **Tfam** | CACCCAGATGCAAAACTTTCAG | AGATCACTTCGTCCAACTTCAG |
| **UCP2** | TCGTCTCCCAGCCATTTTC | ATTCTGATTTCCTGCTACCTCC |
| **UCP3** | ACGGTTGTGAAGTTCCTGG | GGTTCTGTAGGCATCCATAGTC |

| | | |
|---|---|---|
| **GAPDH** | AGGCCGGTGCTGAGTATGTC | TGCCTGCTTCACCACCTTCT |

**Table S2**. Primers used in methylation, FAIRE, ChIP, and mRNA quantification.