



Faculdade de Medicina de São José do Rio Preto

Programa de Pós-Graduação em Ciências da Saúde

Joice Matos Biselli

Expressão diferencial de microRNAs em células mononucleares do sangue periférico de crianças com síndrome de Down

Tese apresentada à Faculdade de Medicina de São José do Rio Preto para obtenção do Título de Doutor no Curso de Pós-Graduação em Ciências da Saúde, Eixo Temático: Medicina e Ciências Correlatas.

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Orientadora: Prof^a. Dr^a. Érika Cristina Pavarino

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Joice Matos Biselli

**Expressão diferencial de microRNAs em células
mononucleares do sangue periférico de crianças
com síndrome de Down**

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“O mais importante é não deixar de fazer perguntas.”

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LISTA DE ABREVIATURAS E SÍMBOLOS

μL	Microlitro
<i>AGTR1</i>	Gene receptor de angiotensina II, tipo 1
CEP	Comitê de Ética em Pesquisa
Cq	Ciclo de quantificação
DEPC	Dietilpirocarbonato
DGCR8	<i>DiGeorge syndrome critical region gene 8</i>
dme	<i>Drosophila melanogaster</i>
DNAc	DNA complementar
dNTPs	Desoxirribonucleotídeos trifosfatados
DP	Desvio padrão
DS	<i>Down syndrome</i>
DSCR	<i>Down syndrome critical region</i> / região crítica para a síndrome de Down
dTTP	Desoxitimidina trifosfatada
EDTA	Ácido etilenodiaminotetracético
<i>ETS2</i>	<i>v-ets erythroblastosis virus E26 oncogene homolog 2 (avian)</i>
FAMERP	Faculdade de Medicina de São José do Rio Preto
FMRP	Faculdade de Medicina de Ribeirão Preto
FU	Sinal de fluorescência
g	Força centrífuga em medida da gravidade da Terra
G	Teste de <i>Grubbs</i>
<i>GABPA</i>	<i>GA binding protein transcription factor, alpha subunit 60kDa</i>
GL	Graus de liberdade
HB	Hospital de Base de São José do Rio Preto
<i>HLCS</i>	<i>Holocarboxylase synthetase</i>

Hsa	<i>Homo sapiens</i>
Hsa 21	<i>Homo sapiens</i> cromossomo 21
Hsa 21p	Braço curto do cromossomo 21
Hsa 21q	Braço longo do cromossomo 21
IBILCE	Instituto de Biociências, Letras e Ciências Exatas
<i>M</i>	Medida da estabilidade de genes de referência
<i>MeCP2</i>	<i>Methyl-CpG-binding protein</i>
MGB	<i>Minor groove binder</i>
MgCl ₂	Cloreto de magnésio
mL	Mililitro
mM	Milimolar
mmu	<i>Mus musculus</i>
NCBI	<i>National Center for Biotechnology Information</i>
ng	Nanograma
nm	Nanômetro
nM	Nanomolar
nt	Número de nucleotídeos
°C	Graus Celsius
PBS	Tampão fosfato salino
PCR	Reação em cadeia da polimerase
PCRq	Reação em cadeia da polimerase quantitativa
qPCR	<i>Quantitative polymerase chain reaction</i>
<i>RefSeq</i>	Banco de dados de sequências de referência
RIN	<i>RNA Integrity Number</i>
RNA	Ácido ribonucléico
RNAm	RNA mensageiro

RQ	Quantificação relativa
RT-PCR	Transcrição reversa por reação em cadeia da polimerase
SD	Síndrome de Down
<i>SOD1</i>	<i>Superoxide dismutase 1</i>
<i>TIAM1</i>	<i>T-cell lymphoma invasion and metastasis 1</i>
Tris-HCl	Tris Hidrocloro
UNESP	Universidade Estadual Paulista
USP	Universidade de São Paulo
UTR 3'	Região 3' não traduzida

RESUMO

Introdução: A trissomia do cromossomo 21 é a base genética da síndrome de Down (SD), a cromossomopatia humana mais frequente. O fenótipo da SD pode incluir várias características dismórficas, deficiência intelectual, alterações imunológicas, cardiopatias congênitas, risco aumentado para leucemias específicas, alterações neurológicas, entre outras. Existem basicamente duas hipóteses que tentam explicar como a presença de três cópias do cromossomo 21 resulta no fenótipo Down. De acordo com a hipótese do “efeito da dosagem gênica”, a expressão elevada em cerca de 50% de um gene específico ou de um grupo de genes do cromossomo 21 presente em triplicata em indivíduos com SD seria diretamente responsável pela manifestação de características da síndrome. A segunda hipótese sugere a existência de efeitos secundários de genes trissômicos, que afetariam múltiplas vias metabólicas, resultando em disfunção celular. Estudos recentes mostram que a trissomia do cromossomo 21 resulta na expressão elevada de microRNAs, pequenas moléculas de RNAs não-codificantes envolvidos na regulação gênica pós-transcricional, o que pode levar à redução da expressão de proteínas específicas e contribuir para o fenótipo da SD.

Objetivo: Identificar microRNAs diferencialmente expressos em células mononucleares do sangue periférico de crianças com SD em relação a crianças sem a síndrome e identificar processos biológicos relevantes para a patogênese da SD associados a genes-alvo preditos de microRNAs diferencialmente expressos em crianças com SD. **Casística e Métodos:** Foram incluídas no estudo seis crianças com trissomia livre do cromossomo 21 e seis crianças sem a síndrome. A quantificação de microRNAs maduros foi realizada utilizando-se *TaqMan® Low Density Arrays (Applied Biosystems)*, que possibilita a investigação da expressão de 754 microRNAs maduros

pelo método de reação em cadeia da polimerase quantitativa (PCRq) fluorescente em tempo real. A predição de genes-alvo dos microRNAs foi realizada utilizando-se o programa *TargetScanHuman* v. 5.2. Para obtenção de informações sobre os genes-alvo preditos foi utilizada a ferramenta *Bioprocess*, um banco de dados alimentado com informações do *National Center for Biotechnology Information* (NCBI). **Resultados:** Dos 490 microRNAs maduros expressos no tipo celular investigado, 49 apresentaram expressão reduzida no grupo de crianças com SD. Os microRNAs localizados no cromossomo 21 não apresentaram expressão diferencial entre os grupos. A análise de Bionformática revelou que genes envolvidos em diversos processos biológicos relevantes para a SD, tais como apoptose, metabolismo de espécies reativas de oxigênio, metabolismo mitocondrial, sistema imunológico, envelhecimento, ciclo e divisão celular e controle da expressão gênica, são alvos preditos de microRNAs diferencialmente expressos em crianças com SD. **Conclusão:** Crianças com SD apresentam expressão reduzida de microRNAs não localizados no cromossomo 21 em células mononucleares do sangue periférico, em relação a crianças sem a síndrome. Processos biológicos relevantes para a patogênese da SD estão associados a genes-alvo preditos de microRNAs diferencialmente expressos em crianças com SD.

ABSTRACT

Introduction: Trisomy 21 is the genetic basis of Down syndrome (DS), the most common human chromosomal disorder. DS phenotype may include several dysmorphic features, intellectual disability, immunological alteration, congenital heart disease, high risk for specific types of leukemia and neurological alterations. There are basically two hypotheses to explain how the presence of three copies of chromosome 21 results in DS phenotype. The “gene dosage effect” hypothesis states that over-expression in about 50% of a specific gene or a group of genes located on chromosome 21 present in triplicate in DS individuals is directly responsible for DS features. The second hypothesis suggests the existence of secondary effects of trisomic genes that affect multiple metabolic pathways, resulting in cellular dysfunction. Recent studies show that trisomy 21 results in the over-expression of microRNAs, small molecules of noncoding RNA involved in post-transcriptional gene regulation, which could result in low expression of specific proteins and contribute to DS phenotype. **Objective:** To identify differentially expressed microRNAs in peripheral blood mononuclear cells of DS and non-DS children and to identify biological processes relevant to DS pathogenesis associated with predicted gene targets of microRNAs differentially expressed in DS children. **Casuistic and Methods:** Six children with free trisomy 21 and six control children were included in the study. Mature microRNAs were quantified using TaqMan® Low Density Arrays (*Applied Biosystems*), which enable the quantification of 754 mature microRNAs by real time quantitative polymerase chain reaction (qPCR) using fluorescent probes. The target prediction was performed using the software TargetScanHuman v. 5.2. Information about gene targets was obtained using the software Bioprocess, a database that obtains data from the National Center for

Biotechnology Information (NCBI). **Results:** Of the 490 mature microRNAs expressed in this cell type, 49 are low-expressed in DS group. The microRNAs located in chromosome 21 did not present differential expression between the groups. Bioinformatics analysis showed that genes involved in several relevant biological process to DS, including apoptosis, reactive oxygen species metabolism, mitochondrial metabolism, immune system, cell aging, cycle and division and control of gene expression, are predicted targets of microRNAs differentially expressed in DS children.

Conclusion: DS children present low expression of microRNAs not located on chromosome 21 in peripheral blood mononuclear cells, as compared to children without DS. Biological processes relevant to DS pathogenesis are associated with predicted gene targets of microRNAs differentially expressed in DS children.

INTRODUÇÃO

I. INTRODUÇÃO

O cromossomo 21, referido como Hsa 21 (*Homo sapiens* cromossomo 21), é o menor autossomo humano. Na publicação inicial da sequência desse cromossomo, em 2000,⁽¹⁾ seu conteúdo foi estimado em 225 genes, incluindo 127 genes conhecidos e 98 genes preditos, além de 59 pseudogenes. Em uma revisão recente do conteúdo do cromossomo 21,⁽²⁾ foram identificados 552 genes localizados em seu braço longo (Hsa 21q), dos quais 161 encontram-se catalogados na base de dados de Sequências de Referência (*RefSeq*) do *National Center for Biotechnology Information* (NCBI)⁽³⁾ como codificantes de proteínas. Os 391 genes restantes são referidos como genes novos ou não catalogados na base de dados de Sequências de Referência (*RefSeq*), podendo codificar proteínas ou RNAs funcionais. Por sua vez, o braço curto do cromossomo 21 (Hsa 21p) apresenta sequência altamente homóloga àquela presente nos outros quatro cromossomos acrocêntricos, mas há evidências da presença de genes ou pseudogenes nessa região cromossômica.^(4,5)

Em 1959, Lejeune e colaboradores descobriram que a presença de três cópias do cromossomo 21 é base genética da síndrome de Down (SD)⁽⁶⁾ (MIM 190685),⁽⁷⁾ a cromossomopatia humana mais frequente, com incidência de 1:660 nascidos vivos.⁽⁸⁾ Desde então, muitos esforços têm sido feitos na tentativa de identificar genes do cromossomo 21 responsáveis pelo desenvolvimento do fenótipo da síndrome, que inclui várias características dismórficas,⁽⁹⁾ deficiência intelectual,⁽¹⁰⁾ alterações imunológicas,^(11,12) cardiopatias congênitas,⁽¹³⁾ risco aumentado para leucemias específicas,⁽¹⁴⁾ alterações neurológicas, como manifestação precoce da Doença de Alzheimer,⁽¹⁵⁾ e outras complicações clínicas.⁽¹⁶⁾ A maioria das características

fenotípicas da SD é variável tanto em gravidade quanto em ocorrência. Entre os fatores que contribuem para essa variabilidade estão componentes ambientais e genéticos, como a variação interindividual da expressão tanto de genes em triplicata quanto de genes dissômicos, em indivíduos com SD.⁽¹⁷⁻¹⁹⁾

Cerca de 95% dos indivíduos com SD apresenta três cópias completas do Hsa 21, mais frequentemente devido à falha na segregação cromossômica durante a meiose materna,⁽²⁰⁾ enquanto 1% apresenta mosaïcismo e 4% apresenta translocações cromossômicas.^(21,22) A manifestação fenotípica resultante da translocação envolvendo o par de cromossomos 21 t(21:21), na qual o Hsa 21p não está presente, não difere daquela observada para a trissomia completa; portanto os genes contidos no Hsa 21p não são considerados importantes para o fenótipo da SD.⁽²³⁾

A partir de estudos com indivíduos apresentando trissomias parciais do Hsa 21, foi definida uma “região crítica para a SD” (*Down syndrome critical region* - DSCR), que inclui parte das regiões 21q22.2 e 21q22.3, e, se triplicada, é associada a várias características fenotípicas da síndrome.⁽²⁴⁾ Entretanto, estudos realizados tanto com indivíduos com SD⁽²⁵⁾ quanto com modelos animais da síndrome⁽²⁶⁾ mostraram que os genes contidos na DSCR não são suficientes para produzir o fenótipo craniofacial da SD, o que sugere a participação de genes localizados em outras regiões cromossômicas na determinação desta e, possivelmente, de outras manifestações fenotípicas. Além disso, há evidências de que genes localizados no cromossomo 21 fora da região crítica também contribuem para o fenótipo da síndrome.⁽²⁷⁾

Existem basicamente duas hipóteses que tentam explicar como a presença de três cópias do Hsa 21 resulta no fenótipo Down. Segundo a hipótese do “efeito da dosagem gênica”, a expressão elevada de um gene específico ou de um grupo de genes do

cromossomo 21 presente em triplicata em indivíduos com SD seria diretamente responsável pela manifestação de características fenotípicas da síndrome. Teoricamente, o aumento esperado da expressão de genes trissômicos é proporcional à dosagem gênica, ou seja, de aproximadamente 50%. A segunda hipótese sugere que produtos de genes localizados no Hsa 21 podem provocar alteração na expressão de genes dissômicos, caracterizando efeitos secundários de genes trissômicos, que afetariam múltiplas vias metabólicas, culminando em disfunção celular.^(28,29)

Considerando os elementos essenciais das duas hipóteses, elas não são mutuamente excludentes. Muitos estudos de expressão gênica comparando tecidos trissômicos para o cromossomo 21 e euplóides reforçam a hipótese do “efeito da dosagem gênica”,⁽³⁰⁻³⁴⁾ embora o aumento da expressão gênica nem sempre siga o padrão esperado de 50%.⁽³⁵⁻³⁷⁾ Por outro lado, a alteração da expressão de genes dissômicos também é observada em indivíduos com SD e modelos animais da síndrome.^(27,34,37-41) A alteração da concentração de proteínas fetais que são detectadas na circulação materna e utilizadas na triagem pré-natal de aneuploidias, como a alfafetoproteína e a gonadotrofina coriônica, bem como de outros possíveis biomarcadores da SD, é uma evidência indireta do efeito secundário de genes trissômicos, uma vez que os genes que codificam essas proteínas localizam-se nos cromossomos 4 e 19, respectivamente.^(29,42)

Os achados de estudos que mostram que genes trissômicos nem sempre seguem o padrão esperado de aumento de 50% de sua expressão, bem como a alteração do padrão de expressão de genes dissômicos, podem ser explicados pelo fato de mecanismos regulatórios também estarem alterados na trissomia do 21. Estudos mostram que células sanguíneas de indivíduos com SD apresentam hipermetilação

global do DNA em relação a indivíduos sem a síndrome.^(43,44) É possível que essa hipermetilação global seja resultado da presença da terceira cópia do Hsa 21, o qual possui sequências altamente metiladas,⁽⁴⁵⁾ ou que este aumento da metilação do DNA corresponda a um mecanismo adaptativo para reduzir a expressão de genes trissômicos, uma vez que a metilação de regiões promotoras de genes resulta no bloqueio da transcrição gênica.⁽⁴⁶⁾ Essa última hipótese é reforçada por evidências de que genes do Hsa 21 apresentam-se hipermetilados e com expressão atenuada em indivíduos com SD, sugerindo que a hipermetilação do DNA funciona como um mecanismo compensatório da dosagem gênica.⁽⁴⁷⁾ Além disso, um padrão de metilação diferencial em indivíduos com SD também foi observado para genes dissômicos com consequente alteração da expressão gênica, sugerindo que alterações no padrão de metilação gene-específicas são uma resposta à trissomia do 21 com consequências funcionais na regulação gênica.⁽⁴⁸⁾

Estudos recentes mostram que a trissomia do 21 resulta na expressão alterada de microRNAs,⁽⁴⁹⁻⁵¹⁾ o que poderia resultar em alteração da expressão de proteínas específicas e contribuir para o fenótipo da SD. MicroRNAs são pequenas moléculas de ácido ribonucléico (RNA) não-codificantes envolvidos na regulação gênica pós-transcricional.⁽⁵²⁾ Os genes de microRNAs são evolutivamente conservados e podem estar localizados em íntrons ou éxons de genes codificadores de proteínas ou regiões intergênicas.⁽⁵³⁾ MicroRNAs são expressos como longos transcritos primários (pri-microRNA) pela RNA polimerase II⁽⁵⁴⁾ e processados no núcleo por um complexo formado pela enzima Drosha, uma nuclease do tipo RNase III,⁽⁵⁵⁾ e uma proteína de ligação ao RNA de fita dupla, DGCR8 (*DiGeorge syndrome critical region gene 8*)⁽⁵⁶⁾ (Figura 1). Como resultado desse processamento, são produzidos os pré-microRNAs, com cerca de 65 nucleotídeos em forma de grampo (*hairpin*), que são exportados para o

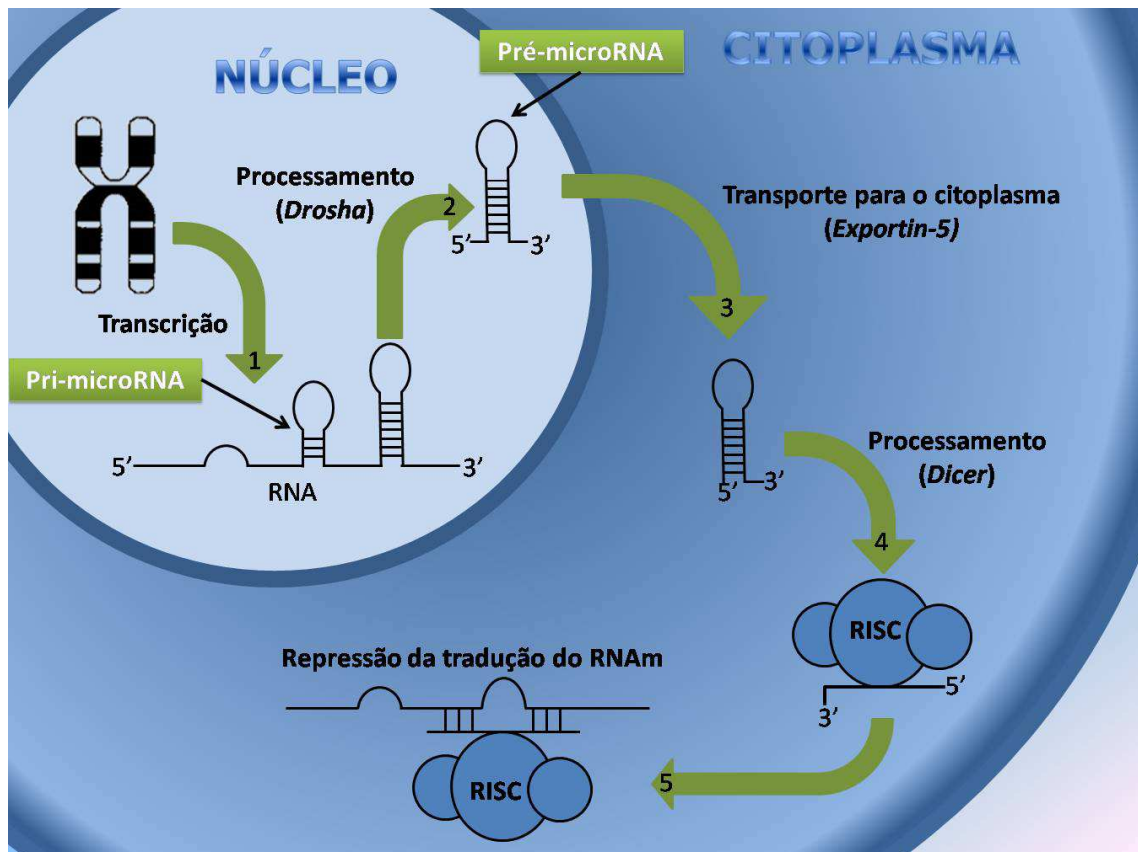


Figura 1. Representação esquemática da biogênese e do mecanismo de ação de microRNAs. Após serem transcritos pela RNA polimerase II, os microRNAs são processados no núcleo (enzima Drosha), dando origem aos pré-microRNAs. Por sua vez, estes são exportados para o citoplasma (*Exportin 5*), onde são reconhecidos pela enzima Dicer, a qual processa os pré-microRNAs em microRNAs maduros. Uma das fitas do microRNA maduro é selecionada para integrar o complexo RISC, que conduzirá a repressão da tradução do RNA mensageiro (RNAm) alvo por meio do pareamento entre o microRNA maduro e a região UTR 3' do RNAm. Figura modificada a partir de http://www.ambion.com/techlib/resources/miRNA/mirna_pro.html.⁽⁵⁷⁾

citoplasma pela proteína *Exportin 5* dependente de Ran-GTP.⁽⁵⁸⁾ No citoplasma, os pré-microRNAs são reconhecidos pela enzima Dicer RNase III. A enzima Dicer, juntamente com proteínas acessórias, processa os pré-microRNAs em microRNAs maduros, que são pequenos RNAs de fita dupla com cerca de 22 nucleotídeos de comprimento.⁽⁵⁹⁾

O microRNA de fita dupla resultante do processamento pela enzima Dicer pode dar origem a dois diferentes microRNAs maduros, provenientes da extremidade 5' ou da extremidade 3' do *hairpin*. Alguns microRNAs precursores são processados para produzir um único microRNA maduro dominante, com uma pequena quantidade gerada a partir da extremidade oposta, referida como fita passageira ou miR*. Nesse caso, a escolha da extremidade dominante do microRNA precursor parece ser determinada por propriedades termodinâmicas e estruturais do duplex.^(60,61) Outros microRNAs precursores são processados para produzir quantidades significantes de microRNAs maduros a partir de sequências de ambas as extremidades, e a fita miR*, quando incorporada ao complexo RISC, também apresenta impacto em vias regulatórias de vertebrados.^(62,63) Estudos sugerem que a extremidade do *hairpin* precursor que vai dar origem ao microRNA maduro dominante pode variar entre diferentes tecidos e entre diferentes estágios do desenvolvimento.⁽⁶⁴⁻⁶⁶⁾ O mais importante é que as sequências das extremidades opostas do microRNA precursor apresentam diferentes alvos e podem estar envolvidos na regulação de diferentes processos biológicos.

MicroRNAs maduros reconhecem seu RNAm alvo por pareamento de bases entre os nucleotídeos nas posições 2 e 7 do microRNA (região *seed*) e os nucleotídeos complementares na região 3' não traduzida (UTR 3') do RNAm alvo.⁽⁶⁷⁻⁶⁹⁾ O resultado é a inibição do acúmulo da proteína codificada pelo RNAm alvo por meio da

degradação do RNAm ou, mais comumente em animais, da repressão da tradução do RNAm.⁽⁷⁰⁻⁷³⁾ Embora a função estabelecida dos microRNAs seja a regulação negativa da expressão protéica, há evidências de que também possam estimular a tradução sob certas condições; entretanto o mecanismo pelo qual ocorre aumento da eficiência da tradução não está estabelecido.^(72,74)

É estimado que cerca de 30 a 90% dos genes humanos sejam regulados por microRNAs^(68,75) e vários princípios gerais relacionados à regulação de genes-alvo por microRNAs têm sido propostos. Cada microRNA pode potencialmente regular um grande número de genes que codificam proteínas^(71,76) e diferentes microRNAs podem atuar em um mesmo gene-alvo⁽⁵⁰⁾. Além disso, os genes-alvo de microRNAs não são restritos a uma categoria funcional particular ou via biológica, mas estão envolvidos em uma grande variedade de processos biológicos.⁽⁷⁷⁾

Para fins de nomenclatura de microRNAs, são utilizados prefixos de três ou quatro letras para designar a espécie, como hsa, que representa *Homo sapiens*, mmu, que representa *Mus musculus*, e dme, *Drosophila melanogaster*. As sequências maduras são designadas ‘miR’ (com “R” maiúsculo), enquanto os *hairpins* precursores são designados ‘mir’ (com “r” minúsculo), seguidos por um identificador sequencial numérico. Os nomes dos genes fornecem algumas informações sobre a relação funcional entre microRNAs maduros. Por exemplo, hsa-miR-101 em humanos e mmu-miR-101 em camundongo são ortólogos. Sequências parálogas cujos microRNAs diferem em somente uma ou duas posições recebem letras como sufixos, como mmu-miR-10a e mmu-miR-10b em camundongo. MicroRNAs precursores distintos que dão origem a microRNAs maduros idênticos recebem números como sufixos, como dme-mir-281-1 e dme-mir-281-2 em *Drosophila melanogaster*. E, por fim, quando duas

sequências de microRNAs maduros são provenientes de extremidades opostas do mesmo microRNA *hairpin* precursor, recebem os sufixos -5p (proveniente da extremidade 5') ou -3p (proveniente da extremidade 3').⁽⁷⁸⁾

Na versão mais recente da base de dados *miRBase (release 18)*⁽⁷⁹⁾, encontram-se registrados mais de 1.500 microRNAs humanos, 15 desses sintetizados pelo Hsa 21: hsa-miR-99a, hsa-let-7c, hsa-miR-125b-2, hsa-miR-155, hsa-miR-802, hsa-miR-548x, hsa-miR-3118-5, hsa-miR-3156-3, hsa-miR-3648, hsa-miR-3687, hsa-miR-3197, hsa-miR-4327, hsa-miR-4759, hsa-miR-4760 e hsa-miR-5692b. Entretanto, as funções desses microRNAs e seus genes-alvo não são totalmente conhecidos. A complexidade da função desses microRNAs é demonstrada pelo grande número de possíveis sítios-alvo inferidos por ferramentas de Bioinformática para alguns dos microRNA localizados no Hsa 21.^(79,80) Até o presente, nem todos os microRNAs do Hsa 21 apresentam alvos preditos.⁽⁷⁹⁾

Experimentos sobre a expressão tecidual dos cinco microRNAs do Hsa 21 mais estudados, hsa-miR-99a, hsa-let-7c, hsa-miR-125b-2, hsa-miR-155 e hsa-miR-802, incluindo suas respectivas fitas miR* (cerca de 100 vezes menos abundantes que o microRNA de sua extremidade complementar) mostraram que hsa-miR-99a, hsa-let-7c e hsa-miR-125b-2 são abundantemente expressos em diversos tecidos, incluindo tecidos relevantes para a SD, como coração, cérebro, tecido muscular, timo, entre outros, enquanto hsa-miR-155 e hsa-miR-802 apresentam expressão mais restrita.⁽⁸⁰⁾ As evidências experimentais da existência dos outros nove microRNAs do cromossomo 21 são mais recentes (2009 - 2011) e provêm de estudos que utilizaram plataformas de sequenciamento automático de DNA de nova geração, a maioria deles relacionada à expressão diferencial de microRNAs em diferentes tipos de câncer.⁽⁷⁹⁾

A contribuição de microRNAs localizados no Hsa 21 para o fenótipo da SD foi pouco investigada até o presente, mas há evidências de que a expressão alterada dos mesmos pode estar relacionada a manifestações da síndrome. Em estudo com um par de gêmeos monozigóticos discordantes para a trissomia do 21, Sethupathy et al.⁽⁴⁹⁾ observaram expressão elevada do hsa-miR-155 em fibroblastos do indivíduo com SD, resultando na expressão reduzida do gene *Receptor de angiotensina II, tipo 1 (AGTRI)*, sabidamente regulado por esse microRNA.⁽⁸¹⁾ Os autores sugerem que esse mecanismo de regulação pode contribuir para a baixa pressão sanguínea apresentada por indivíduos com trissomia do 21,^(82,83) uma vez que o gene *AGTRI* codifica uma proteína receptora de Angiotensina II, um hormônio vasopressor que desempenha papel importante no controle da pressão sanguínea.⁽⁸⁴⁾

Posteriormente, Kuhn et al.^(50,51) observaram que cinco microRNAs maduros do Hsa 21 (hsa-miR-99a, hsa-let-7c, hsa-miR-125b-2, hsa-miR-155, hsa-miR-802) apresentam expressão elevada em pelo menos 50% em células do hipocampo fetal e do coração de indivíduos com SD. Os autores mostram evidências de que o gene *MeCP2 (Methyl-CpG-binding protein)*, que codifica uma proteína envolvida na neurogênese e que é alvo de hsa-miR-155 e hsa-miR-802, apresenta expressão reduzida em cérebros de indivíduos com SD como resultado da expressão elevada desses microRNAs, o que poderia levar ao desenvolvimento anormal do cérebro e resultar em comprometimento cognitivo nesses indivíduos.⁽⁵¹⁾

Além de microRNAs localizados no Hsa 21, a expressão alterada de microRNAs localizados em outros cromossomos em tecidos cerebrais e cardíacos de indivíduos com SD também foi observada.⁽⁵⁰⁾ Considerando o cenário metabólico da SD, a expressão alterada de microRNAs do Hsa 21 bem como de outros cromossomos poderia resultar

na expressão alterada de inúmeras proteínas, cujos RNAs estão sujeitos a esse controle, em uma variedade de tecidos.

Assim, a investigação do padrão de expressão de microRNAs em indivíduos com SD pode contribuir para a compreensão de um importante mecanismo de controle de expressão gênica em uma condição de aneuploidia e fornecer informações para o entendimento das bases moleculares de manifestações fenotípicas da síndrome. Além disso, um importante avanço nas pesquisas com microRNAs é o domínio de metodologias que permitem o silenciamento gênico por meio da utilização de microRNAs exógenos, ou ainda a inibição ou perda de função de microRNAs específicos por meio da utilização de oligonucleotídeos anti-microRNAs. Tais ferramentas são utilizadas com o objetivo de identificar funções celulares de microRNAs e como possíveis estratégias terapêuticas para doenças humanas.⁽⁸⁵⁻⁸⁷⁾

OBJETIVO

O presente trabalho teve como objetivos:

a) identificar microRNAs diferencialmente expressos em células mononucleares do sangue periférico de crianças com SD em relação a crianças sem a síndrome;

b) identificar processos biológicos relevantes para a patogênese da SD associados a genes-alvo preditos de microRNAs diferencialmente expressos em crianças com SD.

CASUÍSTICA E MÉTODOS

II. CASUÍSTICA E MÉTODOS

II.1. Casuística

De acordo com Normas Regulamentares de Pesquisa em Seres Humanos, Resolução 196/96 do Ministério da Saúde, este estudo foi aprovado pelo Comitê de Ética em Pesquisa (CEP) da Faculdade de Medicina de São José do Rio Preto (FAMERP), parecer nº 043/2010 (Anexo 1). Após consentimento livre e esclarecido de um responsável (Anexo 2), foram incluídas no estudo seis crianças com SD (grupo caso) e seis crianças sem a síndrome (grupo controle), cujos dados estão apresentados na Tabela 1. O grupo caso foi proveniente do Serviço Ambulatorial de Genética e do Serviço Ambulatorial de Pediatria em Síndrome de Down do Hospital de Base de São José do Rio Preto (HB), hospital-escola vinculado à FAMERP. Foram incluídas no estudo somente crianças com trissomia livre do cromossomo 21, de acordo com o exame do cariótipo, realizado pelo Serviço de Genética do HB por bandeamento GTG de cromossomos metafásicos, cujo resultado encontra-se disponível no prontuário médico do paciente. Em relação ao grupo controle, três crianças foram provenientes do Serviço Ambulatorial de Pediatria do HB e três da creche da Universidade Estadual Paulista “Júlio de Mesquita Filho” (UNESP), campus de São José do Rio Preto (Instituto de Biociências, Letras e Ciências Exatas - IBILCE).

Os critérios de inclusão para ambos os grupos foram: idade entre dois e seis anos, ausência de manifestações clínicas sugestivas de infecção aguda, incluindo quadro gripal, tosse, febre e/ou uso de antibiótico até dez dias antes da data da coleta e ausência de infecção crônica (bronquite, asma e pneumonias de repetição). Para o grupo controle

Tabela 1. Dados referentes à idade e sexo das crianças incluídas no estudo.

Grupo	Código	Idade (anos)	Sexo
Caso	CD5	2,7	F
Caso	CD7	3,7	M
Caso	CD11	4,4	F
Caso	CD15-2	2,3	M
Caso	CD16-1	4,8	M
Caso	CD19	6,1	F
Controle	CC5	4,5	F
Controle	CC10	2,9	M
Controle	CC11	4,3	F
Controle	CC17	5,4	F
Controle	CC18	2,6	F
Controle	CC21	3,2	F

foi também utilizada como critério de inclusão a ausência de doenças associadas ao quadro clínico da SD.

II.2. Métodos

II.2.1. Coleta e processamento de amostras de sangue periférico

Foram coletados de 2 a 4 mL de sangue periférico em tubos contendo o anticoagulante ácido etilenodiaminotetracético (EDTA 7,2 mg, BD). Após a coleta, as amostras de sangue foram mantidas em gelo até o momento do processamento. As amostras de sangue foram transferidas para tubos de centrífuga contendo quantidade equivalente de *Ficoll-Paque Plus* (GE Healthcare) e submetidas à centrifugação por 30 minutos a 239 g para separação de quatro fases (do fundo à superfície do tubo): (1) granulócitos e eritrócitos, (2) *Ficoll-Paque Plus*, (3) células mononucleares e (4) plasma. A camada de células mononucleares foi aspirada com pipeta Pasteur, transferida para novo tubo e submetida à lavagem com tampão fosfato salino (PBS) 1X. Os tubos foram submetidos à centrifugação a 153 g por 15 minutos.

O sobrenadante foi descartado e às células mononucleares isoladas foi adicionado 1 mL de *TRIzol® Reagent* (Invitrogen). As membranas celulares foram rompidas por pipetagem repetitiva e as amostras foram incubadas por cinco minutos em temperatura ambiente para permitir a dissociação completa dos complexos nucleoprotéicos. As amostras foram congeladas a -80°C até o momento da extração de RNA total.

II.2.2. Extração de RNA total

Após descongelamento das amostras, foram adicionados 200 µL de clorofórmio. Os tubos foram agitados vigorosamente por 15 segundos e incubados em temperatura ambiente por 3 minutos. As amostras foram submetidas à centrifugação a 12.000 g por 15 minutos a 4°C. Após centrifugação, a solução apresentou-se separada em uma camada inferior vermelha (fase de fenol/clorofórmio), uma interfase e uma fase aquosa incolor na porção superior. A fase aquosa, cujo volume é cerca de 60% do volume de *TRIzol® Reagent* utilizado para homogeneização e na qual o RNA está presente, foi transferida para um microtubo de 1,5 mL. À fase aquosa foi adicionado 0,5 mL de álcool isopropílico para precipitação do RNA. As amostras foram incubadas em temperatura ambiente por 10 minutos e, então, submetidas à centrifugação a 12.000 g por 10 minutos a 4°C. Após centrifugação, o sobrenadante foi descartado e foi adicionado ao *pellet* de RNA 1 mL de etanol 75%. As amostras foram submetidas à agitação e posterior centrifugação a 7.500 g por 5 minutos a 4°C. Após centrifugação, o sobrenadante foi descartado e as amostras foram mantidas em temperatura ambiente por 5 – 10 minutos para secagem. Posteriormente, o *pellet* de RNA foi eluído em 30 µL de água tratada com dietilpirocarbonato (DEPC) (*Ambion®*). Os tubos foram, sequencialmente, incubados por 10 minutos a 55 - 60°C, mantidos no gelo por 2 minutos, brevemente centrifugados e estocados a -80°C.

II.2.3. Quantificação das amostras de RNA total

A quantificação das amostras de RNA total foi realizada por espectrofotometria, que consiste na determinação da concentração do RNA pela absorbância do comprimento de onda de 260nm, utilizando o equipamento *NanoDrop 1000 (Thermo*

Scientific). Para leitura da concentração, foi utilizado 1,5 µL de amostra de RNA total. As concentrações de RNA foram determinadas em ng/µL. Após leitura no espectrofotômetro, a concentração das amostras de RNA total foi ajustada para 100 ng/µL.

A razão da absorbância a 260 nm e 280 nm foi utilizada para determinação da pureza das amostras de RNA. Uma razão próxima de 2 é geralmente aceita para classificar uma amostra de RNA como livre de contaminantes nocivos à amplificação *in vitro*. No presente estudo, todas as amostras apresentaram razão 1,80 e 2,01.

A razão da absorbância a 260 nm e 230 nm é uma medida secundária de pureza de ácidos nucleicos. Valores aceitáveis para classificar uma amostra como pura são geralmente próximos de 2. As amostras incluídas no estudo apresentaram razão entre 0,33 e 1,21, indicado possível contaminação com carboidratos, peptídeos, fenóis ou compostos aromáticos.⁽⁸⁸⁾ Possivelmente, isso se deve ao uso de *TRIzol® Reagent* para a extração de RNA, uma solução monofásica de fenol e isotiocianato de guanidina, que absorve a 260 nm. Entretanto, há evidências de que a razão da absorbância a 260 nm e 230 nm não é uma maneira específica de determinar inibidores reação em cadeia da polimerase (PCR).⁽⁸⁹⁾ No presente estudo, não há evidências de que tal contaminação por reagentes químicos tenha exercido papel inibidor na PCR quantitativa (PCRq) em tempo real, uma vez que a curva padrão realizada para o microRNA RNU48 mostrou eficiência do ensaio em torno de 100% (conforme detalhado no item II.2.7.a).

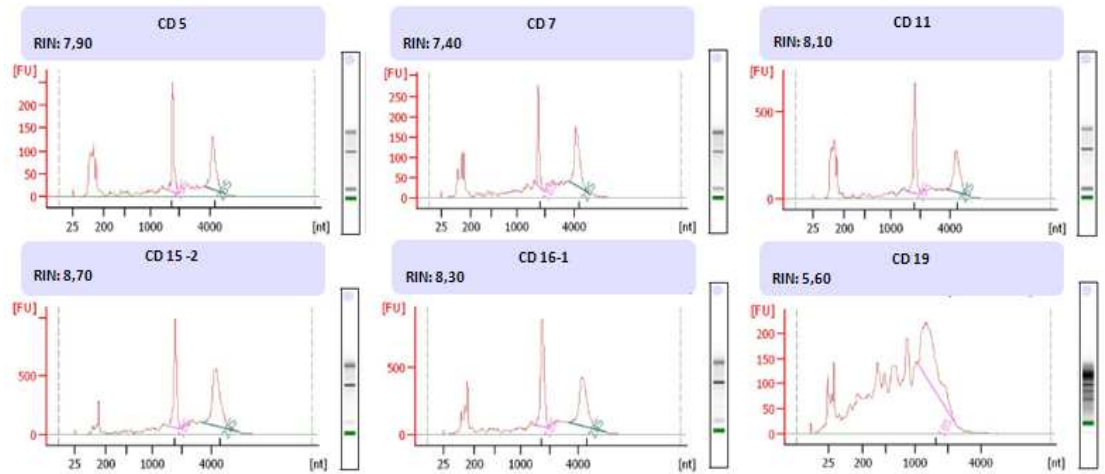
II.2.4. Análise da integridade das amostras de RNA total

A análise da integridade das amostras de RNA total foi realizada utilizando o equipamento *Agilent 2100 Bioanalyzer (Agilent Technologies)*. As amostras de RNA

foram separadas por eletroforese utilizando-se o microchip *Eukaryote Total RNA Pico*, (*Agilent Technologies*) e detectadas por emissão de fluorescência induzida por *laser*. A utilização de um marcador de peso molecular durante a eletroforese permite estimar os tamanhos dos fragmentos gerados pelas amostras de RNA. A avaliação da integridade do RNA é baseada na razão entre as bandas de RNA ribossomal 18S e 28S e no sinal basal de emissão de fluorescência entre os dois picos de detecção das bandas de RNA ribossomal. A redução da razão 18S:28S e o aumento do sinal basal entre as subunidades ribossomais são indicativos de degradação da amostra de RNA. Além dos picos correspondentes ao RNA ribossômico, para análise da integridade são considerados ainda os sinais fluorescentes captados em diferentes regiões do eletroferograma. O software do equipamento *Agilent 2100 Bioanalyzer* gera automaticamente a razão das subunidades ribossomais 18S e 28S e expressa a integridade das amostras de RNA baseado em um sistema numérico de 1 a 10, com 1 representando o perfil mais degradado e 10 o perfil mais intacto, chamado de *RNA Integrity Number* (RIN). Para realização dessa análise foram utilizados 80 ng de RNA total em volume final de 1 μ L.

Todas as amostras de RNA incluídas no estudo apresentaram valor de RIN maior que 5,0, conforme sugerido pela literatura.⁽⁹⁰⁻⁹²⁾ Os eletroferogramas gerados pelo equipamento *Agilent 2100 Bioanalyzer* estão apresentados na Figura 2.

A.



B.

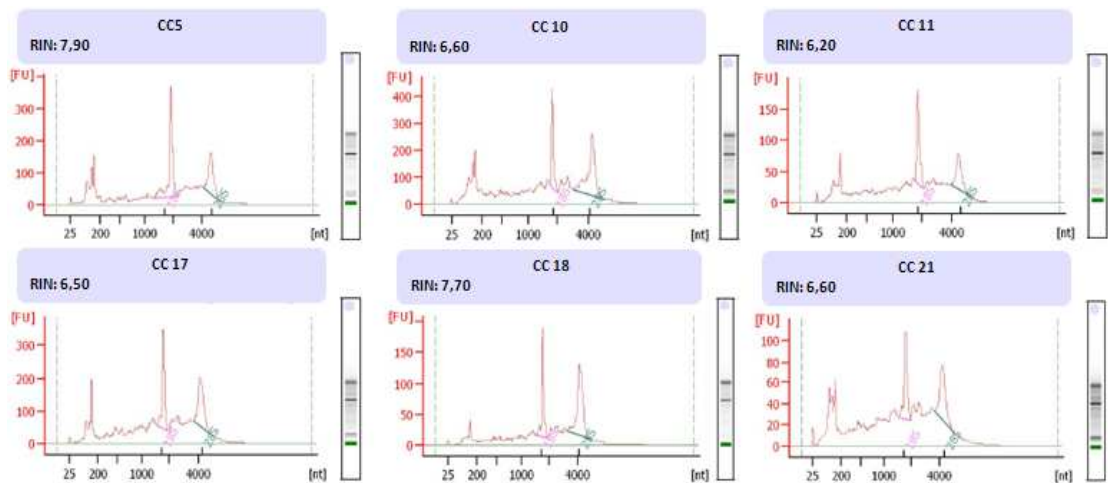


Figura 2. Eletroferogramas gerados pelo equipamento *Agilent 2100 Bioanalyzer* (*Agilent Technologies*) mostrando o padrão de detecção das subunidades ribossomais 18S e 28S e os respectivos valores de RIN de cada amostra. O eixo X do gráfico expressa o número de nucleotídeos (nt) o eixo y expressa o sinal de fluorescência (FU). Ao lado de cada gráfico é apresentado o padrão eletroforético das respectivas amostras. **A.** Amostras do grupo caso. **B.** Amostras do grupo controle.

II.2.5. Transcrição reversa e síntese de DNA complementar (DNAc)

As amostras de RNA total foram submetidas à transcrição reversa por reação em cadeia da polimerase (RT-PCR) para síntese de DNAc utilizando-se o kit comercial *TaqMan microRNA reverse transcription (Applied Biosystems)* juntamente com um conjunto de oligonucleotídeos iniciadores específicos para microRNAs humanos. Para cada amostra foram realizadas duas reações de transcrição reversa: uma com o *Megaplex™ RT Primers, Human Pool A* e uma com o *Megaplex™ RT Primers, Human Pool B (Applied Biosystems)*.

Em uma reação de 7,5 µL, foram utilizados *Megaplex™ RT Primers 1X*, 2,7 mM de desoxirribonucleotídeos trifosfatados (dNTPs) contendo desoxitimidina trifosfatada (dTTP), 75 unidades da enzima *MultiScribe™ Reverse Transcriptase*, Tampão 1X, 3 mM de cloreto de magnésio (MgCl₂), 2 unidades de inibidor de RNase, água tratada com DEPC (*Ambion®*) e 50 ng de RNA total em volume de 3 µL. Em termociclador, as reações foram submetidas a 40 ciclos a 16°C por 2 minutos e 42°C por 1 minuto, seguidos por 1 segundo a 50°C e 5 minutos a 85°C. As amostras de DNAc foram armazenadas a -20°C por até 7 dias.

II.2.6. Pré-amplificação de microRNAs

Para cada amostra foram realizadas duas reações de pré-amplificação: uma com o *Megaplex™ PreAmp Primers, Human Pool A* e uma com o *Megaplex™ PreAmp Primers, Human Pool B (Applied Biosystems)*. Em uma reação de 25 µL, foram utilizados *TaqMan® PreAmp Master Mix 1X*, *Megaplex™ PreAmp Primers 1X*, 2,5 µL do produto da RT-PCR e água tratada com DEPC (*Ambion®*). Em termociclador, as reações foram submetidas a 95°C por 10 minutos, seguidos por 55°C por 2 minutos,

72°C por 2 minutos, 12 ciclos a 95°C por 15 segundos e 72°C por 2 minutos e a 99,9°C por 10 minutos. Antes de ser submetidos à quantificação da expressão de microRNAs, os produtos da reação de pré-amplificação (volume final de 25 µL) foram diluídos em 75 µL de solução tampão contendo 10 mM de Tris-Hidroclorato (Tris-HCl) e 1 mM de EDTA, conforme instruções do fabricante. As amostras foram armazenadas a -20°C por até 7 dias.

II.2.7. Quantificação de microRNAs por PCRq

A quantificação de microRNAs maduros foi realizada utilizando-se os ensaios *TaqMan*® (*Applied Biosystems*), os quais discriminam os microRNAs maduros de seus precursores. As sondas *TaqMan*® MGB (*minor groove binder*) contêm o fluoróforo FAM ligado à extremidade 5' e um supressor (*quencher*) não fluorescente ligado à extremidade 3'. Durante a PCR, a sonda *TaqMan*® MGB hibridiza-se especificamente à sua sequência complementar entre os oligonucleotídeos iniciadores senso e anti-senso. Quando a sonda está intacta, a proximidade do fluoróforo com o supressor resulta em supressão da fluorescência do fluoróforo FAM. Durante a amplificação da sequência de interesse, a DNA polimerase cliva as sondas hibridizadas em seus alvos, separando o fluoróforo do supressor, o que resulta em emissão de fluorescência. O aumento do sinal de fluorescência ocorre somente se a sequência alvo for complementar à sonda e for amplificada durante a PCR. Dessa forma, fragmentos amplificados de maneira inespecífica não são detectados.

A intensidade de fluorescência na reação é determinada pelo cálculo do ΔRn ($\Delta Rn = Rn^+ - Rn^-$), onde Rn^+ corresponde à intensidade de emissão do fluoróforo FAM / intensidade de emissão do ROX em determinado momento; e Rn^- corresponde à

intensidade de emissão do fluoróforo FAM / intensidade de emissão do ROX antes da amplificação. O fluoróforo ROX é utilizado como controle interno passivo, pois a fluorescência emitida é constante durante toda a reação. Durante os ciclos iniciais da reação não há acúmulo de produtos de amplificação e os valores de ΔRn correspondem ao sinal basal de fluorescência ou *baseline* (fluorescência do ROX > FAM). Na fase logarítmica ocorre acúmulo dos produtos de amplificação e ΔRn ultrapassa a linha de base. Para a quantificação relativa foi estabelecido um valor de ΔRn , correspondente a linha de corte (*threshold*) para a curva de amplificação de cada microRNA estudado. O número do ciclo em que o ΔRn cruza a linha de corte corresponde ao ciclo de quantificação (Cq) da amostra. O valor de Cq é preditivo da quantidade de microRNA alvo presente na amostra e quanto menor o seu valor, maior é a quantidade de microRNA presente.

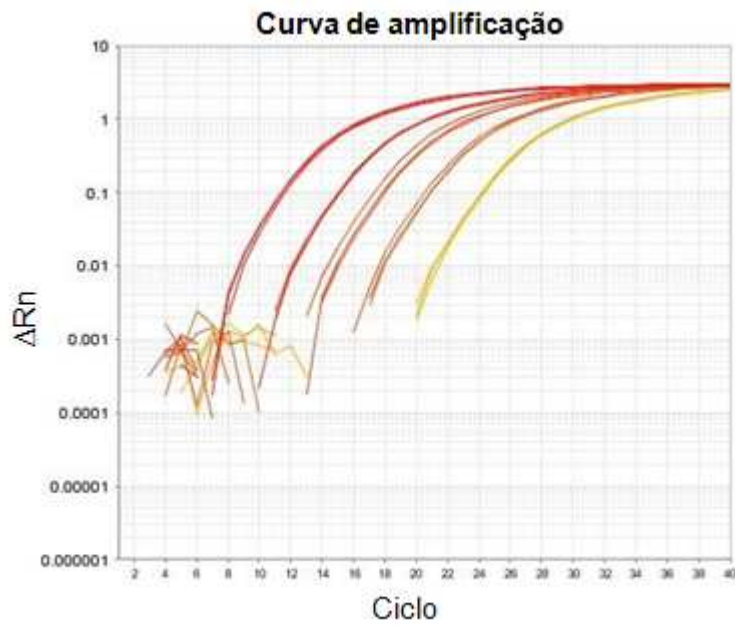
a) Curva padrão de quantificação do RNA não-codificante RNU48

Para determinação da quantidade de DNAC alvo a ser utilizada na PCRq, foi realizada uma curva padrão de quantificação do RNA não-codificante RNU48 em um *pool* de amostras de DNAC. Para realização da curva padrão, foi utilizado o produto de pré-amplificação (*Pool A*) diluído segundo instruções do fabricante (25 μ L em 75 μ L de solução tampão contendo 10 mM de Tris-HCl e 1 mM de EDTA) e mais quatro pontos de diluição seriada: 1:10, 1:100, 1:1000 e 1:10000. As reações de amplificação do RNA não-codificante RNU48 foram realizadas em triplicata e em volume final de 10 μ L utilizando-se o *TaqMan® Universal PCR Master Mix without UNG 1X (Applied Biosystems)* e o *Taqman microRNA assay RNU 48 1X (Applied Biosystems, Assay ID 001006)*, que contém os oligonucleotídeos iniciadores e a sonda *TaqMan® MGB*

ligada ao fluoróforo FAM específicos para amplificação e detecção do RNU48. No equipamento *StepOne Plus (Applied Biosystems)*, as reações foram submetidas a 95°C por 10 minutos seguidos por 40 ciclos a 97°C por 15 segundos e 60°C por 1 minuto.

A realização da curva padrão possibilita a avaliação da eficiência do ensaio, pois indica a cinética de amplificação da sequência alvo. As médias dos valores de Cq das triplicatas correspondentes a cada diluição foram utilizadas no cálculo de eficiência. O programa *SDS 2.0* gerou gráficos mostrando a curva de amplificação e a curva padrão gerada (Figura 3). A eficiência de amplificação do microRNA RNU48 foi igual a 108,7%. A diluição inicial da amostra pré-amplificada seguida por uma segunda diluição em 1:10 apresentou o melhor padrão de amplificação, com média de Cq igual a 15,708.

A.



B.

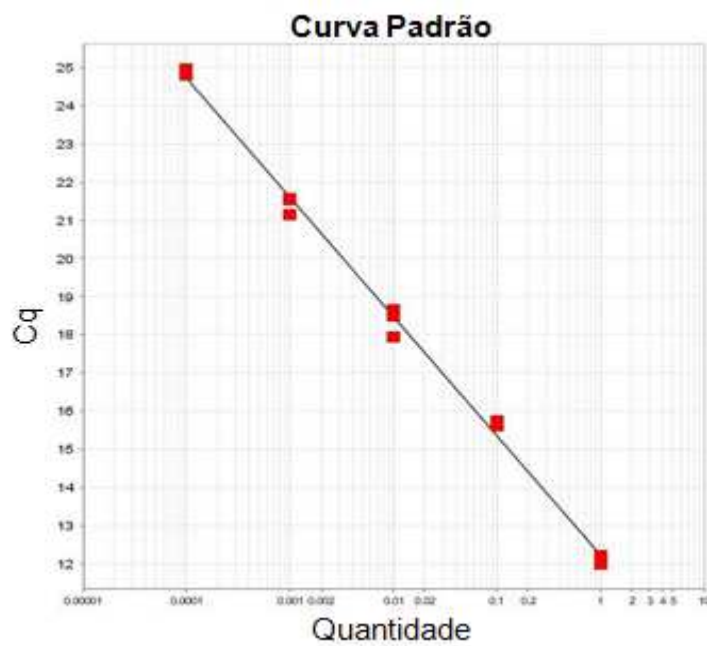


Figura 3. Gráficos resultantes da curva padrão de quantificação do microRNA RNU48.

A. Curva de amplificação das diluições seriadas. **B.** Curva padrão representando as diluições seriadas (eixo X) e os valores da média de Cq (eixo Y) das diluições.

b) Quantificação de microRNAs por PCRq utilizando *TaqMan*® *Low Density Arrays*

Para quantificação da expressão de microRNAs foi utilizando o kit comercial *TaqMan*® *Array Human MicroRNA A+B Cards Set v3.0 (Applied Biosystems)*, juntamente com o *TaqMan*® *Universal PCR Master Mix without UNG*. O kit comercial *TaqMan*® *Array Human MicroRNA A+B Cards Set v3.0* é composto por dois conjuntos de ensaios (Av2 e Bv3) que possibilitam a investigação da expressão de 754 microRNAs maduros, além de 3 genes de referência para normalização dos dados e um controle negativo em cada ensaio. O ensaio A compreende os microRNAs melhor caracterizados, enquanto o ensaio B inclui microRNAs menos estudados e que tendem a ser menos expressos (Figuras 4a e 4b).

Para cada amostra, foram realizadas quatro reações: duas para o ensaio A e duas para o ensaio B (duplicatas para cada ensaio). Cada reação foi realizada em volume final de 900 µL contendo *TaqMan*® *Universal PCR Master Mix 1X*, 9 µL do produto pré-amplificado diluído (25 µL em 75 µL de solução tampão) e água tratada com DEPC (*Ambion*®). Os procedimentos de aplicação da amostra e selagem dos *arrays* foram realizados segundo instruções do fabricante. No equipamento 7900HT *Fast Real-Time PCR (Applied Biosystems)*, as reações foram submetidas a 50°C por 2 minutos, 94,5°C por 10 minutos, 40 ciclos a 97°C por 30 segundos e 59,7°C por 1 minuto. A quantificação por PCRq foi realizada em colaboração com o Laboratório de Genômica e Biologia Molecular do Centro de Pesquisa – Hospital A. C. Camargo, sob coordenação da Profa. Dra. Dirce Maria Carraro.

TaqMan® Array Human MicroRNA Card B v3

A	hsa-miR-7 -5481	hsa-miR-30a-3p -304	hsa-miR-30a-3p -306-3p	hsa-miR-30a-3p -346	hsa-miR-126* -154*	hsa-miR-182* -182*	hsa-miR-302c* -302d	hsa-miR-378	hsa-miR-380-5p	hsa-miR-1257	hsa-miR-201a* -201a*	hsa-miR-432	hsa-miR-432* -422*	hsa-miR-497	hsa-miR-500
B	hsa-miR-1229 -488	hsa-miR-517* -517*	hsa-miR-516-3p -516-3p	hsa-miR-520b* -520b*	hsa-miR-524 -524	hsa-miR-363* -363*	hsa-miR-549	hsa-miR-668	hsa-miR-669	hsa-miR-551a	hsa-miR-552	hsa-miR-553	hsa-miR-554	hsa-miR-555	hsa-miR-557
C	hsa-miR-558 -559	hsa-miR-562 -562	hsa-miR-563 -563	hsa-miR-567 -567	hsa-miR-569 -569	hsa-miR-587 -587	hsa-miR-588	hsa-miR-592	hsa-miR-593	hsa-miR-595	hsa-miR-599	hsa-miR-623	hsa-miR-600	hsa-miR-624	hsa-miR-601
D	hsa-miR-626 -629	hsa-miR-630 -630	hsa-miR-631 -631	hsa-miR-605 -605	hsa-miR-606 -606	hsa-miR-607 -607	hsa-miR-634	hsa-miR-639	hsa-miR-640	hsa-miR-641	hsa-miR-613	hsa-miR-614	hsa-miR-616	hsa-miR-617	hsa-miR-643
E	hsa-miR-644 -645	hsa-miR-621 -621	hsa-miR-646 -646	hsa-miR-649 -649	hsa-miR-650 -650	hsa-miR-661 -661	hsa-miR-571	hsa-miR-578	hsa-miR-580	hsa-miR-581	hsa-miR-584	hsa-miR-585	hsa-miR-586	hsa-miR-587	hsa-miR-588
F	hsa-miR-668 -668	hsa-miR-767-3p -767-3p	hsa-miR-464* -464*	hsa-miR-768-3p -768-3p	hsa-miR-802	hsa-miR-875	hsa-miR-222*	hsa-miR-34b	hsa-miR-185*	hsa-miR-186*	hsa-miR-30c-1*	hsa-miR-30c-2*	hsa-miR-32*	hsa-miR-31*	hsa-miR-130b*
G	hsa-miR-26a-2* -361-3p	hsa-miR-79* -79*	hsa-miR-302b* -302b*	hsa-miR-367* -367*	hsa-miR-23p* -23p*	hsa-miR-376a* -376a*	hsa-miR-172*	hsa-miR-149a*	hsa-miR-33a	hsa-miR-33a*	hsa-miR-92a-1*	hsa-miR-93*	hsa-miR-96*	hsa-miR-98a*	hsa-miR-100*
H	hsa-miR-101* -138-2*	hsa-miR-141* -141*	hsa-miR-143* -143*	hsa-miR-920 -920	hsa-miR-921 -921	hsa-miR-922 -922	hsa-miR-135b* -135b*	hsa-miR-146a*	hsa-miR-29b-1*	hsa-miR-29b-2*	hsa-miR-105*	hsa-miR-106a*	hsa-miR-16-2*	hsa-miR-71*	hsa-miR-27b*
I	hsa-miR-833 -834	hsa-miR-835 -835	hsa-miR-936 -936	hsa-miR-938 -938	hsa-miR-941 -941	hsa-miR-942 -942	hsa-miR-944	hsa-miR-875-5p	hsa-miR-888*	hsa-miR-892b	hsa-miR-411*	hsa-miR-378	hsa-miR-151-3p	hsa-miR-340*	hsa-miR-190b
J	hsa-miR-545* -183*	hsa-miR-192* -192*	hsa-miR-200c* -200c*	hsa-miR-195* -195*	hsa-miR-109* -109*	hsa-miR-214* -214*	hsa-miR-30d* -30d*	hsa-miR-180*	hsa-miR-200*	hsa-miR-431*	hsa-miR-71-2*	hsa-miR-100*	hsa-miR-39a*	hsa-miR-744*	hsa-miR-452*
K	hsa-miR-409-3p -181c*	hsa-miR-196a* -196a*	hsa-miR-483-3p -483-3p	hsa-miR-92b* -92b*	hsa-miR-551b* -551b*	hsa-miR-193b* -193b*	hsa-miR-194*	hsa-miR-108b*	hsa-miR-519c-3p	hsa-miR-519f*	hsa-miR-374b*	hsa-miR-520c-3p	hsa-miR-7c*	hsa-miR-7a*	hsa-miR-550
L	hsa-miR-593 -7f-1*	hsa-miR-159* -159*	hsa-miR-16-1* -16-1*	hsa-miR-17* -17*	hsa-miR-189* -189*	hsa-miR-199* -199*	hsa-miR-21*	hsa-miR-24-1*	hsa-miR-25*	hsa-miR-26a-1*	hsa-miR-280*	hsa-miR-27a*	hsa-miR-151-5p	hsa-miR-765	hsa-miR-338-5p
M	hsa-miR-620 -577	hsa-miR-144 -144	hsa-miR-590-3p -590-3p	hsa-miR-605 -605	hsa-miR-5200-3p -5200-3p	hsa-miR-1305 -1305	hsa-miR-1226*	hsa-miR-1233	hsa-miR-1227	hsa-miR-1286	hsa-miR-548M	hsa-miR-1179	hsa-miR-1205	hsa-miR-1271	hsa-miR-1201
N	hsa-miR-548J -1263	hsa-miR-1294 -1294	hsa-miR-1265 -1265	hsa-miR-1244 -1244	hsa-miR-1303 -1303	hsa-miR-1264 -1264	hsa-miR-1282	hsa-miR-1324	hsa-miR-548H	hsa-miR-1254	hsa-miR-1251	hsa-miR-1285	hsa-miR-1245	hsa-miR-1292	hsa-miR-1301
O	hsa-miR-1200 -1182	hsa-miR-1288 -1288	hsa-miR-1275 -1275	hsa-miR-1183 -1183	hsa-miR-1194 -1194	hsa-miR-320B -320B	hsa-miR-1278	hsa-miR-663B	hsa-miR-1252	hsa-miR-1298	hsa-miR-1249	hsa-miR-1248	hsa-miR-1289	hsa-miR-1204	hsa-miR-1826
P	hsa-miR-1304 -1203	hsa-miR-1206 -1206	hsa-miR-1208 -1208	hsa-miR-548E -548E	hsa-miR-1274A -1274A	hsa-miR-1267 -1267	hsa-miR-1247	hsa-miR-1260	hsa-miR-664	hsa-miR-1302	hsa-miR-1300	hsa-miR-549L	hsa-miR-1293	hsa-miR-1825	hsa-miR-1296

Figura 4. B. Ensaios contidos no TaqMan® Array Human MicroRNA Card B.

Os valores brutos de Cq foram calculados pelo programa *SDS RQ Manager v.1.2.1 (Applied Biosystems)* após ajuste manual do sinal basal de fluorescência e da linha de corte para cada microRNA analisado.

II.2.8. Avaliação dos genes de referência

A estabilidade da expressão dos genes de referência MammU6 (referido como U6 snRNA no *Array B*), RNU44 e RNU48, presentes tanto no *Array A* quanto no *Array B* do kit comercial *TaqMan® Array Human MicroRNA A+B Cards Set v3.0 (Applied Biosystems)*, foi avaliada utilizando-se o programa *DataAssist v.3.0 (Applied Biosystems)*.

A medida da estabilidade da expressão de genes de referência baseia-se no princípio de que a razão da expressão de dois ou mais genes de referência ideais é idêntica em todas as amostras, independente do tipo celular ou condição experimental. Assim, a variação das razões de expressão de dois ou mais genes de referência reflete o fato de que um (ou mais) gene não é constantemente expresso, com aumento da variação na razão correspondendo à diminuição da estabilidade da expressão. A medida da estabilidade de genes de referência (M) é definida pela variação média pareada de um gene em particular com todos os outros genes de referência. Genes com o menor valor M apresentam a maior estabilidade de expressão.⁽⁹³⁾ Os gráficos da Figura 5 mostram os valores de Cq gerados para cada gene de referência nas amostras estudadas, bem como o valor M de cada gene de referência, os quais apresentaram pequena variação entre as amostras. Portanto, MammU6, RNU44 e RNU48 foram utilizados como genes de referência para normalização dos dados da PCRq.

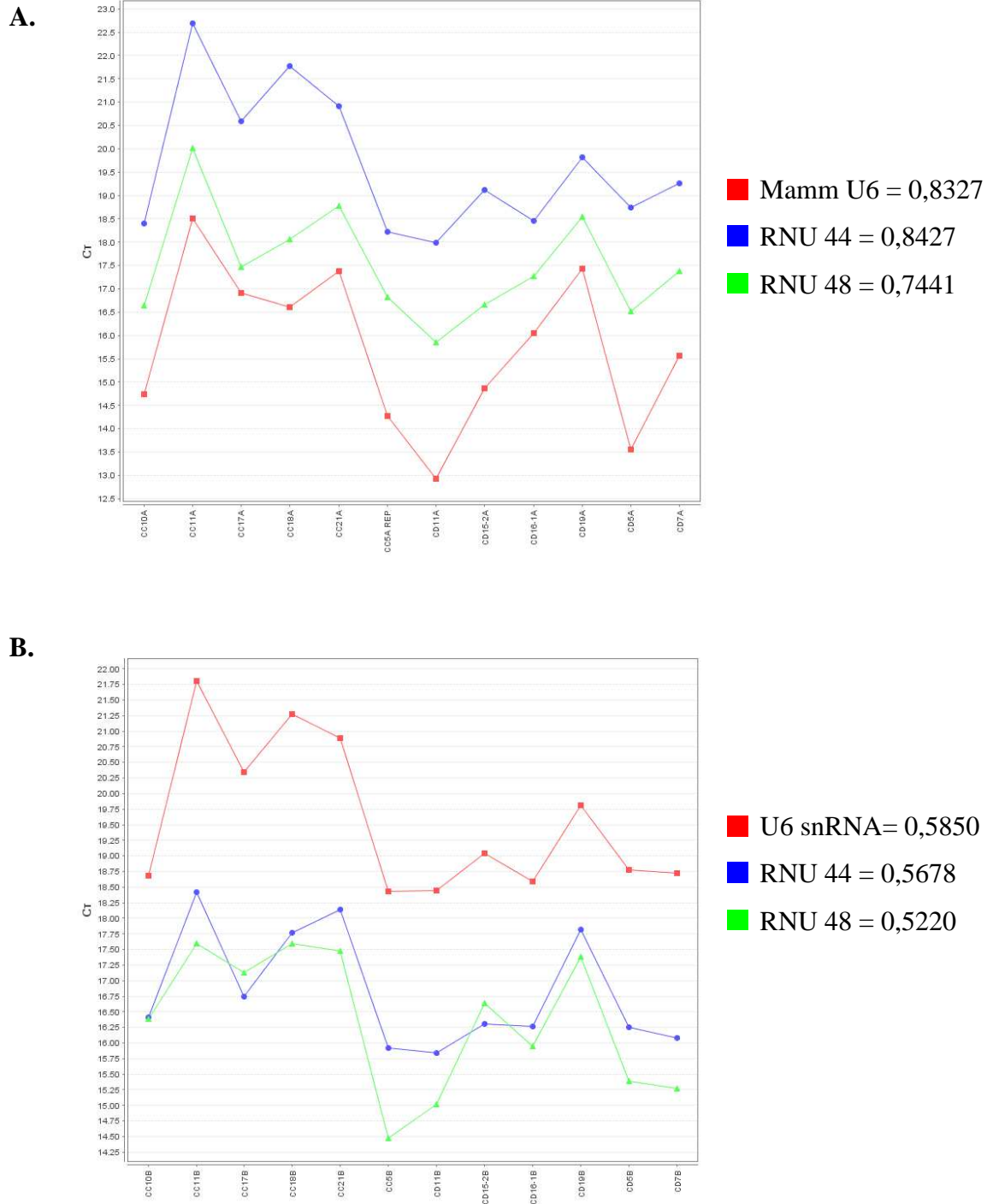


Figura 5. Distribuição dos valores de C_q gerados para cada gene de referência nas amostras estudadas e o valor M de cada gene de referência. **A.** Resultados dos genes de referência contidos no Array A. **B.** Resultados dos genes de referência contidos no Array B.

II.2.9. Tratamento dos dados

Primeiramente, os dados foram analisados pelo programa *DataAssist v.3.0* (*Applied Biosystems*). O valor de Cq igual a 32 foi utilizado como corte para indicar a detecção da expressão gênica, conforme orientação do fabricante dos *TaqMan® Low Density Arrays* (*Applied Biosystems*). Assim, marcadores com $Cq < 32$ foram considerados expressos, enquanto aqueles com $Cq \geq 32$ foram considerados não expressos e não foram incluídos nas análises posteriores. Foi escolhida a opção de excluir amostras com valores de Cq fora do desvio padrão esperado entre as réplicas técnicas (*outlier*), detectadas pelo programa *DataAssist v.3.0* por meio do teste de *Grubbs* (G). Esse teste busca a réplica técnica cujo valor de Cq apresenta o maior desvio absoluto do valor médio de Cq entre as réplicas técnicas, e calcula o desvio G em unidade do desvio padrão (DP) pela fórmula: $G = (Cq \text{ máximo} - Cq \text{ mínimo}) / DP$. Se o valor de G for $\geq 0,25$, a réplica técnica com o valor de Cq máximo é classificada como estando fora do desvio padrão esperado e é removida do estudo. Somente uma amostra do grupo controle (*Array A*) e uma do grupo caso (*Array B*) testadas para o marcador MammU6 apresentaram uma das réplicas técnicas identificada como fora do desvio padrão esperado e ambas foram excluídas das análises posteriores.

Após cálculo da média aritmética dos valores de Cq das réplicas técnicas para microRNAs alvos e genes de referência para cada amostra, utilizando-se o programa *DataAssist v.3.0* (*Applied Biosystems*), os dados foram exportados para uma planilha do *Microsoft Office Excel 2007* (*Microsoft*) para normalização dos dados utilizando-se a média geométrica de múltiplos genes de referência conforme descrito por Vandesompele et al.⁽⁹³⁾. O cálculo da quantificação relativa foi realizado pelo método $2^{-\Delta\Delta Cq}$.⁽⁹⁴⁾

$$2^{-\Delta\Delta Cq} = (Cq \text{ alvo} - Cq \text{ gene referência}) \text{ caso} - (Cq \text{ alvo} - Cq \text{ gene referência}) \text{ controle}$$

Nesse cálculo, o grupo controle foi utilizado como calibrador. Assim os dados de quantificação relativa (RQ) do grupo caso são apresentados em relação ao grupo controle. Para o grupo controle, $\Delta\Delta Cq = 0$ e $2^0 = 1$, então o RQ do grupo controle é igual a 1, por definição.⁽⁹⁴⁾

II.2.10. Análise estatística

A comparação da distribuição dos sexos masculino e feminino entre os grupos de estudo foi realizada pelo teste Qui-quadrado (X^2) de Pearson, utilizando-se o programa *Minitab v.14*.

Antes da realização de testes utilizando dados contínuos, os dados foram submetidos ao teste da normalidade de Anderson-Darling com auxílio do programa *Minitab v.14*. Os dados que apresentaram distribuição normal foram analisados por testes paramétricos, enquanto aqueles que não apresentaram distribuição normal foram analisados por testes não-paramétricos.

Em relação à idade, as médias entre os grupos foram comparadas utilizando-se o teste T para duas amostras (*two-sample T test*), por meio do programa *Minitab v.14* e considerando-se o valor de $P \leq 0,05$ como critério de significância estatística.

Em relação à expressão de microRNAs, as análises estatísticas foram realizadas somente para microRNAs cuja expressão foi detectada em pelo menos duas amostras de cada grupo (caso e controle). Os marcadores cujos valores de RQ apresentaram distribuição normal foram comparados ao RQ do grupo controle ($RQ = 1$) pelo teste T para uma amostra (*one-sample T test*). Os marcadores cujos valores de RQ não

apresentaram distribuição normal foram analisados por *Wilcoxon signed rank test*. As comparações de RQ entre os grupos foram realizadas utilizando-se o programa *GraphPad Prism v.5*. Ao final dos testes, foi aplicada a correção para múltiplos testes descrita por Benjamini e Hochberg⁽⁹⁵⁾ (*Benjamini-Hochberg False Discovery Rate*) para corrigir a ocorrência de falsos positivos, adotando-se $\alpha = 0,05$.

II.2.11. Predição de alvos por ferramentas de Bioinformática

Considerando que é aceito que uma alteração de 50% na expressão de genes em triplicata resulta em consequências biológicas para indivíduos com SD, no presente estudo foram considerados somente os microRNAs com expressão diferencial de pelo menos 50% em relação ao grupo controle para a busca de genes-alvo.

Para predição de genes-alvo dos microRNAs de interesse, foi utilizado o programa *TargetScanHuman v. 5.2*,⁽⁹⁶⁾ um algoritmo que prediz alvos biológicos de microRNAs pela busca de sítios conservados de 8 e 7 nucleotídeos que se anelam à região *seed* de cada microRNA.⁽⁶⁸⁾ As predições são organizadas em *rank* baseado na eficácia de predição do alvo, calculada pelos *scores* dos sítios de ligação.⁽⁹⁷⁾ No presente estudo, foram considerados somente os 100 genes-alvo para cada microRNA que apresentaram os *scores* mais favoráveis, ou seja, o menores números de *score*. A predição de alvos foi realizada em colaboração com o Laboratório de Genética Molecular e Bioinformática da Faculdade de Medicina de Ribeirão Preto (FMRP) / Universidade de São Paulo (USP).

Posteriormente, foi utilizada a ferramenta *Bioprocess*, desenvolvida pelo Laboratório de Marcadores Moleculares e Bioinformática Médica da FAMERP, para obtenção de informações sobre os genes-alvo, tais como localização cromossômica,

função, localização celular do produto gênico e processos biológicos nos quais o gene está envolvido. *Bioprocess* é um *script* escrito na linguagem de programação *perl*, que busca em um banco de dados *mysql* local as informações sobre os genes. O banco de dados é alimentado com informações do NCBI⁽⁹⁸⁾ e o símbolo oficial do gene é utilizado como entrada para a pesquisa.

RESULTADOS

III. RESULTADOS

III.1. Caracterização dos grupos

Os dados referentes à idade e sexo das crianças incluídas no estudo estão apresentados na Tabela 2. Não houve diferença significativa entre os grupos em relação à idade ($P = 0,806$) e ao sexo ($X^2 = 1,500$; $GL = 1$; $P = 0,221$).

III.2. Expressão de microRNAs

Dos 754 microRNAs-alvo investigados (excetuando-se os genes de referência e os controles negativos), 77 marcadores localizados no *Array A* (Quadro 1) e 187 no *Array B* (Quadro 2) não foram detectados nas amostras estudadas ($Cq \geq 32$), totalizando 264 microRNAs não detectados em ambos os grupos.

Entre os marcadores detectados ($n = 490$), 62 não preencheram o critério para ser submetidos à análise estatística, ou seja, não se apresentaram expressos em pelo menos duas amostras de cada grupo de estudo (Quadro 3). Destes, 26 apresentaram expressão exclusiva em amostras do grupo caso e oito apresentaram expressão exclusiva em amostras do grupo controle (Figura 6 e Quadro 4).

Excetuando-se os marcadores que não preencheram o critério para ser submetidos à análise estatística, os dados de expressão relativa de 428 microRNAs foram analisados estatisticamente. Assim, a correção para múltiplos testes *Benjamini-Hochberg False Discovery Rate* foi realizada considerando 428 testes estatísticos independentes (Material suplementar 1).

Tabela 2. Comparação de dados referentes à idade e sexo das crianças incluídas no estudo entre os grupos caso e controle.

	Idade		Sexo		P ^b
	Média ± DP	P ^a	Feminino n (%)	Masculino n (%)	
Caso	4,00 ± 1,41	0,806	3 (50,0)	3 (50,0)	0,221
Controle	3,82 ± 1,09		5 (83,3)	1 (16,7)	

^aTeste T para duas amostras. ^bX² de Pearson.

Quadro 1. MicroRNAs com ensaios localizados no *Array A* que não foram detectados nas amostras estudadas ($Cq \geq 32$).

Array A – Marcadores não detectados			
hsa-miR-105	hsa-miR-220c	hsa-miR-512-3p	hsa-miR-556-5p
hsa-miR-10b	hsa-miR-296-3p	hsa-miR-512-5p	hsa-miR-615-5p
hsa-miR-127-5p	hsa-miR-299-3p	hsa-miR-513-5p	hsa-miR-624
hsa-miR-129-3p	hsa-miR-325	hsa-miR-515-3p	hsa-miR-653
hsa-miR-129-5p	hsa-miR-371-3p	hsa-miR-518a-5p	hsa-miR-672
hsa-miR-137	hsa-miR-380	hsa-miR-518c	hsa-miR-674
hsa-miR-147	hsa-miR-384	hsa-miR-518d-5p	hsa-miR-871
hsa-miR-147b	hsa-miR-412	hsa-miR-519c-3p	hsa-miR-872
hsa-miR-149	hsa-miR-448	hsa-miR-520b	hsa-miR-873
hsa-miR-153	hsa-miR-450b-3p	hsa-miR-520e	hsa-miR-875-3p
hsa-miR-154	hsa-miR-453	hsa-miR-520f	hsa-miR-876-5p
hsa-miR-184	hsa-miR-485-5p	hsa-miR-524-5p	hsa-miR-885-3p
hsa-miR-187	hsa-miR-488	hsa-miR-525-5p	hsa-miR-887
hsa-miR-188-3p	hsa-miR-492	hsa-miR-526b	hsa-miR-888
hsa-miR-198	hsa-miR-499-3p	hsa-miR-541	hsa-miR-890
hsa-miR-216a	hsa-miR-499-5p	hsa-miR-544	hsa-miR-891b
hsa-miR-217	hsa-miR-506	hsa-miR-548a-3p	hsa-miR-892a
hsa-miR-219-2-3p	hsa-miR-507	hsa-miR-548a-5p	
hsa-miR-220	hsa-miR-508-5p	hsa-miR-548b-3p	
hsa-miR-220b	hsa-miR-509-3-5p	hsa-miR-551b	

Quadro 2. MicroRNAs com ensaios localizados no *Array B* que não foram detectados nas amostras estudadas ($Cq \geq 32$).

Array B – Marcadores não detectados			
hsa-let-7b*	hsa-miR-1251	hsa-miR-1324	hsa-miR-218-1*
hsa-let-7c*	hsa-miR-1252	hsa-miR-135b*	hsa-miR-218-2*
hsa-let-7e*	hsa-miR-1253	hsa-miR-138-2*	hsa-miR-23b*
hsa-let-7f-1	hsa-miR-1256	hsa-miR-141*	hsa-miR-24-1*
hsa-let-7f-2	hsa-miR-1257	hsa-miR-143*	hsa-miR-25*
hsa-let-7i*	hsa-miR-1259	hsa-miR-144	hsa-miR-302a*
hsa-miR-100*	hsa-miR-125b-1*	hsa-miR-146a*	hsa-miR-302b*
hsa-miR-101*	hsa-miR-125b-2*	hsa-miR-148a*	hsa-miR-302c*
hsa-miR-105*	hsa-miR-1263	hsa-miR-149*	hsa-miR-302d*
hsa-miR-1178	hsa-miR-1264	hsa-miR-16-2*	hsa-miR-302d
hsa-miR-1182	hsa-miR-1269	hsa-miR-181c*	hsa-miR-30b*
hsa-miR-1184	hsa-miR-1272	hsa-miR-182*	hsa-miR-30c-1*
hsa-miR-1200	hsa-miR-1278	hsa-miR-1825	hsa-miR-30c-2*
hsa-miR-1203	hsa-miR-1283	hsa-miR-1826	hsa-miR-32*
hsa-miR-1204	hsa-miR-1284	hsa-miR-183*	hsa-miR-33a
hsa-miR-1205	hsa-miR-1286	hsa-miR-185*	hsa-miR-367*
hsa-miR-1206	hsa-miR-1288	hsa-miR-186*	hsa-miR-380-5p
hsa-miR-122*	hsa-miR-1289	hsa-miR-18b*	hsa-miR-431*
hsa-miR-1224-3P	hsa-miR-1292	hsa-miR-193b*	hsa-miR-432*
hsa-miR-1225-3P	hsa-miR-1293	hsa-miR-194*	hsa-miR-488
hsa-miR-1228*	hsa-miR-1294	hsa-miR-195*	hsa-miR-497*
hsa-miR-1236	hsa-miR-1296	hsa-miR-196a*	hsa-miR-513B
hsa-miR-1238	hsa-miR-1298	hsa-miR-200a*	hsa-miR-513C
hsa-miR-124*	hsa-miR-1302	hsa-miR-200b*	hsa-miR-517*
hsa-miR-1245	hsa-miR-1304	hsa-miR-200c*	hsa-miR-518c*
hsa-miR-1247	hsa-miR-130a*	hsa-miR-202*	hsa-miR-518e*
hsa-miR-1250	hsa-miR-132*	hsa-miR-214*	hsa-miR-518f*

Continuação Quadro 2.

hsa-miR-519b-3p	hsa-miR-559	hsa-miR-603	hsa-miR-675
hsa-miR-519e*	hsa-miR-562	hsa-miR-607	hsa-miR-708*
hsa-miR-520h	hsa-miR-563	hsa-miR-608	hsa-miR-767-3p
hsa-miR-524	hsa-miR-569	hsa-miR-613	hsa-miR-767-5p
hsa-miR-541*	hsa-miR-573	hsa-miR-614	hsa-miR-770-5p
hsa-miR-548G	hsa-miR-578	hsa-miR-617	hsa-miR-802
hsa-miR-548H	hsa-miR-580	hsa-miR-620	hsa-miR-888*
hsa-miR-548I	hsa-miR-583	hsa-miR-621	hsa-miR-892b
hsa-miR-548K	hsa-miR-584	hsa-miR-622	hsa-miR-920
hsa-miR-548L	hsa-miR-585	hsa-miR-631	hsa-miR-921
hsa-miR-548M	hsa-miR-586	hsa-miR-633	hsa-miR-92a-2*
hsa-miR-548N	hsa-miR-587	hsa-miR-634	hsa-miR-92b*
hsa-miR-548P	hsa-miR-588	hsa-miR-635	hsa-miR-933
hsa-miR-551a	hsa-miR-591	hsa-miR-637	hsa-miR-934
hsa-miR-552	hsa-miR-592	hsa-miR-640	hsa-miR-936
hsa-miR-553	hsa-miR-593	hsa-miR-646	hsa-miR-937
hsa-miR-554	hsa-miR-593	hsa-miR-647	hsa-miR-938
hsa-miR-555	hsa-miR-595	hsa-miR-649	hsa-miR-943
hsa-miR-557	hsa-miR-596	hsa-miR-658	hsa-miR-96*
hsa-miR-558	hsa-miR-600	hsa-miR-665	

Quadro 3. MicroRNAs que não preencheram o critério para ser submetidos à análise estatística.

Marcadores não analisados estatisticamente		
<i>Array A</i>		<i>Array B</i>
hsa-miR-122	hsa-miR-542-3p	hsa-miR-106a*
hsa-miR-135a	hsa-miR-548c-3p	hsa-miR-10b*
hsa-miR-136	hsa-miR-548d-3p	hsa-miR-1179
hsa-miR-182	hsa-miR-582-5p	hsa-miR-1265
hsa-miR-183	hsa-miR-615-3p	hsa-miR-129*
hsa-miR-193a-3p	hsa-miR-616	hsa-miR-155*
hsa-miR-208	hsa-miR-627	hsa-miR-191*
hsa-miR-208b	hsa-miR-651	hsa-miR-19a*
hsa-miR-218	hsa-miR-654-3p	hsa-miR-34b
hsa-miR-219-5p	hsa-miR-876-3p	hsa-miR-374a*
hsa-miR-298	hsa-miR-891a	hsa-miR-374b*
hsa-miR-299-5p	hsa-miR-96	hsa-miR-376a*
hsa-miR-329		hsa-miR-545*
hsa-miR-369-5p		hsa-miR-550
hsa-miR-376b		hsa-miR-581
hsa-miR-381		hsa-miR-599
hsa-miR-455-5p		hsa-miR-604
hsa-miR-496		hsa-miR-630
hsa-miR-508-3p		hsa-miR-644
hsa-miR-510		hsa-miR-769-3p
hsa-miR-511		hsa-miR-922
hsa-miR-519e		hsa-miR-924
hsa-miR-520a-5p		hsa-miR-944
hsa-miR-520d-5p		hsa-miR-99a*
hsa-miR-523		rno-miR-29c*

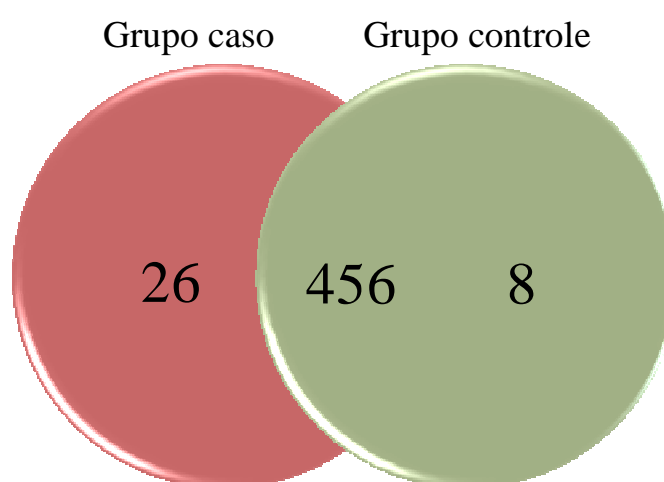


Figura 6. Diagrama de Venn indicando o número de microRNAs expressos nos grupos estudados. Dos 490 marcadores detectados, 456 apresentaram expressão em ambos os grupos, enquanto 26 foram detectados apenas no grupo caso e oito apenas no grupo controle.

Quadro 4. MicroRNAs com expressão exclusiva em um dos grupos de estudo.

Marcadores com expressão exclusiva		
Grupo caso		Grupo controle
hsa-miR-193a-3p	hsa-miR-96	hsa-miR-135a
hsa-miR-369-5p	hsa-miR-155*	hsa-miR-208b
hsa-miR-520d-5p	hsa-miR-34b	hsa-miR-219-5p
hsa-miR-627	hsa-miR-924	hsa-miR-298
hsa-miR-891a	hsa-miR-183	hsa-miR-496
hsa-miR-129*	hsa-miR-329	hsa-miR-1265
hsa-miR-19a*	hsa-miR-520a-5p	hsa-miR-604
hsa-miR-581	hsa-miR-582-5p	hsa-miR-922
hsa-miR-122	hsa-miR-876-3p	
hsa-miR-299-5p	hsa-miR-106a*	
hsa-miR-510	hsa-miR-191*	
hsa-miR-523	hsa-miR-376a*	
hsa-miR-651	hsa-miR-944	

Após o cálculo de correção para múltiplos testes, somente valores de $P < 0,0058$ foram considerados estatisticamente significantes. Como resultado, 49 microRNAs apresentaram expressão reduzida em crianças com SD em relação ao grupo controle, conforme mostrado na Figura 7. Em relação aos microRNAs presentes no cromossomo 21, o hsa-miR-802 não foi detectado nas amostras estudadas, conforme apresentado no Quadro 2. A Figura 8 apresenta os valores da expressão relativa de hsa-miR-155, hsa-miR-99a, hsa-miR-125b e hsa-let-7c, presentes no cromossomo 21, os quais não apresentaram expressão diferencial estatisticamente significativa no grupo de crianças com SD em relação ao grupo controle.



Figura 7. Expressão relativa (RQ) dos 49 marcadores diferencialmente expressos em crianças com SD em relação ao grupo controle (RQ = 1).

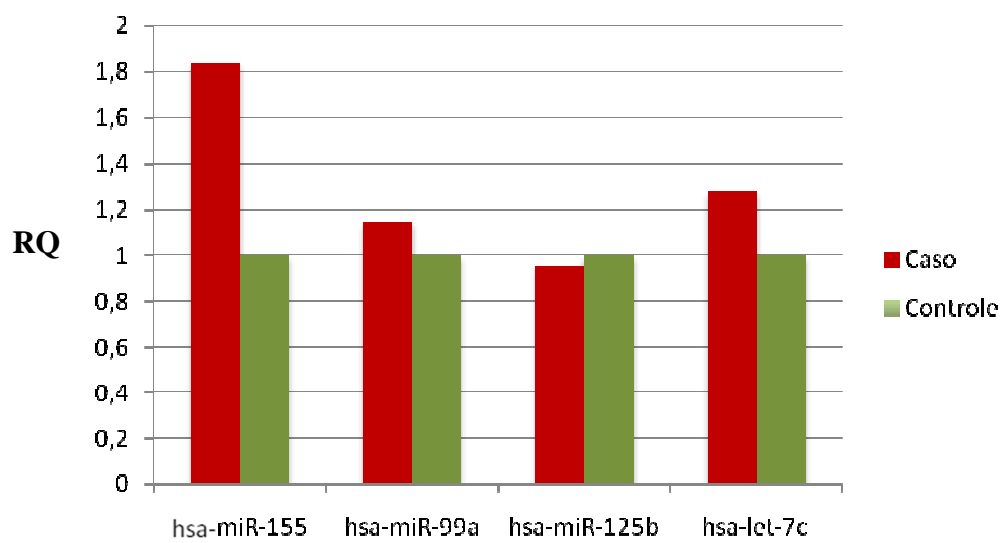


Figura 8. Expressão relativa (RQ) dos microRNAs localizados no cromossomo 21 em crianças com SD em relação ao grupo controle (RQ = 1).

III.3. Predição de genes-alvo dos microRNAs diferencialmente expressos em crianças com SD

A identificação de genes-alvo preditos auxilia no entendimento da função biológica de microRNAs diferencialmente expressos. Como resultado da predição de alvos dos microRNAs com expressão reduzida em pelo menos 50% ($RQ \leq 0,5$), foram identificados 2.099 genes, dos quais 2.030 são expressos em células sanguíneas. Todos os cromossomos do genoma humano (autossomos e cromossomos sexuais) apresentaram alvos preditos para os microRNAs diferencialmente expressos. Localizados no cromossomo 21, foram identificados 22 genes-alvo, todos expressos em células sanguíneas (Tabela 3 e Material suplementar 2). O número de genes-alvo por microRNA variou de 1 a 100 (número máximo considerado). Em relação aos genes preditos, os mesmos podem ser alvos de 1 a 7 microRNAs simultaneamente (Material suplementar 3).

A análise de Bioinformática revelou que genes envolvidos em diversos processos biológicos relevantes para a SD, tais como apoptose, metabolismo de espécies reativas de oxigênio, metabolismo mitocondrial, sistema imunológico, envelhecimento, ciclo e divisão celular e controle da expressão gênica, são alvos preditos de microRNAs diferencialmente expressos em crianças com SD (Material suplementar 4).

Tabela 3. Genes-alvo de microRNAs diferencialmente expressos em crianças com SD localizados no cromossomo 21.

Símbolo oficial do gene	Nome do gene	Localização cromossômica
<i>ADAMTS1</i>	<i>ADAM metallopeptidase with thrombospondin type 1 motif, 1</i>	21q21.2
<i>BACH1</i>	<i>BTB and CNC homology 1, basic leucine zipper transcription factor 1</i>	21q22.11
<i>BAGE2</i>	<i>B melanoma antigen family, member 2</i>	21p
<i>BAGE3</i>	<i>B melanoma antigen family, member 3</i>	21p11.2
<i>BRWD1</i>	<i>bromodomain and WD repeat domain containing 1</i>	21q22.2
<i>C21orf91</i>	<i>chromosome 21 open reading frame 91</i>	21q21.1
<i>CHODL</i>	<i>chondrolectin</i>	21q11.2
<i>DYRK1A</i>	<i>dual-specificity tyrosine-(Y)-phosphorylation regulated kinase 1A</i>	21q22.13
<i>ETS2</i>	<i>v-ets erythroblastosis virus E26 oncogene homolog 2 (avian)</i>	21q22.3 21q22.2
<i>GABPA</i>	<i>GA binding protein transcription factor, alpha subunit 60kDa</i>	21q21-q22.1 21q21.3
<i>HLCS</i>	<i>holocarboxylase synthetase</i>	21q22.1 21q22.13
<i>ITSN1</i>	<i>intersectin 1 (SH3 domain protein)</i>	21q22.1-q22.2
<i>MORC3</i>	<i>MORC family CW-type zinc finger 3</i>	21q22.13
<i>NRIP1</i>	<i>nuclear receptor interacting protein 1</i>	21q11.2
<i>RIPK4</i>	<i>receptor-interacting serine-threonine kinase 4</i>	21q22.3
<i>RUNX1</i>	<i>runt-related transcription factor 1 (acute myeloid leukemia 1; <i>aml1</i> oncogene)</i>	21q22.3
<i>SLC5A3</i>	<i>solute carrier family 5 (inositol transporters), member 3</i>	21q22.12
<i>SUMO3</i>	<i>SMT3 suppressor of mitotic 3 homolog 3 (S. cerevisiae)</i>	21q22.3
<i>SYNJ1</i>	<i>synaptotagmin 1</i>	21q22.2
<i>TLAM1</i>	<i>T-cell lymphoma invasion and metastasis 1</i>	21q22.1 21q22.11
<i>USP25</i>	<i>ubiquitin specific peptidase 25</i>	21q11.2
<i>ZNF295</i>	<i>zinc finger protein 295</i>	21q22.3

DISCUSSÃO

IV. DISCUSSÃO

Os resultados do presente estudo mostram que crianças com SD apresentam um perfil de expressão diferencial de microRNAs em células mononucleares do sangue periférico em relação a crianças sem a síndrome. Considerando a hipótese do “efeito da dosagem gênica”, espera-se um aumento de cerca de 50% na expressão de genes localizados no Hsa 21 em indivíduos com SD.^(28,29) Diferentemente do esperado devido ao número de cópias gênicas, no presente estudo os microRNAs localizados no Hsa 21 e detectados no presente estudo (hsa-miR-155, hsa-miR-99a, hsa-miR-125b e hsa-let-7c) não apresentaram expressão diferencial no grupo de crianças com SD.

Estudos mostram que os microRNAs hsa-miR-155, hsa-miR-99a, hsa-miR-125b, hsa-let-7c e hsa-miR-802 apresentam expressão elevada em alguns tipos celulares de indivíduos com trissomia do 21, incluindo fibroblastos⁽⁴⁹⁾ e tecidos cerebral e cardíaco^(50,51), com consequente alteração da expressão de genes-alvo, o que poderia contribuir para o desenvolvimento de características fenotípicas da SD.^(49,51) Recentemente, expressão elevada dos microRNAs ortólogos a hsa-miR-155 e hsa-miR-802 foi detectada em células do hipocampo e do sangue periférico do camundongo Ts65Dn,⁽⁹⁹⁾ um modelo animal da SD que apresenta um segmento triplicado do cromossomo 16 contendo genes ortólogos àqueles do Hsa 21.⁽¹⁰⁰⁾ A análise funcional experimental desses microRNAs mostrou a expressão reduzida de genes-alvo em ambos os tecidos, sugerindo uma potencial contribuição desses microRNAs para anormalidades neuronais, sinápticas e hematopoiéticas.⁽⁹⁹⁾

Por outro lado, Gefen *et al.*⁽¹⁰¹⁾ mostraram que a expressão dos microRNAs hsa-miR-155, hsa-miR-99a, hsa-miR-125b e hsa-let-7c não é condizente com a dosagem gênica em células de medula óssea provenientes de indivíduos com SD que apresentam

leucemia. Esses dados corroboram com os achados do presente estudo, que também não mostrou aumento de expressão destes microRNAs nos indivíduos com SD; além disso, este é o primeiro a investigar a expressão de microRNAs em células mononucleares do sangue periférico de crianças com SD, não havendo, assim, dados disponíveis sobre esse tipo celular para comparação.

É importante salientar que a expressão de hsa-miR-125b e miR-99a pode estar superestimada devido à reatividade cruzada das sondas *Taqman*[®] de PCRq entre esses microRNAs maduros e outros membros de suas famílias, como observado por Yamada *et al.*⁽¹⁰²⁾ Considerando que os genes que sintetizam os microRNA precursores hsa-mir-125b-1 e hsa-miR-125b-2 localizam-se em cromossomos diferentes (cromossomos 11 e 21, respectivamente), não é possível definir a quantidade exata do microRNA maduro hsa-miR-125b proveniente do Hsa 21. O mesmo se aplica aos microRNAs precursores hsa-mir-99a (Hsa 21) e hsa-mir-99b (cromossomo 19), caso haja detecção cruzada entre os microRNAs maduros hsa-miR-99a e hsa-miR-99b.

Embora vários estudos mostrem que a expressão de genes em triplicata esteja aumentada na proporção esperada de 50% tanto em indivíduos com SD^(17,32,103) quanto em modelos animais da síndrome,^(30,33,104) nem todos os genes presentes em três cópias apresentam o mesmo padrão elevado de expressão e muitos sequer têm sua expressão alterada pela presença de uma cópia extra,^(17,103,104,105) evidenciando a presença de mecanismos de “compensação” para a dosagem gênica, que resultam na restauração da expressão dos genes em triplicata a níveis equivalentes aos de genes presentes em duas cópias. A existência desses mecanismos foi sugerida tanto por estudos com indivíduos com SD^(32,36) quanto com modelos animais.^(34,39,104,106,107) Além disso, há evidências de

que a aparente compensação de dose para genes individuais seja tecido-específica e estágio-específica.^(104,105)

A alteração de mecanismos reguladores da expressão gênica em indivíduos trissômicos poderia explicar, pelo menos em parte, a compensação de dose observada para alguns genes em triplicata, bem como a alteração da expressão de genes dissômicos. Indivíduos com SD apresentam padrão de metilação do DNA diferencial com possíveis consequências funcionais na regulação gênica,⁽⁴⁸⁾ além de expressão alterada de microRNAs em diferentes tecidos, com consequente redução da expressão de proteínas-alvo específicas.^(49,51,80) Há evidências de que a transcrição de microRNAs é regulada por fatores epigenéticos, como metilação do DNA e modificações de histonas, além de fatores ambientais, mutações e polimorfismos genéticos. Além disso, os próprios microRNAs regulados por mecanismos epigenéticos podem participar direta ou indiretamente da regulação de componentes da maquinaria epigenética, criando um mecanismo de *feedback* regulatório altamente controlado.^(108,109)

No presente estudo, os microRNAs diferencialmente expressos em crianças com SD estão localizados em cromossomos dissômicos e todos apresentaram expressão reduzida nesse grupo. O perfil de expressão de microRNAs em amostras de tecido cerebral de indivíduos com SD⁽⁵⁰⁾ mostrou que a maioria dos microRNAs diferencialmente expressos nesses indivíduos apresentou expressão reduzida e encontra-se localizada em cromossomos presentes em duas cópias, o que corrobora com os achados do presente estudo. Além disso, estudos de expressão gênica mostram que genes dissômicos apresentam expressão diferencial em indivíduos com a SD e em modelos animais da síndrome,^(33,103,106,110-113) o que sustenta a hipótese de que alterações transcricionais secundárias ocorrem como resultado da trissomia do 21. De maneira

geral, os resultados do presente estudo estão de acordo com achados prévios de estudos de expressão gênica,^(106,113) que mostram que a trissomia do 21 induz uma sutil alteração global de genes distribuídos ao longo do genoma e que poucos genes apresentam uma robusta alteração de sua expressão.

Considerando que a significância estatística não necessariamente corresponde à significância biológica, para predição de alvos por ferramenta de bioinformática foram considerados somente os microRNAs com expressão alterada em pelo menos 50% no grupo caso em relação ao grupo controle. Uma alteração de 50% na expressão de genes em triplicata, proporcional à dosagem gênica, é considerada suficiente para produzir efeitos biológicos em indivíduos com SD,⁽²⁹⁾ o que justifica o critério utilizado. Como resultado, foram preditos 2.099 genes-alvo, 22 destes localizados no cromossomo 21, envolvidos em diversas vias biológicas, algumas das quais se apresentam alteradas em indivíduos com trissomia do 21.

Vários genes relacionados ao controle da apoptose celular foram preditos como alvos de microRNAs diferencialmente expressos no presente estudo. A apoptose ou morte celular programada é um mecanismo fundamental para o desenvolvimento de órgãos durante a embriogênese, bem como para o controle do número de células em tecidos adultos.⁽¹¹⁴⁾ Estudos mostram que indivíduos com SD apresentam alto índice de apoptose em diversos tipos celulares, incluindo neurônios,⁽¹¹⁵⁾ fibroblastos⁽¹¹⁶⁾ e células do sangue periférico.⁽¹¹⁷⁾ Há evidências de que o aumento da apoptose na SD seja induzido pela expressão elevada do gene *ETS2* (*v-ets erythroblastosis virus E26 oncogene homolog 2 - avian*), localizado no cromossomo 21 e apontado como alvo predito do microRNA hsa-miR-605, que apresentou expressão reduzida em crianças com SD no presente estudo. Um camundongo transgênico apresentando expressão

constitutivamente elevada do gene *ETS2* em todos os tecidos desenvolve características muito similares às aquelas presentes em indivíduos com SD, tais como involução do timo e anormalidades esqueléticas e craniofaciais, também presentes em camundongos-modelo da síndrome, sugerindo que a expressão elevada do gene *ETS2* pode contribuir para diversas características patológicas da SD.^(118,119)

Além da presença de três cópias do gene *ETS2* em indivíduos com SD, o aumento da sua expressão é induzido em resposta ao estresse oxidativo, o que poderia explicar a expressão elevada desse gene acima do esperado pela dosagem gênica na trissomia do 21.⁽¹¹⁹⁻¹²¹⁾ Estudos mostram que indivíduos com SD, bem como modelos animais da síndrome, estão expostos a um estresse oxidativo exacerbado,⁽¹²²⁻¹²⁴⁾ decorrente da presença de três cópias do gene *SOD1* (*Superoxide dismutase 1*), um dos genes localizados no Hsa 21 envolvidos na geração de energia mitocondrial e no metabolismo de espécies reativas de oxigênio.^(125,126) Estudos sugerem que o estresse oxidativo pode contribuir para manifestações fenotípicas da SD, como a doença de Alzheimer,^(124,125) envelhecimento precoce^(122,126,127) e alterações no desenvolvimento de células progenitoras hematopoiéticas e linfóides, que podem estar associadas à involução precoce do timo e alterações imunológicas observadas na SD.⁽¹²⁸⁾ No presente estudo, vários genes associados ao metabolismo de espécies reativas de oxigênio foram preditos como alvos de microRNAs diferencialmente expressos nas crianças com SD, e a expressão alterada dos mesmos poderia contribuir para o quadro de estresse oxidativo em indivíduos com SD.

Entre os alvos preditos de microRNAs diferencialmente expressos no presente estudo, estão incluídos genes que participam do metabolismo mitocondrial, o qual também se encontra alterado em indivíduos com SD.^(103,129-132) Entre os genes

envolvidos, destaca-se o gene *GABPA* (*GA binding protein transcription factor, alpha subunit 60kDa*), que codifica um fator de transcrição que regula a expressão de genes envolvidos no metabolismo mitocondrial⁽¹³³⁾ e é localizado no cromossomo 21. O metabolismo mitocondrial é intimamente relacionado ao estresse oxidativo, uma vez que as mitocôndrias são uma importante fonte de espécies reativas de oxigênio na célula.⁽¹³⁴⁾ Há evidências de que a disfunção mitocondrial possa desempenhar um papel significativo no desenvolvimento da neuropatologia de Alzheimer em indivíduos com SD⁽¹³⁵⁾ e estudos mostram que espécies reativas de oxigênio mitocondriais atuam como moléculas de sinalização para induzir a produção de citocinas pró-inflamatórias.⁽¹³⁶⁾ Indivíduos com SD que apresentam doenças hematológicas, como a síndrome mielodisplásica, leucemia megacarioblástica aguda⁽¹³⁷⁾ e doença mieloproliferativa transitória⁽¹³⁸⁾ apresentam concentração sérica elevada de citocinas pró-inflamatórias, assim como adultos com SD.⁽¹³⁹⁾ A produção elevada de citocinas pró-inflamatórias é uma característica de doenças auto-imunes,^(140,141) as quais ocorrem mais frequentemente em indivíduos com SD em relação à população geral.⁽¹⁴²⁻¹⁴⁴⁾

Por outro lado, há evidências de que indivíduos com SD apresentam expressão elevada de moléculas anti-inflamatórias que inibem a síntese de citocinas pró-inflamatórias, sugerindo que um estado anti-inflamatório contínuo nesses indivíduos poderia explicar a frequência elevada de infecções associadas à síndrome.^(11,145) Além da expressão alterada de citocinas,^(137-139,146) a SD é associada a diversas alterações intrínsecas do sistema imune, tais como alteração nos processos de diferenciação, maturação e ativação de linfócitos T e B,^(10,147-152) além de produção elevada de auto-anticorpos⁽¹⁵³⁾ e resposta reduzida à vacinação contra diversos patógenos.⁽¹⁴⁸⁾ Condizente com a contribuição das alterações imunológicas para a fisiopatologia da SD,

doenças infecciosas constituem uma importante causa de morte entre indivíduos com a síndrome.⁽¹⁵⁴⁾ No presente estudo, vários genes associados ao controle da resposta imunológica foram preditos como alvos de microRNAs diferencialmente expressos em crianças com SD, incluindo o gene *TIAM1* (*T-cell lymphoma invasion and metastasis 1*), localizado no cromossomo 21, o qual está envolvido no controle da migração e recrutamento de células T para sítios de inflamação.⁽¹⁵⁵⁾ A expressão alterada de genes que codificam proteínas envolvidas em vias do sistema imunológico é observada em indivíduos com SD^(113,156) e pode estar associada às alterações imunológicas características da síndrome.

Genes-alvo relacionados ao controle do ciclo e divisão celular, da expressão gênica, e à manutenção dos telômeros também foram preditos como alvos de microRNAs no presente estudo. Estudos mostram que indivíduos com SD e modelos animais apresentam proliferação celular reduzida com alteração da expressão de genes envolvidos no ciclo celular⁽¹⁵⁷⁻¹⁵⁹⁾ e encurtamento dos telômeros, uma característica de envelhecimento celular,^(126,160) sugerida como marcador do desenvolvimento da doença de Alzheimer e de doenças mieloproliferativas na SD.⁽¹⁶¹⁻¹⁶⁴⁾ Entre os genes envolvidos no controle epigenético da expressão gênica destaca-se o gene *HLCS* (*Holocarboxylase synthetase*), presente no cromossomo 21, envolvido na modificação de histonas.⁽¹⁶⁵⁾

Os resultados da predição de genes-alvo de microRNAs diferencialmente expressos em crianças com SD no presente estudo reforça a importância de genes localizados em outros cromossomos, além do Hsa 21, no desenvolvimento do fenótipo Down. Acredita-se que os efeitos dos microRNAs são modestos, mas os efeitos da dosagem gênica devido à trissomia de um gene também poderiam ser classificados como modestos se resultarem em aumento de somente 50% na expressão gênica. Além

disso, microRNAs podem atuar cooperativamente, conforme observado pela predição de genes-alvo no presente estudo, resultando em grande impacto na tradução de alguns RNAm.⁽¹⁶⁶⁾ Para avaliar o significado biológico da expressão diferencial de microRNAs em indivíduos com trissomia do 21, faz-se necessária a análise funcional experimental desses microRNAs para melhor entendimento de seus mecanismos de ação e de seus genes-alvo. Atualmente, o maior desafio é identificar as funções dos microRNAs diferencialmente expressos em indivíduos com SD e elucidar sua contribuição para o fenótipo da síndrome.

CONCLUSÃO

V. CONCLUSÃO

1. Crianças com SD apresentam expressão reduzida de microRNAs não localizados no cromossomo 21 em células mononucleares do sangue periférico, em relação a crianças sem a síndrome.
2. Processos biológicos relevantes para a patogênese da SD, tais como apoptose, metabolismo de espécies reativas de oxigênio, metabolismo mitocondrial, sistema imunológico, envelhecimento, ciclo e divisão celular e controle da expressão gênica estão associados a genes-alvo preditos de microRNAs diferencialmente expressos em crianças com SD.

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ANEXOS



FACULDADE DE MEDICINA DE SÃO JOSÉ DO RIO PRETO

Autarquia Estadual - Lei n.º 8899 de 27/09/94
(Reconhecida pelo Decreto Federal n.º 74.179 de 14/06/74)

Parecer n.º 043/2010


COMITÊ DE ÉTICA EM PESQUISA

O Protocolo CEP n.º 0297/2010 sob a responsabilidade de **Érika Cristina Pavarino Bertelli**, com o título "Expressão de genes envolvidos na resposta imunológica e de micro-RNAs em crianças com Síndrome de Down", está de acordo com a Resolução do CNS 196/96 e foi **aprovado por esse CEP**.

Lembramos ao senhor(a) pesquisador(a) que, no cumprimento da Resolução 251/97, o Comitê de Ética em Pesquisa em Seres Humanos (CEP) **deverá receber relatórios semestrais sobre o andamento do Estudo**, bem como a qualquer tempo e a critério do pesquisador nos casos de relevância, além do envio dos relatos de eventos adversos, com certeza para conhecimento deste Comitê. **Salientamos ainda, a necessidade de relatório completo ao final do Estudo.**

São José do Rio Preto, 08 de fevereiro de 2010.

Dr.ª Maria Angélica Benes Teixeira Lemos
Secretária do CEP/FAMERP


Prof. Dr. Antônio Carlos Pires
Coordenador do CEP - FAMERP

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

(Conselho Nacional de Saúde, resolução 196/96)

Título da Pesquisa: Expressão e análise funcional de microRNAs do cromossomo 21 em linfócitos de crianças com síndrome de Down.

Pesquisadora Responsável: Profa Dra Érika Cristina Pavarino.

Eu.....RG....., responsável legal por, declaro que autorizo meu filho (a) a participar como voluntário (a) do projeto de pesquisa “ Expressão de genes envolvidos na resposta imunológica e de micro-RNAs em crianças com síndrome de Down”, conforme consentimento do mesmo. Declaro ainda que fomos satisfatoriamente esclarecidos que:

A) o objetivo do estudo é investigar se a presença de três cópias do cromossomo 21 pode levar à alterações na resposta imunológica e no material genético (microRNA) de indivíduos com síndrome de Down ; B) o estudo molecular será realizado utilizando-se RNA (material genético) extraído de sangue periférico de crianças com síndrome de Down (grupo caso) e de crianças sem a síndrome (grupo controle); C) o sangue será colhido com seringa descartável por profissionais habilitados e o risco da coleta inclui vermelhidão local transitória, e raramente a formação de pequenos hematomas e inflamação local; D) posso consultar a pesquisadora responsável em qualquer época, pessoalmente ou pelo telefone (17) 3201-5720, para esclarecimento de qualquer dúvida; E) estou livre para, a qualquer momento, deixar de participar da pesquisa e que não preciso apresentar justificativas para isso; F) todas as informações fornecidas e os resultados serão mantidos em sigilo e estes últimos somente serão utilizados para divulgação em reuniões e revistas científicas; G) autorizo o armazenamento do material coletado e serei contatado (a) para conceder ou não a autorização para o uso deste material em futuros projetos.

Assim, consinto em participar do projeto de pesquisa em questão.

São José do Rio Preto, _____ de _____, _____.

Responsável legal

Érika Cristina Pavarino
Pesquisadora Responsável

Em caso de dúvidas contatar a secretaria do Comitê de Ética em Pesquisa da Faculdade de Medicina de São José do Rio Preto, telefone: (0xx17)32015700, ramal 5813.

MATERIAL SUPPLEMENTAR

Material Suplementar 1. Resultados da análise estatística de 428 microRNAs. A coluna A apresenta o microRNA seguido do *part number* do conjunto de oligonucleotídeos iniciadores e sonda (*Applied Biosystems*) utilizados para cada marcador. São apresentados ainda o valor de expressão de relativa (RQ) do grupo caso em relação ao grupo controle, bem como o valor P dos testes individuais e após correção de Benjamini e Hochberg⁽⁹⁵⁾ (*Benjamini-Hochberg False Discovery Rate*).

Material Suplementar 2. Genes preditos pelo programa *TargetScanHuman* v. 5.2 como possíveis alvos dos microRNAs diferencialmente expressos. São apresentadas informações sobre a localização cromossômica dos genes e sua expressão (+) ou ausência de expressão (-) em células sanguíneas.

Material Suplementar 3. MicroRNAs diferencialmente expressos e seus alvos preditos. A coluna B apresenta o número de microRNAs que regula cada gene alvo. As colunas C a AJ apresentam os microRNAs diferencialmente expressos em pelo menos 50% no presente estudo. O “X” representa a regulação do gene alvo pelo respectivo microRNA. Os microRNAs hsa-miR-516, hsa-miR-10a*, hsa-miR-454*, has-miR-1305, hsa-miR-92a-1*, hsa-miR-23a*, hsa-miR-18a*, hsa-miR-363*, hsa-miR-452* e hsa-miR-148b* não constam na base de dados do *TargetScanHuman* v. 5.2.

Material Suplementar 4. Informações sobre localização celular e função dos genes-alvo dos microRNAs de interesse, bem como processos biológicos nos quais os mesmos estão associados.

Material Suplementar

Material Suplementar 1. Resultados da análise estatística de 428 microRNAs. A coluna A apresenta o microRNA seguido do *part number* do conjunto de oligonucleotídeos iniciadores e sonda (*Applied Biosystems*) utilizados para cada marcador. São apresentados ainda o valor de expressão de relativa (RQ) do grupo caso em relação ao grupo controle, bem como o valor P dos testes individuais e após correção de Benjamini e Hochberg⁽⁹⁵⁾ (*Benjamini-Hochberg False Discovery Rate*).

microRNA - Part number (<i>Applied Biosystems</i>)	RQ	Valor P (<i>two-tailed</i>) teste individual	Teste estatístico	Valor P após correção para múltiplos testes	Significância estatística após correção para múltiplos testes
hsa-miR-1255B-002801	0,27	<0,0001	<i>One-sample T test</i>	0,0006	Significante
hsa-miR-1275-002840	0,43	<0,0001	<i>One-sample T test</i>	0,0002	Significante
hsa-miR-206-000510	0,23	<0,0001	<i>One-sample T test</i>	0,0007	Significante
hsa-miR-211-4373088	0,34	<0,0001	<i>One-sample T test</i>	0,00012	Significante
hsa-miR-516-3p-001149	0,28	<0,0001	<i>One-sample T test</i>	0,0004	Significante
hsa-miR-520c-3p-002400	0,27	<0,0001	<i>One-sample T test</i>	0,0008	Significante
hsa-miR-641-001585	0,18	<0,0001	<i>One-sample T test</i>	0,0009	Significante
hsa-miR-656-001510	0,55	0,0001	<i>One-sample T test</i>	0,0005	Significante
hsa-miR-10a*-002288	0,32	0,0002	<i>One-sample T test</i>	0,0014	Significante
hsa-miR-452-4395440	0,24	0,0002	<i>One-sample T test</i>	0,0011	Significante
hsa-miR-454*-001996	0,33	0,0002	<i>One-sample T test</i>	0,0015	Significante
hsa-miR-564-001531	0,37	0,0002	<i>One-sample T test</i>	0,0012	Significante
hsa-miR-766-001986	0,51	0,0002	<i>One-sample T test</i>	0,0013	Significante
has-miR-1305-002867	0,36	0,0003	<i>One-sample T test</i>	0,0018	Significante
hsa-miR-375-4373027	0,32	0,0003	<i>One-sample T test</i>	0,0016	Significante
hsa-miR-92a-1*-002137	0,73	0,0003	<i>One-sample T test</i>	0,0019	Significante

hsa-miR-1208-002880	0,39	0,0004	<i>One-sample T test</i>	0,0022	Significante
hsa-miR-1254-002818	0,32	0,0004	<i>One-sample T test</i>	0,0023	Significante
hsa-miR-219-1-3p-4395206	0,26	0,0004	<i>One-sample T test</i>	0,0020	Significante
hsa-miR-372-4373029	0,39	0,0004	<i>One-sample T test</i>	0,0021	Significante
hsa-miR-650-001603	0,33	0,0005	<i>One-sample T test</i>	0,0025	Significante
hsa-miR-939-002182	0,55	0,0005	<i>One-sample T test</i>	0,0026	Significante
hsa-miR-1260-002896	0,30	0,0006	<i>One-sample T test</i>	0,0027	Significante
hsa-miR-1282-002803	0,47	0,001	<i>One-sample T test</i>	0,0028	Significante
hsa-miR-605-001568	0,38	0,001	<i>One-sample T test</i>	0,0029	Significante
hsa-miR-1285-002822	0,45	0,0011	<i>One-sample T test</i>	0,0030	Significante
hsa-miR-575-001617	0,35	0,0013	<i>One-sample T test</i>	0,0032	Significante
hsa-miR-23a*-002439	0,54	0,0018	<i>One-sample T test</i>	0,0033	Significante
hsa-miR-135b-4395372	0,43	0,0019	<i>One-sample T test</i>	0,0034	Significante
hsa-miR-346-4373038	0,44	0,002	<i>One-sample T test</i>	0,0035	Significante
hsa-miR-18a*-002423	0,49	0,0021	<i>One-sample T test</i>	0,0036	Significante
hsa-miR-520D-3P-002743	0,40	0,0027	<i>One-sample T test</i>	0,0037	Significante
hsa-miR-1290-002863	0,45	0,0031	<i>One-sample T test</i>	0,0040	Significante
hsa-miR-320B-002844	0,72	0,0031	<i>One-sample T test</i>	0,0041	Significante
hsa-miR-32-4395220	0,47	0,0031	<i>One-sample T test</i>	0,0039	Significante
hsa-miR-363*-001283	0,63	0,0032	<i>One-sample T test</i>	0,0043	Significante
hsa-miR-664-002897	0,67	0,0032	<i>One-sample T test</i>	0,0042	Significante
hsa-miR-337-5p-4395267	0,23	0,0033	<i>One-sample T test</i>	0,0046	Significante
hsa-miR-597-4380960	0,48	0,0033	<i>One-sample T test</i>	0,0044	Significante
hsa-miR-296-5p-4373066	0,67	0,0036	<i>One-sample T test</i>	0,0047	Significante
hsa-miR-452*-002330	0,12	0,0036	<i>One-sample T test</i>	0,0048	Significante

hsa-miR-133a-4395357	0,40	0,0037	<i>One-sample T test</i>	0,0049	Significante
hsa-miR-483-5p-4395449	0,42	0,0038	<i>One-sample T test</i>	0,0050	Significante
hsa-miR-548c-5p-4395540	0,26	0,0038	<i>One-sample T test</i>	0,0051	Significante
hsa-miR-1300-002902	0,34	0,0039	<i>One-sample T test</i>	0,0053	Significante
hsa-miR-1-4395333	0,35	0,0046	<i>One-sample T test</i>	0,0054	Significante
hsa-miR-134-4373299	0,48	0,0048	<i>One-sample T test</i>	0,0055	Significante
hsa-miR-148b*-002160	0,19	0,0049	<i>One-sample T test</i>	0,0056	Significante
hsa-miR-550-001544	0,50	0,0054	<i>One-sample T test</i>	0,0057	Significante
hsa-miR-7-2*-002314	0,47	0,0062	<i>One-sample T test</i>	0,0058	Não significante
hsa-miR-657-001512	0,40	0,0067	<i>One-sample T test</i>	0,0060	Não significante
hsa-miR-518b-4373246	0,40	0,0069	<i>One-sample T test</i>	0,0061	Não significante
hsa-miR-125a-5p-4395309	0,45	0,0073	<i>One-sample T test</i>	0,0062	Não significante
hsa-let-7a*-002307	0,53	0,0079	<i>One-sample T test</i>	0,0063	Não significante
hsa-miR-503-4373228	0,53	0,0082	<i>One-sample T test</i>	0,0065	Não significante
hsa-miR-99b-4373007	0,47	0,0082	<i>One-sample T test</i>	0,0064	Não significante
hsa-miR-548E-002881	0,51	0,0084	<i>One-sample T test</i>	0,0067	Não significante
hsa-miR-410-4378093	0,58	0,0093	<i>One-sample T test</i>	0,0068	Não significante
hsa-miR-548d-5p-4395348	0,54	0,0094	<i>One-sample T test</i>	0,0069	Não significante
hsa-miR-601-001558	0,42	0,0095	<i>One-sample T test</i>	0,0070	Não significante
hsa-miR-655-4381015	0,56	0,0107	<i>One-sample T test</i>	0,0071	Não significante
hsa-miR-133b-4395358	0,54	0,0119	<i>One-sample T test</i>	0,0072	Não significante
hsa-miR-522-4395524	0,60	0,0124	<i>One-sample T test</i>	0,0074	Não significante
hsa-miR-551b*-002346	0,41	0,0124	<i>One-sample T test</i>	0,0075	Não significante
hsa-miR-138-4395395	0,60	0,0131	<i>One-sample T test</i>	0,0076	Não significante

hsa-miR-483-3p-002339	0,57	0,0133	<i>One-sample T test</i>	0,0077	Não significante
hsa-miR-429-4373203	0,54	0,0141	<i>One-sample T test</i>	0,0078	Não significante
hsa-miR-720-002895	0,55	0,0144	<i>One-sample T test</i>	0,0079	Não significante
hsa-miR-494-4395476	0,49	0,0147	<i>One-sample T test</i>	0,0081	Não significante
hsa-miR-1183-002841	0,45	0,0151	<i>One-sample T test</i>	0,0082	Não significante
hsa-miR-192*-002272	0,37	0,0156	<i>One-sample T test</i>	0,0083	Não significante
hsa-miR-99b*-002196	0,71	0,0171	<i>One-sample T test</i>	0,0084	Não significante
hsa-miR-577-002675	0,45	0,0176	<i>One-sample T test</i>	0,0085	Não significante
hsa-miR-497-001043	0,41	0,0193	<i>One-sample T test</i>	0,0086	Não significante
hsa-miR-378-002243	2,20	0,0214	<i>One-sample T test</i>	0,0088	Não significante
hsa-miR-490-3p-4373215	0,40	0,0219	<i>One-sample T test</i>	0,0089	Não significante
has-miR-155-4395459	1,83	0,022	<i>One-sample T test</i>	0,0090	Não significante
hsa-miR-22-4373079	1,94	0,0231	<i>One-sample T test</i>	0,0091	Não significante
hsa-miR-487b-4378102	0,61	0,0236	<i>One-sample T test</i>	0,0092	Não significante
hsa-miR-379-4373349	0,54	0,0241	<i>One-sample T test</i>	0,0093	Não significante
hsa-miR-383-4373018	0,54	0,0256	<i>One-sample T test</i>	0,0095	Não significante
hsa-miR-489-4395469	0,57	0,027	<i>One-sample T test</i>	0,0096	Não significante
hsa-miR-190-4373110	0,51	0,0274	<i>One-sample T test</i>	0,0097	Não significante
hsa-miR-409-3p-002332	0,58	0,0292	<i>One-sample T test</i>	0,0098	Não significante
hsa-miR-942-002187	1,78	0,0305	<i>One-sample T test</i>	0,0099	Não significante
hsa-miR-1244-002791	0,12	0,0313	<i>Wilcoxon signed rank test</i>	0,0107	Não significante
hsa-miR-181a-4373117	1,26	0,0313	<i>Wilcoxon signed rank test</i>	0,0100	Não significante
hsa-miR-224-4395210	0,28	0,0313	<i>Wilcoxon signed rank test</i>	0,0102	Não significante
hsa-miR-338-5P-002658	0,46	0,0313	<i>Wilcoxon signed rank test</i>	0,0109	Não significante
hsa-miR-376c-4395233	0,77	0,0313	<i>Wilcoxon signed rank test</i>	0,0103	Não significante
hsa-miR-433-4373205	0,19	0,0313	<i>Wilcoxon signed rank test</i>	0,0104	Não significante
hsa-miR-516b-4395172	0,16	0,0313	<i>Wilcoxon signed rank test</i>	0,0106	Não significante

hsa-miR-518d-3p-4373248	0,17	0,0313	<i>Wilcoxon signed rank test</i>	0,0105	Não significante
hsa-miR-639-001583	0,17	0,0313	<i>Wilcoxon signed rank test</i>	0,0110	Não significante
hsa-miR-509-5p-4395346	0,63	0,0339	<i>One-sample T test</i>	0,0111	Não significante
hsa-miR-139-3p-4395424	1,67	0,0341	<i>One-sample T test</i>	0,0112	Não significante
hsa-miR-636-4395199	0,61	0,0343	<i>One-sample T test</i>	0,0113	Não significante
hsa-miR-423-5p-4395451	0,73	0,0353	<i>One-sample T test</i>	0,0114	Não significante
hsa-miR-373-4378073	0,56	0,0379	<i>One-sample T test</i>	0,0116	Não significante
hsa-miR-1201-002781	1,27	0,0382	<i>One-sample T test</i>	0,0117	Não significante
hsa-miR-221*-002096	0,47	0,0388	<i>One-sample T test</i>	0,0118	Não significante
hsa-miR-874-4395379	0,78	0,0406	<i>One-sample T test</i>	0,0119	Não significante
hsa-miR-370-4395386	0,65	0,041	<i>One-sample T test</i>	0,0120	Não significante
hsa-miR-662-001607	0,54	0,0413	<i>One-sample T test</i>	0,0121	Não significante
hsa-miR-504-4395195	0,54	0,0431	<i>One-sample T test</i>	0,0123	Não significante
hsa-miR-202-4395474	0,23	0,0438	<i>One-sample T test</i>	0,0124	Não significante
hsa-miR-9-4373285	2,27	0,0486	<i>One-sample T test</i>	0,0125	Não significante
hsa-miR-29b-1*-002165	0,54	0,0509	<i>One-sample T test</i>	0,0126	Não significante
hsa-miR-127-3p-4373147	0,61	0,0546	<i>One-sample T test</i>	0,0127	Não significante
hsa-miR-548b-5p-4395519	0,29	0,0564	<i>One-sample T test</i>	0,0129	Não significante
hsa-miR-130b-4373144	1,66	0,0573	<i>One-sample T test</i>	0,0130	Não significante
hsa-miR-411-4381013	0,61	0,0615	<i>One-sample T test</i>	0,0131	Não significante
hsa-miR-328-4373049	0,60	0,0625	<i>One-sample T test</i>	0,0132	Não significante
hsa-miR-1226*-002758	0,29	0,0625	<i>Wilcoxon signed rank test</i>	0,0140	Não significante
hsa-miR-331-3p-4373046	0,80	0,0625	<i>Wilcoxon signed rank test</i>	0,0133	Não significante
hsa-miR-485-3p-4378095	0,38	0,0625	<i>Wilcoxon signed rank test</i>	0,0134	Não significante
hsa-miR-517b-4373244	0,07	0,0625	<i>Wilcoxon signed rank test</i>	0,0136	Não significante

hsa-miR-625*-002432	0,51	0,0625	<i>Wilcoxon signed rank test</i>	0,0138	Não significante
hsa-miR-638-001582	0,37	0,0625	<i>Wilcoxon signed rank test</i>	0,0139	Não significante
hsa-miR-758-4395180	0,30	0,0625	<i>Wilcoxon signed rank test</i>	0,0137	Não significante
hsa-miR-24-2*-002441	1,85	0,063	<i>One-sample T test</i>	0,0141	Não significante
hsa-miR-361-3p-002116	0,80	0,0631	<i>One-sample T test</i>	0,0143	Não significante
hsa-miR-570-4395458	0,30	0,0643	<i>One-sample T test</i>	0,0144	Não significante
hsa-miR-484-4381032	0,77	0,0683	<i>One-sample T test</i>	0,0145	Não significante
hsa-miR-501-5p-4373226	2,31	0,0686	<i>One-sample T test</i>	0,0146	Não significante
hsa-miR-151-3p-002254	0,68	0,0703	<i>One-sample T test</i>	0,0147	Não significante
hsa-miR-449b-4381011	0,68	0,0722	<i>One-sample T test</i>	0,0148	Não significante
hsa-miR-1227-002769	0,74	0,078	<i>One-sample T test</i>	0,0150	Não significante
hsa-miR-103-4373158	1,47	0,0785	<i>One-sample T test</i>	0,0151	Não significante
hsa-miR-20b*-002311	0,62	0,0796	<i>One-sample T test</i>	0,0152	Não significante
hsa-miR-521-4373259	0,48	0,0813	<i>One-sample T test</i>	0,0153	Não significante
hsa-miR-424*-002309	2,10	0,0824	<i>One-sample T test</i>	0,0154	Não significante
hsa-miR-1270-002807	0,64	0,0857	<i>One-sample T test</i>	0,0155	Não significante
hsa-miR-450a-4395414	0,66	0,0865	<i>One-sample T test</i>	0,0157	Não significante
hsa-miR-136*-002100	0,56	0,0883	<i>One-sample T test</i>	0,0158	Não significante
hsa-miR-532-5p-4380928	1,99	0,0895	<i>One-sample T test</i>	0,0159	Não significante
hsa-miR-30a-5p-000417	0,83	0,0922	<i>One-sample T test</i>	0,0160	Não significante
hsa-miR-124-4373295	0,11	0,0938	<i>Wilcoxon signed rank test</i>	0,0161	Não significante
hsa-miR-144*-002148	1,96	0,0938	<i>Wilcoxon signed rank test</i>	0,0164	Não significante
hsa-miR-302a-4378070	0,30	0,0938	<i>Wilcoxon signed rank test</i>	0,0162	Não significante
hsa-miR-15b*-002173	2,54	0,0942	<i>One-sample T test</i>	0,0165	Não significante
hsa-miR-130b*-002114	1,81	0,0945	<i>One-sample T test</i>	0,0166	Não significante
hsa-miR-93*-002139	1,47	0,0948	<i>One-sample T test</i>	0,0167	Não significante
hsa-miR-487a-4378097	0,55	0,0954	<i>One-sample T test</i>	0,0168	Não significante

hsa-miR-132-4373143	1,35	0,0962	<i>One-sample T test</i>	0,0169	Não significante
hsa-miR-1301-002827	0,71	0,0975	<i>One-sample T test</i>	0,0171	Não significante
hsa-miR-425-4380926	1,34	0,0977	<i>One-sample T test</i>	0,0172	Não significante
hsa-miR-518e-4395506	0,55	0,0991	<i>One-sample T test</i>	0,0173	Não significante
hsa-miR-28-3p-4395557	1,31	0,0992	<i>One-sample T test</i>	0,0174	Não significante
hsa-miR-500-4395539	1,98	0,1004	<i>One-sample T test</i>	0,0175	Não significante
hsa-miR-9*-002231	2,50	0,1015	<i>One-sample T test</i>	0,0176	Não significante
hsa-miR-194-4373106	1,40	0,1019	<i>One-sample T test</i>	0,0178	Não significante
hsa-miR-362-5p-4378092	1,87	0,1021	<i>One-sample T test</i>	0,0179	Não significante
hsa-miR-22*-002301	1,52	0,1023	<i>One-sample T test</i>	0,0180	Não significante
hsa-miR-495-4381078	0,70	0,1045	<i>One-sample T test</i>	0,0181	Não significante
hsa-miR-199a-3p-4395415	0,75	0,1054	<i>One-sample T test</i>	0,0182	Não significante
hsa-miR-30c-4373060	1,30	0,1055	<i>One-sample T test</i>	0,0183	Não significante
hsa-miR-567-001534	0,63	0,1062	<i>One-sample T test</i>	0,0185	Não significante
hsa-miR-197-4373102	0,70	0,1069	<i>One-sample T test</i>	0,0186	Não significante
hsa-let-7a-4373169	1,62	0,1124	<i>One-sample T test</i>	0,0187	Não significante
hsa-miR-502-5p-4373227	2,02	0,1154	<i>One-sample T test</i>	0,0188	Não significante
hsa-miR-30b-4373290	1,28	0,1155	<i>One-sample T test</i>	0,0189	Não significante
hsa-miR-425*-002302	1,54	0,1181	<i>One-sample T test</i>	0,0190	Não significante
hsa-miR-320-4395388	0,86	0,1188	<i>One-sample T test</i>	0,0192	Não significante
hsa-miR-517a-4395513	0,60	0,1197	<i>One-sample T test</i>	0,0193	Não significante
hsa-miR-192-4373108	1,91	0,121	<i>One-sample T test</i>	0,0194	Não significante
hsa-miR-199a-5p-4373272	0,73	0,1232	<i>One-sample T test</i>	0,0195	Não significante
hsa-miR-222-4395387	1,22	0,1236	<i>One-sample T test</i>	0,0196	Não significante
hsa-miR-215-4373084	1,91	0,1238	<i>One-sample T test</i>	0,0197	Não significante

hsa-miR-623-001555	0,33	0,125	<i>Wilcoxon signed rank test</i>	0,0199	Não significante
hsa-miR-765-002643	0,13	0,125	<i>Wilcoxon signed rank test</i>	0,0200	Não significante
hsa-miR-451-4373360	5,75	0,1251	<i>One-sample T test</i>	0,0201	Não significante
hsa-miR-15b-4373122	1,49	0,1289	<i>One-sample T test</i>	0,0202	Não significante
hsa-miR-935-002178	0,56	0,1329	<i>One-sample T test</i>	0,0203	Não significante
hsa-miR-212-4373087	0,70	0,1367	<i>One-sample T test</i>	0,0204	Não significante
hsa-miR-34b-002102	0,77	0,143	<i>One-sample T test</i>	0,0206	Não significante
hsa-miR-30d*-002305	1,99	0,1436	<i>One-sample T test</i>	0,0207	Não significante
hsa-miR-660-4380925	1,62	0,1446	<i>One-sample T test</i>	0,0208	Não significante
hsa-miR-190b-002263	1,52	0,1455	<i>One-sample T test</i>	0,0209	Não significante
hsa-miR-454-4395434	1,55	0,1487	<i>One-sample T test</i>	0,0210	Não significante
hsa-miR-519d-4395514	3,56	0,1502	<i>One-sample T test</i>	0,0211	Não significante
hsa-miR-744-4395435	0,84	0,1521	<i>One-sample T test</i>	0,0213	Não significante
hsa-miR-142-5p-4395359	0,78	0,1523	<i>One-sample T test</i>	0,0214	Não significante
hsa-miR-345-4395297	1,80	0,1544	<i>One-sample T test</i>	0,0215	Não significante
hsa-miR-1274B-002884	0,37	0,1563	<i>Wilcoxon signed rank test</i>	0,0216	Não significante
hsa-miR-659-001514	0,39	0,1563	<i>Wilcoxon signed rank test</i>	0,0217	Não significante
hsa-miR-661-001606	0,39	0,1563	<i>Wilcoxon signed rank test</i>	0,0218	Não significante
hsa-miR-941-002183	1,16	0,1563	<i>Wilcoxon signed rank test</i>	0,0220	Não significante
hsa-miR-193a-5p-4395392	2,37	0,1581	<i>One-sample T test</i>	0,0221	Não significante
hsa-miR-200c-4395411	1,39	0,16	<i>One-sample T test</i>	0,0222	Não significante
hsa-miR-25-4373071	1,45	0,1605	<i>One-sample T test</i>	0,0223	Não significante
hsa-miR-130a-4373145	1,47	0,1631	<i>One-sample T test</i>	0,0224	Não significante
hsa-miR-886-3p-4395305	0,65	0,1643	<i>One-sample T test</i>	0,0225	Não significante
hsa-miR-382-4373019	0,71	0,1681	<i>One-sample T test</i>	0,0227	Não significante
hsa-miR-152-4395170	1,62	0,1747	<i>One-sample T test</i>	0,0228	Não significante

hsa-miR-106b*-002380	1,28	0,1753	<i>One-sample T test</i>	0,0229	Não significante
hsa-miR-28-5p-4373067	1,28	0,1806	<i>One-sample T test</i>	0,0230	Não significante
hsa-miR-361-5p-4373035	1,40	0,1823	<i>One-sample T test</i>	0,0231	Não significante
hsa-miR-30d-000420	0,88	0,1849	<i>One-sample T test</i>	0,0232	Não significante
hsa-miR-628-3p-002434	1,67	0,189	<i>One-sample T test</i>	0,0234	Não significante
hsa-miR-125a-3p-4395310	0,58	0,1913	<i>One-sample T test</i>	0,0235	Não significante
hsa-miR-33b-4395196	0,79	0,1939	<i>One-sample T test</i>	0,0236	Não significante
hsa-miR-889-4395313	0,71	0,1939	<i>One-sample T test</i>	0,0237	Não significante
hsa-miR-571-001613	0,73	0,194	<i>One-sample T test</i>	0,0238	Não significante
hsa-miR-29a-4395223	1,25	0,1959	<i>One-sample T test</i>	0,0239	Não significante
hsa-miR-139-5p-4395400	0,84	0,1977	<i>One-sample T test</i>	0,0241	Não significante
hsa-miR-340*-002259	1,46	0,1985	<i>One-sample T test</i>	0,0242	Não significante
hsa-miR-642-4380995	1,43	0,1994	<i>One-sample T test</i>	0,0243	Não significante
hsa-miR-491-5p-4381053	0,77	0,2029	<i>One-sample T test</i>	0,0244	Não significante
hsa-miR-191-4395410	1,38	0,2038	<i>One-sample T test</i>	0,0245	Não significante
hsa-miR-223*-002098	1,74	0,2069	<i>One-sample T test</i>	0,0246	Não significante
hsa-miR-502-3p-4395194	1,53	0,2081	<i>One-sample T test</i>	0,0248	Não significante
hsa-miR-193b-4395478	0,81	0,2104	<i>One-sample T test</i>	0,0249	Não significante
hsa-miR-1233-002768	0,51	0,2188	<i>Wilcoxon signed rank test</i>	0,0250	Não significante
hsa-miR-549-001511	1,12	0,2188	<i>Wilcoxon signed rank test</i>	0,0251	Não significante
mmu-let-7d*-001178	1,24	0,2188	<i>Wilcoxon signed rank test</i>	0,0252	Não significante
hsa-miR-411*-002238	0,77	0,2189	<i>One-sample T test</i>	0,0254	Não significante
hsa-miR-744*-002325	0,79	0,2189	<i>One-sample T test</i>	0,0255	Não significante
hsa-miR-98-4373009	1,61	0,2197	<i>One-sample T test</i>	0,0256	Não significante
hsa-miR-520a-3p-4373268	0,42	0,2216	<i>One-sample T test</i>	0,0257	Não significante

hsa-let-7c-4373167	1,28	0,2255	<i>One-sample T test</i>	0,0258	Não significante
hsa-miR-15a-4373123	1,31	0,2274	<i>One-sample T test</i>	0,0259	Não significante
hsa-miR-20a*-002437	1,71	0,2283	<i>One-sample T test</i>	0,0261	Não significante
hsa-let-7e-4395517	1,36	0,2303	<i>One-sample T test</i>	0,0262	Não significante
hsa-miR-30e-3p-000422	1,37	0,2308	<i>One-sample T test</i>	0,0263	Não significante
hsa-miR-27a*-002445	1,81	0,2309	<i>One-sample T test</i>	0,0264	Não significante
hsa-miR-93-4373302	1,52	0,2334	<i>One-sample T test</i>	0,0265	Não significante
hsa-miR-369-3p-4373032	0,52	0,2366	<i>One-sample T test</i>	0,0266	Não significante
hsa-miR-518f-4395499	0,70	0,2415	<i>One-sample T test</i>	0,0268	Não significante
hsa-miR-645-001597	0,74	0,2431	<i>One-sample T test</i>	0,0269	Não significante
hsa-miR-500-001046	1,38	0,2448	<i>One-sample T test</i>	0,0270	Não significante
hsa-miR-223-4395406	1,42	0,2493	<i>One-sample T test</i>	0,0271	Não significante
hsa-miR-326-4373050	0,33	0,25	<i>Wilcoxon signed rank test</i>	0,0272	Não significante
hsa-miR-520g-4373257	0,24	0,25	<i>Wilcoxon signed rank test</i>	0,0273	Não significante
hsa-miR-213-000516	1,19	0,2505	<i>One-sample T test</i>	0,0275	Não significante
hsa-miR-106b-4373155	1,32	0,2514	<i>One-sample T test</i>	0,0276	Não significante
hsa-miR-432-001026	0,74	0,2564	<i>One-sample T test</i>	0,0277	Não significante
hsa-miR-23b-4373073	1,71	0,2611	<i>One-sample T test</i>	0,0278	Não significante
hsa-miR-875-5p-002203	1,37	0,2614	<i>One-sample T test</i>	0,0279	Não significante
hsa-miR-34c-5p-4373036	1,33	0,2742	<i>One-sample T test</i>	0,0280	Não significante
hsa-miR-221-4373077	1,37	0,2743	<i>One-sample T test</i>	0,0282	Não significante
hsa-miR-377-4373025	0,76	0,2767	<i>One-sample T test</i>	0,0283	Não significante
hsa-miR-301b-4395503	1,30	0,2848	<i>One-sample T test</i>	0,0284	Não significante
hsa-miR-590-5p-4395176	0,76	0,2868	<i>One-sample T test</i>	0,0285	Não significante
hsa-miR-200b-4395362	1,32	0,2998	<i>One-sample T test</i>	0,0286	Não significante
hsa-miR-628-5p-4395544	1,33	0,304	<i>One-sample T test</i>	0,0287	Não significante
hsa-miR-199b-5p-	0,78	0,3068	<i>One-sample T test</i>	0,0289	Não significante

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hsa-miR-769-5p-001998	1,14	0,3076	<i>One-sample T test</i>	0,0290	Não significante
hsa-miR-100-4373160	1,27	0,3084	<i>One-sample T test</i>	0,0291	Não significante
hsa-miR-1274A-002883	0,42	0,3125	<i>Wilcoxon signed rank test</i>	0,0293	Não significante
hsa-miR-519a-4395526	0,37	0,3125	<i>Wilcoxon signed rank test</i>	0,0292	Não significante
hsa-miR-26a-1*-002443	0,76	0,3203	<i>One-sample T test</i>	0,0294	Não significante
hsa-miR-29b-4373288	0,77	0,3204	<i>One-sample T test</i>	0,0296	Não significante
hsa-miR-181c-4373115	0,90	0,3219	<i>One-sample T test</i>	0,0297	Não significante
hsa-miR-1262-002852	1,40	0,3245	<i>One-sample T test</i>	0,0298	Não significante
hsa-miR-128-4395327	1,32	0,3253	<i>One-sample T test</i>	0,0299	Não significante
hsa-let-7g-4395393	1,23	0,3256	<i>One-sample T test</i>	0,0300	Não significante
hsa-miR-101-4395364	0,78	0,3356	<i>One-sample T test</i>	0,0301	Não significante
hsa-miR-1243-002854	0,63	0,3356	<i>One-sample T test</i>	0,0303	Não significante
hsa-miR-625-4395542	0,83	0,3372	<i>One-sample T test</i>	0,0304	Não significante
hsa-miR-323-3p-4395338	0,86	0,3415	<i>One-sample T test</i>	0,0305	Não significante
dme-miR-7-000268	1,33	0,342	<i>One-sample T test</i>	0,0306	Não significante
rno-miR-7*-001338	1,52	0,3427	<i>One-sample T test</i>	0,0307	Não significante
hsa-miR-449a-4373207	0,73	0,3428	<i>One-sample T test</i>	0,0308	Não significante
hsa-miR-18b-4395328	0,82	0,3447	<i>One-sample T test</i>	0,0310	Não significante
hsa-miR-23a-4373074	1,38	0,3454	<i>One-sample T test</i>	0,0311	Não significante
hsa-miR-19a-4373099	0,79	0,346	<i>One-sample T test</i>	0,0312	Não significante
hsa-miR-1249-002868	1,71	0,3466	<i>One-sample T test</i>	0,0313	Não significante
hsa-miR-16-4373121	1,27	0,348	<i>One-sample T test</i>	0,0314	Não significante
hsa-miR-589-4395520	0,80	0,3492	<i>One-sample T test</i>	0,0315	Não significante
hsa-miR-27b*-002174	1,24	0,3495	<i>One-sample T test</i>	0,0317	Não significante
hsa-miR-24-4373072	1,22	0,3506	<i>One-sample T test</i>	0,0318	Não significante
hsa-miR-29c-4395171	1,46	0,353	<i>One-sample T test</i>	0,0319	Não significante

hsa-miR-27b-4373068	1,35	0,3539	<i>One-sample T test</i>	0,0320	Não significativa
hsa-miR-338-3p-4395363	1,37	0,3563	<i>One-sample T test</i>	0,0321	Não significativa
hsa-miR-196b-4395326	1,27	0,3569	<i>One-sample T test</i>	0,0322	Não significativa
hsa-miR-505-4395200	1,52	0,3571	<i>One-sample T test</i>	0,0324	Não significativa
hsa-miR-624-001557	0,78	0,3591	<i>One-sample T test</i>	0,0325	Não significativa
hsa-miR-146a-4373132	0,88	0,3612	<i>One-sample T test</i>	0,0326	Não significativa
hsa-miR-342-3p-4395371	1,11	0,3614	<i>One-sample T test</i>	0,0327	Não significativa
hsa-miR-150-4373127	0,87	0,3642	<i>One-sample T test</i>	0,0328	Não significativa
hsa-miR-142-3p-4373136	0,81	0,3646	<i>One-sample T test</i>	0,0329	Não significativa
hsa-miR-26a-4395166	0,84	0,3648	<i>One-sample T test</i>	0,0331	Não significativa
hsa-let-7d-4395394	1,23	0,3688	<i>One-sample T test</i>	0,0332	Não significativa
hsa-miR-15a*-002419	1,33	0,3702	<i>One-sample T test</i>	0,0333	Não significativa
hsa-miR-140-5p-4373374	1,22	0,3823	<i>One-sample T test</i>	0,0334	Não significativa
hsa-miR-95-4373011	1,20	0,384	<i>One-sample T test</i>	0,0335	Não significativa
hsa-miR-21-4373090	1,25	0,3858	<i>One-sample T test</i>	0,0336	Não significativa
hsa-miR-140-3p-4395345	0,88	0,387	<i>One-sample T test</i>	0,0338	Não significativa
hsa-miR-26a-2*-002115	1,27	0,3907	<i>One-sample T test</i>	0,0339	Não significativa
hsa-miR-539-4378103	0,82	0,3935	<i>One-sample T test</i>	0,0340	Não significativa
hsa-miR-342-5p-4395258	1,13	0,4069	<i>One-sample T test</i>	0,0341	Não significativa
hsa-miR-339-3p-4395295	1,14	0,415	<i>One-sample T test</i>	0,0342	Não significativa
hsa-miR-362-3p-4395228	1,22	0,4167	<i>One-sample T test</i>	0,0343	Não significativa
hsa-miR-422a-4395408	0,78	0,4204	<i>One-sample T test</i>	0,0345	Não significativa
hsa-miR-590-3P-002677	1,50	0,4214	<i>One-sample T test</i>	0,0346	Não significativa
hsa-let-7f-4373164	1,27	0,4226	<i>One-sample T test</i>	0,0347	Não significativa
hsa-miR-609-001573	0,73	0,4226	<i>One-sample T test</i>	0,0348	Não significativa
hsa-miR-21*-002438	1,32	0,4244	<i>One-sample T test</i>	0,0349	Não significativa
hsa-miR-195-4373105	1,20	0,4253	<i>One-sample T test</i>	0,0350	Não significativa

hsa-let-7b-4395446	1,24	0,4329	<i>One-sample T test</i>	0,0352	Não significativa
hsa-miR-20b-4373263	1,17	0,4349	<i>One-sample T test</i>	0,0353	Não significativa
hsa-miR-146b-5p-4373178	1,23	0,4371	<i>One-sample T test</i>	0,0354	Não significativa
hsa-miR-1197-002810	0,26	0,4375	<i>Wilcoxon signed rank test</i>	0,0361	Não significativa
hsa-miR-1276-002843	0,45	0,4375	<i>Wilcoxon signed rank test</i>	0,0362	Não significativa
hsa-miR-1303-002792	0,42	0,4375	<i>Wilcoxon signed rank test</i>	0,0363	Não significativa
hsa-miR-302c-4378072	0,27	0,4375	<i>Wilcoxon signed rank test</i>	0,0360	Não significativa
hsa-miR-365-4373194	1,10	0,4375	<i>Wilcoxon signed rank test</i>	0,0355	Não significativa
hsa-miR-515-5p-4373242	0,47	0,4375	<i>Wilcoxon signed rank test</i>	0,0356	Não significativa
hsa-miR-545-4395378	0,42	0,4375	<i>Wilcoxon signed rank test</i>	0,0357	Não significativa
hsa-miR-566-001533	0,72	0,4375	<i>Wilcoxon signed rank test</i>	0,0364	Não significativa
hsa-miR-618-4380996	0,31	0,4375	<i>Wilcoxon signed rank test</i>	0,0359	Não significativa
hsa-miR-629-001562	0,85	0,4375	<i>Wilcoxon signed rank test</i>	0,0366	Não significativa
hsa-miR-643-001594	0,23	0,4375	<i>Wilcoxon signed rank test</i>	0,0367	Não significativa
hsa-miR-663B-002857	0,49	0,4375	<i>Wilcoxon signed rank test</i>	0,0368	Não significativa
hsa-miR-668-001992	0,19	0,4375	<i>Wilcoxon signed rank test</i>	0,0369	Não significativa
hsa-miR-222*-002097	0,83	0,4387	<i>One-sample T test</i>	0,0370	Não significativa
hsa-miR-324-5p-4373052	1,17	0,4428	<i>One-sample T test</i>	0,0371	Não significativa
hsa-miR-324-3p-4395272	0,89	0,4484	<i>One-sample T test</i>	0,0373	Não significativa
hsa-miR-525-3p-4395496	0,77	0,4561	<i>One-sample T test</i>	0,0374	Não significativa
hsa-miR-629-4395547	0,87	0,4576	<i>One-sample T test</i>	0,0375	Não significativa
hsa-miR-576-3p-4395462	0,85	0,4628	<i>One-sample T test</i>	0,0376	Não significativa
hsa-miR-330-5p-4395341	0,70	0,463	<i>One-sample T test</i>	0,0377	Não significativa
hsa-miR-185-4395382	1,17	0,4651	<i>One-sample T test</i>	0,0379	Não significativa
hsa-miR-205-4373093	2,94	0,4732	<i>One-sample T test</i>	0,0380	Não significativa
hsa-miR-204-4373094	1,34	0,4886	<i>One-sample T test</i>	0,0381	Não significativa

hsa-miR-616-001589	0,91	0,4985	<i>One-sample T test</i>	0,0382	Não significante
hsa-miR-99a-4373008	1,15	0,5003	<i>One-sample T test</i>	0,0383	Não significante
hsa-miR-186-4395396	1,14	0,5026	<i>One-sample T test</i>	0,0384	Não significante
hsa-miR-340-4395369	1,19	0,5052	<i>One-sample T test</i>	0,0386	Não significante
hsa-miR-376a-4373026	0,85	0,5116	<i>One-sample T test</i>	0,0387	Não significante
hsa-let-7g*-002118	0,84	0,5202	<i>One-sample T test</i>	0,0388	Não significante
hsa-miR-339-5p-4395368	0,88	0,5236	<i>One-sample T test</i>	0,0389	Não significante
hsa-miR-598-4395179	0,88	0,5262	<i>One-sample T test</i>	0,0390	Não significante
hsa-miR-151-5P-002642	0,88	0,5271	<i>One-sample T test</i>	0,0391	Não significante
hsa-miR-543-002376	1,15	0,5279	<i>One-sample T test</i>	0,0393	Não significante
hsa-miR-210-4373089	1,12	0,5309	<i>One-sample T test</i>	0,0394	Não significante
hsa-miR-17-4395419	1,12	0,5313	<i>One-sample T test</i>	0,0395	Não significante
hsa-miR-708-4395452	1,42	0,5418	<i>One-sample T test</i>	0,0396	Não significante
hsa-miR-548J-002783	0,81	0,5542	<i>One-sample T test</i>	0,0397	Não significante
hsa-miR-31-4395390	0,89	0,5555	<i>One-sample T test</i>	0,0398	Não significante
hsa-miR-424-4373201	0,88	0,556	<i>One-sample T test</i>	0,0400	Não significante
hsa-miR-125b-4373148	0,72	0,5625	<i>Wilcoxon signed rank test</i>	0,0401	Não significante
hsa-miR-181a-2*-002317	1,01	0,5625	<i>Wilcoxon signed rank test</i>	0,0403	Não significante
hsa-miR-335*-002185	1,04	0,5625	<i>Wilcoxon signed rank test</i>	0,0404	Não significante
hsa-miR-561-4380938	0,27	0,5625	<i>Wilcoxon signed rank test</i>	0,0402	Não significante
hsa-miR-572-001614	0,46	0,5625	<i>Wilcoxon signed rank test</i>	0,0405	Não significante
hsa-miR-648-001601	0,49	0,5625	<i>Wilcoxon signed rank test</i>	0,0407	Não significante
hsa-miR-505*-002087	1,07	0,5646	<i>One-sample T test</i>	0,0408	Não significante
hsa-miR-301a-4373064	1,17	0,5688	<i>One-sample T test</i>	0,0409	Não significante
hsa-miR-148a-4373130	0,88	0,5727	<i>One-sample T test</i>	0,0410	Não significante
hsa-miR-126-4395339	0,91	0,579	<i>One-sample T test</i>	0,0411	Não significante
hsa-miR-579-4395509	0,89	0,5816	<i>One-sample T test</i>	0,0412	Não significante

hsa-miR-652-4395463	1,18	0,5824	<i>One-sample T test</i>	0,0414	Não significante
hsa-miR-106a-4395280	1,10	0,5868	<i>One-sample T test</i>	0,0415	Não significante
hsa-miR-367-4373034	0,81	0,6006	<i>One-sample T test</i>	0,0416	Não significante
hsa-miR-33a*-002136	0,90	0,6024	<i>One-sample T test</i>	0,0417	Não significante
hsa-miR-1248-002870	0,89	0,6033	<i>One-sample T test</i>	0,0418	Não significante
hsa-miR-34a*-002316	1,27	0,6048	<i>One-sample T test</i>	0,0419	Não significante
hsa-miR-29a*-002447	1,17	0,6207	<i>One-sample T test</i>	0,0421	Não significante
hsa-miR-107-4373154	1,05	0,6237	<i>One-sample T test</i>	0,0422	Não significante
hsa-miR-330-3p-4373047	0,97	0,6245	<i>One-sample T test</i>	0,0423	Não significante
hsa-miR-516a-5p-4395527	0,11	0,625	<i>Wilcoxon signed rank test</i>	0,0424	Não significante
hsa-miR-606-001569	0,20	0,625	<i>Wilcoxon signed rank test</i>	0,0425	Não significante
hsa-miR-576-5p-4395461	0,91	0,6335	<i>One-sample T test</i>	0,0426	Não significante
hsa-miR-450b-5p-4395318	0,90	0,6347	<i>One-sample T test</i>	0,0428	Não significante
hsa-miR-16-1*-002420	1,16	0,65	<i>One-sample T test</i>	0,0429	Não significante
hsa-miR-302b-4378071	0,85	0,6607	<i>One-sample T test</i>	0,0430	Não significante
hsa-miR-378-000567	0,93	0,6686	<i>One-sample T test</i>	0,0431	Não significante
hsa-miR-1255A-002805	1,18	0,6722	<i>One-sample T test</i>	0,0432	Não significante
hsa-miR-886-5p-4395304	1,09	0,6813	<i>One-sample T test</i>	0,0433	Não significante
hsa-miR-145*-002149	0,67	0,6875	<i>Wilcoxon signed rank test</i>	0,0435	Não significante
hsa-miR-1271-002779	0,94	0,704	<i>One-sample T test</i>	0,0436	Não significante
hsa-miR-409-5p-4395442	0,92	0,7135	<i>One-sample T test</i>	0,0437	Não significante
hsa-miR-556-3p-4395456	0,86	0,7149	<i>One-sample T test</i>	0,0438	Não significante
hsa-miR-126*-000451	0,90	0,717	<i>One-sample T test</i>	0,0439	Não significante
hsa-miR-574-3p-4395460	0,91	0,7226	<i>One-sample T test</i>	0,0440	Não significante
hsa-miR-30a-3p-000416	0,94	0,7246	<i>One-sample T test</i>	0,0442	Não significante

hsa-miR-582-3p-4395510	0,89	0,7302	<i>One-sample T test</i>	0,0443	Não significativa
hsa-miR-532-3p-4395466	1,08	0,7326	<i>One-sample T test</i>	0,0444	Não significativa
hsa-miR-493-4395475	1,07	0,7458	<i>One-sample T test</i>	0,0445	Não significativa
hsa-miR-19b-1*-002425	0,91	0,7465	<i>One-sample T test</i>	0,0446	Não significativa
hsa-miR-31*-002113	0,90	0,7506	<i>One-sample T test</i>	0,0449	Não significativa
hsa-miR-431-4395173	1,13	0,7506	<i>One-sample T test</i>	0,0447	Não significativa
hsa-miR-501-3p-4395546	1,14	0,7622	<i>One-sample T test</i>	0,0450	Não significativa
hsa-miR-26b-4395167	1,08	0,7675	<i>One-sample T test</i>	0,0451	Não significativa
hsa-miR-589-001543	1,07	0,779	<i>One-sample T test</i>	0,0452	Não significativa
hsa-miR-26b*-002444	1,08	0,7808	<i>One-sample T test</i>	0,0453	Não significativa
hsa-miR-377*-002128	1,05	0,7898	<i>One-sample T test</i>	0,0454	Não significativa
hsa-miR-92a-4395169	0,95	0,7981	<i>One-sample T test</i>	0,0456	Não significativa
hsa-miR-337-3p-002157	0,96	0,8044	<i>One-sample T test</i>	0,0457	Não significativa
hsa-miR-1291-002838	0,94	0,8052	<i>One-sample T test</i>	0,0459	Não significativa
hsa-miR-491-3p-4395471	1,09	0,8052	<i>One-sample T test</i>	0,0458	Não significativa
hsa-miR-1180-002847	1,04	0,8098	<i>One-sample T test</i>	0,0460	Não significativa
hsa-miR-154*-000478	0,85	0,8125	<i>Wilcoxon signed rank test</i>	0,0461	Não significativa
hsa-miR-146b-3p-4395472	1,04	0,8184	<i>One-sample T test</i>	0,0463	Não significativa
hsa-miR-17*-002421	1,09	0,8193	<i>One-sample T test</i>	0,0464	Não significativa
hsa-miR-200a-4378069	1,08	0,8276	<i>One-sample T test</i>	0,0465	Não significativa
hsa-miR-148b-4373129	1,04	0,8438	<i>Wilcoxon signed rank test</i>	0,0466	Não significativa
hsa-miR-203-4373095	0,67	0,8438	<i>Wilcoxon signed rank test</i>	0,0472	Não significativa
hsa-miR-216b-4395437	0,96	0,8438	<i>Wilcoxon signed rank test</i>	0,0467	Não significativa
hsa-miR-34a-4395168	0,94	0,8438	<i>Wilcoxon signed rank test</i>	0,0468	Não significativa
hsa-miR-486-5p-4378096	0,90	0,8438	<i>Wilcoxon signed rank test</i>	0,0470	Não significativa
hsa-miR-518a-3p-	0,87	0,8438	<i>Wilcoxon signed rank test</i>	0,0471	Não significativa

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hsa-miR-885-5p-4395407	0,77	0,8438	<i>Wilcoxon signed rank test</i>	0,0473	Não significante
hsa-miR-145-4395389	1,06	0,8469	<i>One-sample T test</i>	0,0474	Não significante
hsa-miR-335-4373045	1,04	0,8573	<i>One-sample T test</i>	0,0475	Não significante
hsa-miR-542-5p-4395351	0,65	0,875	<i>Wilcoxon signed rank test</i>	0,0477	Não significante
hsa-miR-374a-4373028	1,03	0,8991	<i>One-sample T test</i>	0,0478	Não significante
hsa-miR-20a-4373286	1,03	0,8998	<i>One-sample T test</i>	0,0479	Não significante
hsa-miR-143-4395360	1,03	0,9044	<i>One-sample T test</i>	0,0480	Não significante
hsa-miR-455-3p-4395355	0,97	0,9106	<i>One-sample T test</i>	0,0481	Não significante
hsa-miR-654-5p-4381014	0,96	0,9141	<i>One-sample T test</i>	0,0482	Não significante
hsa-miR-671-3p-4395433	1,03	0,9147	<i>One-sample T test</i>	0,0484	Não significante
hsa-miR-141-4373137	0,97	0,9171	<i>One-sample T test</i>	0,0485	Não significante
hsa-miR-363-4378090	1,02	0,9222	<i>One-sample T test</i>	0,0486	Não significante
hsa-miR-27a-4373287	1,02	0,9307	<i>One-sample T test</i>	0,0487	Não significante
hsa-miR-10a-4373153	1,03	0,9436	<i>One-sample T test</i>	0,0488	Não significante
hsa-miR-374b-4381045	0,99	0,9474	<i>One-sample T test</i>	0,0489	Não significante
hsa-miR-517c-4373264	1,02	0,9574	<i>One-sample T test</i>	0,0491	Não significante
hsa-miR-18a-4395533	0,99	0,9605	<i>One-sample T test</i>	0,0492	Não significante
hsa-miR-29b-2*-002166	0,99	0,9724	<i>One-sample T test</i>	0,0493	Não significante
hsa-miR-626-001559	0,98	0,9843	<i>One-sample T test</i>	0,0494	Não significante
hsa-miR-19b-4373098	1,00	0,9937	<i>One-sample T test</i>	0,0495	Não significante
hsa-miR-1267-002885	0,44	1,0	<i>Wilcoxon signed rank test</i>	0,0500	Não significante
hsa-miR-214-4395417	0,51	1,0	<i>Wilcoxon signed rank test</i>	0,0496	Não significante
hsa-miR-331-5p-4395344	0,82	1,0	<i>Wilcoxon signed rank test</i>	0,0498	Não significante
hsa-miR-486-3p-4395204	0,86	1,0	<i>Wilcoxon signed rank test</i>	0,0499	Não significante

Material Suplementar 2. Genes preditos pelo programa *TargetScanHuman* v. 5.2 como possíveis alvos dos microRNAs diferencialmente expressos. São apresentadas informações sobre a localização cromossômica dos genes e sua expressão (+) ou ausência de expressão (-) em células sanguíneas.

A. Informações sobre os genes-alvo preditos.

Símbolo do gene	Símbolo oficial do gene	Nome do gene	Cromossomo	Localização cromossômica	Expressão em células sanguíneas
7A5	MACC1	metastasis associated in colon cancer 1	7	7p21.1	-
AAK1	AAK1	AP2 associated kinase 1	2	2p14	+
ABCB10	ABCB10	ATP-binding cassette, sub-family B (MDR/TAP), member 10	1	1q42.13	+
ABCF3	ABCF3	ATP-binding cassette, sub-family F (GCN20), member 3	3	3q27.1	+
ABCG4	ABCG4	ATP-binding cassette, sub-family G (WHITE), member 4	11	11q23.3	+
ABHD2	ABHD2	abhydrolase domain containing 2	15	15q26.1	+
ABI2	ABI2	abl interactor 2	2	2q33	+
ABL2	ABL2	v-abl Abelson murine leukemia viral oncogene homolog 2 (arg, Abelson-related gene)	1	1q25.2	+
ACADL	ACADL	acyl-Coenzyme A dehydrogenase, long chain	2	2q34-q35	+
ACAT2	ACAT2	acetyl-Coenzyme A acetyltransferase 2 (acetoacetyl Coenzyme A thiolase)	6	6q25.3	+
ACBD3	ACBD3	acyl-Coenzyme A binding domain containing 3	1	1q42.12	+
ACCN2	ACCN2	amiloride-sensitive cation channel 2, neuronal	12	12q12	+

ACPP	ACPP	acid phosphatase, prostate	3	3q21-q23	+
ACSL3	ACSL3	acyl-CoA synthetase long-chain family member 3	2	2q34-q35	+
ACSL4	ACSL4	acyl-CoA synthetase long-chain family member 4	X	Xq22.3-q23	+
ACTC1	ACTC1	actin, alpha, cardiac muscle 1	15	15q11-q14	+
ACTN1	ACTN1	actinin, alpha 1	14	14q24.1-q24.2 14q24 14q22-q24	+
ACTN4	ACTN4	actinin, alpha 4	19	19q13	+
ACTR5	ACTR5	ARP5 actin-related protein 5 homolog (yeast)	20	20q11.23	+
ACVR1C	ACVR1C	activin A receptor, type IC	2	2q24.1	+
ACVR2A	ACVR2A	activin A receptor, type IIA	2	2q22.3	+
ACVR2B	ACVR2B	activin A receptor, type IIB	3	3p22	+
ADAM11	ADAM11	ADAM metalloproteinase domain 11	17	17q21.3	+
ADAM12	ADAM12	ADAM metalloproteinase domain 12 (meltrin alpha)	10	10q26.3	+
ADAMTS1	ADAMTS1	ADAM metalloproteinase with thrombospondin type 1 motif, 1	21	21q21.2	+
ADAMTS17	ADAMTS17	ADAM metalloproteinase with thrombospondin type 1 motif, 17	15	15q24	+
ADAMTS6	ADAMTS6	ADAM metalloproteinase with thrombospondin type 1 motif, 6	5	5q12	+
ADAMTSL1	ADAMTSL1	ADAMTS-like 1	9	9p21.3	+
ADAT2	ADAT2	adenosine deaminase, tRNA-specific 2	6	6q24.2	+
ADCY9	ADCY9	adenylate cyclase 9	16	16p13.3	+
ADCYAP1	ADCYAP1	adenylate cyclase activating polypeptide 1 (pituitary)	18	18p11	+
ADD3	ADD3	adducin 3 (gamma)	10	10q25.2	+
ADIPOR1	ADIPOR1	adiponectin receptor 1	1	1p36.13-q41	+
ADIPOR2	ADIPOR2	adiponectin receptor 2	12	12p13.31	+
ADO	ADO	2-aminoethanethiol (cysteamine) dioxygenase	10	10q21.3	+

ADPRH	ADPRH	ADP-ribosylarginine hydrolase	3	3q13.31-q13.33	+
ADRBK2	ADRBK2	adrenergic, beta, receptor kinase 2	22	22q11 22q12.1	+
AFAP1	AFAP1	actin filament associated protein 1	4	4p16	+
AFF1	AFF1	AF4/FMR2 family, member 1	4	4q21	+
AFF2	AFF2	AF4/FMR2 family, member 2	X	Xq28	+
AFF3	AFF3	AF4/FMR2 family, member 3	2	2q11.2-q12	+
AFF4	AFF4	AF4/FMR2 family, member 4	5	5q31	+
AFTPH	AFTPH	aftiphilin	2	2p14	+
AGPAT1	AGPAT1	1-acylglycerol-3-phosphate O-acyltransferase 1 (lysophosphatidic acid acyltransferase, alpha)	6	6p21.3	+
AGPAT4	AGPAT4	1-acylglycerol-3-phosphate O-acyltransferase 4 (lysophosphatidic acid acyltransferase, delta)	6	6q26	+
AHCTF1	AHCTF1	AT hook containing transcription factor 1	1	1q44	+
AHCYL2	AHCYL2	adenosylhomocysteinase-like 2	7	7q32.1	+
AHI1	AHI1	Abelson helper integration site 1	6	6q23.3	+
AHR	AHR	aryl hydrocarbon receptor	7	7p15	+
AJAP1	AJAP1	adherens junction associated protein 1	1	1p36.32	+
AKAP13	AKAP13	A kinase (PRKA) anchor protein 13	15	15q24-q25	+
AKAP2	AKAP2	A kinase (PRKA) anchor protein 2	9	9q31.3	+
AKAP5	AKAP5	A kinase (PRKA) anchor protein 5	14	14q21-q24	+
AKIRIN1	AKIRIN1	akirin 1	1	1p34.3	+
AKT2	AKT2	v-akt murine thymoma viral oncogene homolog 2	19	19q13.1-q13.2	+
AKT3	AKT3	v-akt murine thymoma viral oncogene homolog 3 (protein kinase B, gamma)	1	1q44	+
ALPK1	ALPK1	alpha-kinase 1	4	4q25	+
ALPL	ALPL	alkaline phosphatase, liver/bone/kidney	1	1p36.12	+
ALS2CR13	FAM117B	amyotrophic lateral sclerosis 2 (juvenile) chromosome region, candidate 13	2	2q33.2	+

ALS2CR4	ALS2CR4	amyotrophic lateral sclerosis 2 (juvenile) chromosome region, candidate 4	2	-	+
ALX3	ALX3	aristaless-like homeobox 3	1	1p13.3	+
AMMECR1	AMMECR1	Alport syndrome, mental retardation, midface hypoplasia and elliptocytosis chromosomal region, gene 1	X	Xq22.3	+
ANAPC4	ANAPC4	anaphase promoting complex subunit 4	4	4p15.2	+
ANGPT1	ANGPT1	angiopoietin 1	8	8q23.1	+
ANGPT2	ANGPT2	angiopoietin 2	8	8p23.1	+
ANGPTL4	ANGPTL4	angiopoietin-like 4	19	19p13.3	+
ANK2	ANK2	ankyrin 2, neuronal	4	4q25-q27	+
ANKFY1	ANKFY1	ankyrin repeat and FYVE domain containing 1	17	17p13.3	+
ANKH	ANKH	ankylosis, progressive homolog (mouse)	5	5p15.1	+
ANKHD1	ANKHD1	ankyrin repeat and KH domain containing 1	5	5q31.3	+
ANKRD12	ANKRD12	ankyrin repeat domain 12	18	18p11.22	+
ANKRD13A	ANKRD13A	ankyrin repeat domain 13A	12	12q24.11	+
ANKRD13C	ANKRD13C	ankyrin repeat domain 13C	1	1p32.3-p31.3	+
ANKRD27	ANKRD27	ankyrin repeat domain 27 (VPS9 domain)	19	19q13.11	+
ANKRD28	ANKRD28	ankyrin repeat domain 28	3	3p25.1	+
ANKRD34A	ANKRD34A	ankyrin repeat domain 34A	1	1q21.1	+
ANKRD42	ANKRD42	ankyrin repeat domain 42	11	11q14.1	-
ANKRD50	ANKRD50	ankyrin repeat domain 50	4	4q28.1	+
ANKRD52	ANKRD52	ankyrin repeat domain 52	12	12q13.3	+
ANKS1B	ANKS1B	ankyrin repeat and sterile alpha motif domain containing 1B	12	12q23.1	+
ANP32E	ANP32E	acidic (leucine-rich) nuclear phosphoprotein 32 family, member E	1	1q21.2	+
ANTXR1	ANTXR1	anthrax toxin receptor 1	2	2p13.1	+

ANXA4	ANXA4	annexin A4	2	2p13	+
ANXA7	ANXA7	annexin A7	10	10q22.2	+
AOF1	KDM1B	amine oxidase (flavin containing) domain 1	6	6p22.3	+
AP1G1	AP1G1	adaptor-related protein complex 1, gamma 1 subunit	16	16q23	+
AP1S2	AP1S2	adaptor-related protein complex 1, sigma 2 subunit	X	Xp22.2	+
AP1S3	AP1S3	adaptor-related protein complex 1, sigma 3 subunit	2	2q36.1	+
AP2M1	AP2M1	adaptor-related protein complex 2, mu 1 subunit	3	3q28	+
APBB2	APBB2	amyloid beta (A4) precursor protein-binding, family B, member 2 (Fe65-like)	4	4p13	+
API5	API5	apoptosis inhibitor 5	11	11p11.2	+
APLN	APLN	apelin, AGTRL1 ligand	X	Xq25	+
APLNR	APLNR	apelin receptor	11	11q12	+
APOM	APOM	apolipoprotein M	6	6p21.33	+
APPL2	APPL2	adaptor protein, phosphotyrosine interaction, PH domain and leucine zipper containing 2	12	12q24.1	+
AQP2	AQP2	aquaporin 2 (collecting duct)	12	12q12-q13	+
ARC	ARC	activity-regulated cytoskeleton-associated protein	8	8q24.3	+
ARCN1	ARCN1	archain 1	11	11q23.3	+
ARF1	ARF1	ADP-ribosylation factor 1	1	1q42	+
ARF3	ARF3	ADP-ribosylation factor 3	12	12q13	+
ARFGAP2	ARFGAP2	ADP-ribosylation factor GTPase activating protein 2	11	11p11.2-p11.12	+
ARHGAP1	ARHGAP1	Rho GTPase activating protein 1	11	11p11.2	+
ARHGAP11A	ARHGAP11A	Rho GTPase activating protein 11A	15	15q13.2	+
ARHGAP17	ARHGAP17	Rho GTPase activating protein 17	16	16p12.1	+
ARHGAP26	ARHGAP26	Rho GTPase activating protein 26	5	5q31	+
ARHGAP30	ARHGAP30	Rho GTPase activating protein 30	1	1q23.3	+
ARHGDI A	ARHGDI A	Rho GDP dissociation inhibitor (GDI) alpha	17	17q25.3	+

ARHGEF10	ARHGEF10	Rho guanine nucleotide exchange factor (GEF) 10	8	8p23	+
ARHGEF12	ARHGEF12	Rho guanine nucleotide exchange factor (GEF) 12	11	11q23.3	+
ARHGEF15	ARHGEF15	Rho guanine nucleotide exchange factor (GEF) 15	17	17p13.1	+
ARHGEF3	ARHGEF3	Rho guanine nucleotide exchange factor (GEF) 3	3	3p21-p13	+
ARHGEF4	ARHGEF4	Rho guanine nucleotide exchange factor (GEF) 4	2	2q22	+
ARHGEF7	ARHGEF7	Rho guanine nucleotide exchange factor (GEF) 7	13	13q34	+
ARHGEF9	ARHGEF9	Cdc42 guanine nucleotide exchange factor (GEF) 9	X	Xq11.1	+
ARID1A	ARID1A	AT rich interactive domain 1A (SWI- like)	1	1p35.3	+
ARID1B	ARID1B	AT rich interactive domain 1B (SWI1-like)	6	6q25.1	+
ARID2	ARID2	AT rich interactive domain 2 (ARID, RFX-like)	12	12q12	+
ARL1	ARL1	ADP-ribosylation factor-like 1	12	12q23.2	+
ARL3	ARL3	ADP-ribosylation factor-like 3	10	10q23.3	+
ARL4C	ARL4C	ADP-ribosylation factor-like 4C	2	2q37.1	+
ARMC10	ARMC10	armadillo repeat containing 10	7	7q22.1	+
ARMC8	ARMC8	armadillo repeat containing 8	3	3q22.3	+
ARMCX3	ARMCX3	armadillo repeat containing, X-linked 3	X	Xq21.33-q22.2	+
ARNT2	ARNT2	aryl-hydrocarbon receptor nuclear translocator 2	15	15q24	+
ARPP-21	ARPP21	cAMP-regulated phosphoprotein, 21kDa	3	3p22.3	-
ARRDC3	ARRDC3	arrestin domain containing 3	5	5q14.3	+
ARSB	ARSB	arylsulfatase B	5	5q11-q13	+
ASAH1	ASAH1	N-acylsphingosine amidohydrolase (acid ceramidase) 1	8	8p22	+
ASAH3L	ACER2	N-acylsphingosine amidohydrolase 3-like	9	9p22.1	+
ASB12	ASB12	ankyrin repeat and SOCS box-containing 12	X	Xq11.2	+
ASB6	ASB6	ankyrin repeat and SOCS box-containing 6	9	-	+
ASCL1	ASCL1	achaete-scute complex-like 1 (Drosophila)	12	12q23.2	+
ASF1A	ASF1A	ASF1 anti-silencing function 1 homolog A (S. cerevisiae)	6	6q22.31	+

ASH2L	ASH2L	ash2 (absent, small, or homeotic)-like (Drosophila)	8	8p11.2	+
ASPH	ASPH	aspartate beta-hydroxylase	8	8q12.1	+
ASXL1	ASXL1	additional sex combs like 1 (Drosophila)	20	20q11.1	+
ATAD2	ATAD2	ATPase family, AAA domain containing 2	8	8q24.13	+
ATF7IP	ATF7IP	activating transcription factor 7 interacting protein	12	12p13.1	+
ATG12	ATG12	ATG12 autophagy related 12 homolog (S. cerevisiae)	5	5q21-q22	+
ATG2B	ATG2B	ATG2 autophagy related 2 homolog B (S. cerevisiae)	14	14q32.2	+
ATP2B2	ATP2B2	ATPase, Ca ⁺⁺ transporting, plasma membrane 2	3	3p25.3	+
ATP2B3	ATP2B3	ATPase, Ca ⁺⁺ transporting, plasma membrane 3	X	Xq28	+
ATP6AP2	ATP6AP2	ATPase, H ⁺ transporting, lysosomal accessory protein 2	X	Xp11.4	+
ATP6V1A	ATP6V1A	ATPase, H ⁺ transporting, lysosomal 70kDa, V1 subunit A	3	3q13.31	+
ATP7B	ATP7B	ATPase, Cu ⁺⁺ transporting, beta polypeptide	13	13q14.3	+
ATP8A1	ATP8A1	ATPase, aminophospholipid transporter (APLT), Class I, type 8A, member 1	4	4p13	+
ATP8B2	ATP8B2	ATPase, Class I, type 8B, member 2	1	1q21.3	+
ATP9A	ATP9A	ATPase, Class II, type 9A	20	20q13.2	+
ATXN1	ATXN1	ataxin 1	6	6p23	+
AXL	AXL	AXL receptor tyrosine kinase	19	19q13.1	+
B3GALNT1	B3GALNT1	beta-1,3-N-acetylgalactosaminyltransferase 1 (globoside blood group)	3	3q25	+
B3GALT1	B3GALT1	UDP-Gal:betaGlcNAc beta 1,3-galactosyltransferase, polypeptide 1	2	2q24.3	+
B3GALT2	B3GALT2	UDP-Gal:betaGlcNAc beta 1,3-galactosyltransferase, polypeptide 2	1	1q31	+
B3GALTL	B3GALTL	beta 1,3-galactosyltransferase-like	13	13q12.3	+
B3GNT5	B3GNT5	UDP-GlcNAc:betaGal beta-1,3-N-	3	3q28	+

		acetylglucosaminyltransferase 5			
B4GALNT1	B4GALNT1	beta-1,4-N-acetyl-galactosaminyl transferase 1	12	12q13.3	+
B4GALT3	B4GALT3	UDP-Gal:betaGlcNAc beta 1,4- galactosyltransferase, polypeptide 3	1	1q21-q23	+
BACE1	BACE1	beta-site APP-cleaving enzyme 1	11	11q23.2-q23.3	+
BACH1	BACH1	BTB and CNC homology 1, basic leucine zipper transcription factor 1	21	21q22.11	+
BACH2	BACH2	BTB and CNC homology 1, basic leucine zipper transcription factor 2	6	6q15	+
BAG1	BAG1	BCL2-associated athanogene	9	9p12	+
BAGE2	BAGE2	B melanoma antigen family, member 2	21	21p	+
BAGE3	BAGE3	B melanoma antigen family, member 3	21	21p11.2	+
BAHCC1	BAHCC1	BAH domain and coiled-coil containing 1	17	17q25.3	+
BAIAP2	BAIAP2	BAI1-associated protein 2	17	17q25	+
BARHL2	BARHL2	BarH-like 2 (Drosophila)	1	1p22.2	+
BARX1	BARX1	BarH-like homeobox 1	9	9q12	+
BASP1	BASP1	brain abundant, membrane attached signal protein 1	5	5p15.1	+
BAZ2A	BAZ2A	bromodomain adjacent to zinc finger domain, 2A	12	12q13.3	+
BCAT1	BCAT1	branched chain aminotransferase 1, cytosolic	12	12p12.1	+
BCL11B	BCL11B	B-cell CLL/lymphoma 11B (zinc finger protein)	14	14q32.2	+
BCL2	BCL2	B-cell CLL/lymphoma 2	18	18q21.33 18q21.3	+
BCL2L11	BCL2L11	BCL2-like 11 (apoptosis facilitator)	2	2q13	+
BCL2L15	BCL2L15	BCL2-like 15	1	1p13.2	+
BCL6	BCL6	B-cell CLL/lymphoma 6 (zinc finger protein 51)	3	3q27	+
BCL7A	BCL7A	B-cell CLL/lymphoma 7A	12	12q24.13	+
BCORL1	BCORL1	BCL6 co-repressor-like 1	X	Xq25-q26.1	+
BDNF	BDNF	brain-derived neurotrophic factor	11	11p13	+

BECN1	BECN1	beclin 1 (coiled-coil, myosin-like BCL2 interacting protein)	17	17q21	+
BICC1	BICC1	bicaudal C homolog 1 (Drosophila)	10	10q21.1	+
BICD2	BICD2	bicaudal D homolog 2 (Drosophila)	9	9q22.31	+
BMI1	BMI1	B lymphoma Mo-MLV insertion region (mouse)	10	10p11.23	+
BMPR1B	BMPR1B	bone morphogenetic protein receptor, type IB	4	4q22-q24	+
BMPR2	BMPR2	bone morphogenetic protein receptor, type II (serine/threonine kinase)	2	2q33-q34	+
BNC1	BNC1	basonuclin 1	15	15q25.2	+
BNC2	BNC2	basonuclin 2	9	9p22.2	+
BPTF	BPTF	bromodomain PHD finger transcription factor	17	17q24.3	+
BRD1	BRD1	bromodomain containing 1	22	22q13.33	+
BRD4	BRD4	bromodomain containing 4	19	19p13.1	+
BRP44L	BRP44L	brain protein 44-like	6	6q27	+
BRUNOL4	CELF4	bruno-like 4, RNA binding protein (Drosophila)	18	18q12	-
BRWD1	BRWD1	bromodomain and WD repeat domain containing 1	21	21q22.2	+
BSDC1	BSDC1	BSD domain containing 1	1	1p35.1	+
BTBD11	BTBD11	BTB (POZ) domain containing 11	12	12q23.3	+
BTBD12	SLX4	BTB (POZ) domain containing 12	16	16p13.3	-
BTBD7	BTBD7	BTB (POZ) domain containing 7	14	14q32.12	+
BTBD9	BTBD9	BTB (POZ) domain containing 9	6	6p21	+
BTG1	BTG1	B-cell translocation gene 1, anti-proliferative	12	12q22	+
BTG2	BTG2	BTG family, member 2	1	1q32	+
BTRC	BTRC	beta-transducin repeat containing	10	10q24.32	+
BVES	BVES	blood vessel epicardial substance	6	6q21	+
BZRAP1	BZRAP1	benzodiazapine receptor (peripheral) associated protein 1	17	17q22-q23	+

BZW1	BZW1	basic leucine zipper and W2 domains 1	2	2q33	+
C10orf104	ANAPC16	chromosome 10 open reading frame 104	10	10q22.1	+
C10orf11	C10orf11	chromosome 10 open reading frame 11	10	10q22.3	-
C10orf118	C10orf118	chromosome 10 open reading frame 118	10	10q25.3	+
C10orf129	C10orf129	chromosome 10 open reading frame 129	10	10q23.33	+
C10orf30	BEND7	chromosome 10 open reading frame 30	10	10p13	+
C10orf76	C10orf76	chromosome 10 open reading frame 76	10	10q24.32	+
C11orf58	C11orf58	chromosome 11 open reading frame 58	11	11p15.1	+
C11orf61	C11orf61	chromosome 11 open reading frame 61	11	11q24.2	+
C12orf23	C12orf23	chromosome 12 open reading frame 23	12	12q23.3	+
C12orf4	C12orf4	chromosome 12 open reading frame 4	12	12p13.3	+
C12orf5	C12orf5	chromosome 12 open reading frame 5	12	12p13.3	+
C13orf1	C13orf1	chromosome 13 open reading frame 1	13	13q14	+
C13orf23	C13orf23	chromosome 13 open reading frame 23	13	13q13.3	+
C13orf30	C13orf30	chromosome 13 open reading frame 30	13	13q14.11	-
C13orf31	C13orf31	chromosome 13 open reading frame 31	13	13q14.11	+
C14orf1	C14orf1	chromosome 14 open reading frame 1	14	14q24.3	+
C14orf101	C14orf101	chromosome 14 open reading frame 101	14	14q22.3	+
C14orf126	C14orf126	chromosome 14 open reading frame 126	14	14q12	+
C14orf147	C14orf147	chromosome 14 open reading frame 147	14	14q13.1	+
C14orf83	TMEM229B	chromosome 14 open reading frame 83	14	14q24.1	+
C15orf17	C15orf17	chromosome 15 open reading frame 17	15	15q24.1	+
C15orf41	C15orf41	chromosome 15 open reading frame 41	15	15q14	+
C17orf63	C17orf63	chromosome 17 open reading frame 63	17	17q11.2	+
C17orf85	C17orf85	chromosome 17 open reading frame 85	17	17p13.2	+
C18orf1	C18orf1	chromosome 18 open reading frame 1	18	18p11.2	+
C18orf25	C18orf25	chromosome 18 open reading frame 25	18	18q21.1	+

C18orf34	C18orf34	chromosome 18 open reading frame 34	18	18q12.1	-
C18orf54	C18orf54	chromosome 18 open reading frame 54	18	18q21.2	+
C1orf130	C1orf130	chromosome 1 open reading frame 130	1	1p36.11	+
C1orf144	C1orf144	chromosome 1 open reading frame 144	1	1p36.13	+
C1orf161	MAB21L3	chromosome 1 open reading frame 161	1	1p13.1	-
C1orf2	FAM189B	chromosome 1 open reading frame 2	1	1q21	+
C1orf21	C1orf21	chromosome 1 open reading frame 21	1	1q25	-
C1orf63	C1orf63	chromosome 1 open reading frame 63	1	1p36.13-p35.1	+
C1orf71	CNST	chromosome 1 open reading frame 71	1	1q44	+
C1orf83	TCEANC2	chromosome 1 open reading frame 83	1	1p32.3	+
C1orf96	C1orf96	chromosome 1 open reading frame 96	1	1q42.13	+
C1QTNF2	C1QTNF2	C1q and tumor necrosis factor related protein 2	5	5q33.3	+
C20orf11	C20orf11	chromosome 20 open reading frame 11	20	20q13.33	+
C20orf194	C20orf194	chromosome 20 open reading frame 194	20	20p13	+
C21orf91	C21orf91	chromosome 21 open reading frame 91	21	21q21.1	+
C22orf13	C22orf13	chromosome 22 open reading frame 13	22	22q11.2	+
C22orf29	C22orf29	chromosome 22 open reading frame 29	22	22q11.21	+
C2orf13	APLF	chromosome 2 open reading frame 13	2	2p13.3	-
C2orf18	C2orf18	chromosome 2 open reading frame 18	2	2p23.3	+
C2orf60	C2orf60	hromosome 2 open reading frame 60	2	2q33.1	+
C2orf67	C2orf67	chromosome 2 open reading frame 67	2	2q34	-
C2orf68	C2orf68	chromosome 2 open reading frame 68	2	2p11.2	+
C2orf69	C2orf69	chromosome 2 open reading frame 69	2	2q33.1	+
C3orf21	C3orf21	chromosome 3 open reading frame 21	3	3q29	+
C3orf58	C3orf58	chromosome 3 open reading frame 58	3	3q24	+
C3orf59	MB21D2	chromosome 3 open reading frame 59	3	3q29	-
C4orf30	DCAF16	chromosome 4 open reading frame 30	4	4p15.31	+

C4orf34	C4orf34	chromosome 4 open reading frame 34	4	4p14	+
C4orf8	FAM193A	chromosome 4 open reading frame 8	4	4p16.3	+
C5orf13	C5orf13	chromosome 5 open reading frame 13	5	5q22.1	+
C5orf23	NPR3	chromosome 5 open reading frame 23	5	5p14-p13	+
C5orf25	C5orf25	chromosome 5 open reading frame 25	5	5q35.2	+
C5orf29	GAPT	chromosome 5 open reading frame 29	5	5q11.2	+
C5orf33	C5orf33	chromosome 5 open reading frame 33	5	5p13.2	+
C5orf4	C5orf4	chromosome 5 open reading frame 4	5	5q31-q32	+
C5orf41	C5orf41	chromosome 5 open reading frame 41	5	5q35.1	+
C6orf120	C6orf120	chromosome 6 open reading frame 120	6	6q27	+
C6orf168	C6orf168	chromosome 6 open reading frame 168	6	6q16.2	-
C6orf35	C6orf35	chromosome 6 open reading frame 35	6	6q25.3	+
C6orf65	BEND6	chromosome 6 open reading frame 65	6	6p12.1	+
C6orf97	C6orf97	chromosome 6 open reading frame 97	6	6q25.1	-
C7orf23	C7orf23	chromosome 7 open reading frame 23	7	7q21.1-q21.2	+
C7orf41	C7orf41	chromosome 7 open reading frame 41	7	7p14.3	+
C7orf42	C7orf42	chromosome 7 open reading frame 42	7	7q11.21	+
C7orf58	C7orf58	chromosome 7 open reading frame 58	7	7q31.31	+
C7orf60	C7orf60	chromosome 7 open reading frame 60	7	7q31.1	+
C8orf44	C8orf44	chromosome 8 open reading frame 44	8	8q13.1	-
C9orf58	AIF1L	chromosome 9 open reading frame 58	9	9q34.13-q34.3	+
C9orf97	TSTD2	chromosome 9 open reading frame 97	9	9q22.33	+
CA7	CA7	carbonic anhydrase VII	16	16q22.1	+
CAB39	CAB39	calcium binding protein 39	2	2q37.1	+
CACNA1D	CACNA1D	calcium channel, voltage-dependent, L type, alpha 1D subunit	3	3p14.3	+
CACNA1I	CACNA1I	calcium channel, voltage-dependent, alpha 1I subunit	22	22q13.1	+

CACNA2D2	CACNA2D2	calcium channel, voltage-dependent, alpha 2/delta subunit 2	3	3p21.3	+
CACNB3	CACNB3	calcium channel, voltage-dependent, beta 3 subunit	12	12q13	+
CACNG6	CACNG6	calcium channel, voltage-dependent, gamma subunit 6	19	19q13.4	+
CACYBP	CACYBP	calcyclin binding protein	1	1q24-q25	+
CADM2	CADM2	cell adhesion molecule 2	3	3p12.1	+
CADM3	CADM3	cell adhesion molecule 3	1	1q21.2-q22	+
CADPS	CADPS	Ca ²⁺ -dependent secretion activator	3	3p14.2	+
CALCOCO2	CALCOCO2	calcium binding and coiled-coil domain 2	17	17q21.32	+
CALM2	CALM2	calmodulin 2 (phosphorylase kinase, delta)	2	2p21	+
CALML4	CALML4	calmodulin-like 4	15	15q23	+
CALN1	CALN1	calneuron 1	7	7q11	+
CAMK2A	CAMK2A	calcium/calmodulin-dependent protein kinase (CaM kinase) II alpha	5	5q32	+
CAMK2D	CAMK2D	calcium/calmodulin-dependent protein kinase (CaM kinase) II delta	4	4q26	+
CAMK2G	CAMK2G	calcium/calmodulin-dependent protein kinase (CaM kinase) II gamma	10	10q22	+
CAMK2N1	CAMK2N1	calcium/calmodulin-dependent protein kinase II inhibitor 1	1	1p36.12	+
CAMKK1	CAMKK1	calcium/calmodulin-dependent protein kinase kinase 1, alpha	17	17p13.2	+
CAP2	CAP2	CAP, adenylate cyclase-associated protein, 2 (yeast)	6	6p22.3	+
CAPN6	CAPN6	calpain 6	X	Xq23	+
CAPN7	CAPN7	calpain 7	3	3p24	+
CASC3	CASC3	cancer susceptibility candidate 3	17	17q11-q21.3	+
CASC4	CASC4	cancer susceptibility candidate 4	15	15q15.3	+
CASD1	CASD1	CAS1 domain containing 1	7	7q21.3	+

CASKIN2	CASKIN2	CASK interacting protein 2	17	17q25.1	+
CBFA2T2	CBFA2T2	core-binding factor, runt domain, alpha subunit 2; translocated to, 2	20	20q11	+
CBFA2T3	CBFA2T3	core-binding factor, runt domain, alpha subunit 2; translocated to, 3	16	16q24	+
CBL	CBL	Cas-Br-M (murine) ecotropic retroviral transforming sequence	11	11q23.3	+
CBLN4	CBLN4	cerebellin 4 precursor	20	20q13	+
CBX3	CBX3	chromobox homolog 3 (HP1 gamma homolog, Drosophila)	7	7p15.2	+
CBX8	CBX8	chromobox homolog 8 (Pc class homolog, Drosophila)	17	17q25.3	+
CC2D1B	CC2D1B	coiled-coil and C2 domain containing 1B	1	1p32.3	+
CCBL2	CCBL2	cysteine conjugate-beta lyase 2	1	1p22.2	+
CCDC100	CEP120	coiled-coil domain containing 100	5	5q23.2	+
CCDC103	CCDC103	coiled-coil domain containing 103	17	17q21.31	-
CCDC117	CCDC117	coiled-coil domain containing 117	22	22q12.1	+
CCDC141	CCDC141	coiled-coil domain containing 141	2	2q31.2	+
CCDC6	CCDC6	coiled-coil domain containing 6	10	10q21	+
CCDC68	CCDC68	coiled-coil domain containing 68	18	18q21	-
CCDC73	CCDC73	coiled-coil domain containing 73	11	11p13	-
CCDC93	CCDC93	coiled-coil domain containing 93	2	2q14.1	+
CCL22	CCL22	chemokine (C-C motif) ligand 22	16	16q13	+
CCNB1	CCNB1	cyclin B1	5	5q12	+
CCND2	CCND2	cyclin D2	12	12p13	+
CCNJ	CCNJ	cyclin J	10	10pter-q26.12	+
CCNL1	CCNL1	cyclin L1	3	3q25.31	+
CCNT2	CCNT2	cyclin T2	2	2q21.3	+
CCNY	CCNY	cyclin Y	10	10p11.21	+

CCPG1	CCPG1	cell cycle progression 1	15	15q21.1	+
CD1C	CD1C	CD1c molecule	1	1q22-q23	+
CD28	CD28	CD28 molecule	2	2q33	+
CD2AP	CD2AP	CD2-associated protein	6	6p12	+
CD40	CD40	CD40 molecule, TNF receptor superfamily member 5	20	20q12-q13.2	+
CD44	CD44	CD44 molecule (Indian blood group)	11	11p13	+
CD5	CD5	CD5 molecule	11	11q13	+
CD59	CD59	CD59 molecule, complement regulatory protein	11	11p13	+
CD69	CD69	CD69 molecule	12	12p13	+
CD8A	CD8A	CD8a molecule	2	2p12	+
CD8B	CD8B	CD8b molecule	2	2p12	+
CDC27	CDC27	cell division cycle 27	17	17q21.32	+
CDC2L5	CDK13	cell division cycle 2-like 5 (cholinesterase-related cell division controller)	7	7p13	+
CDC42BPA	CDC42BPA	CDC42 binding protein kinase alpha (DMPK-like)	1	1q42.11	+
CDC42SE1	CDC42SE1	CDC42 small effector 1	1	1q21.3	+
CDCA7	CDCA7	cell division cycle associated 7	2	2q31	+
CDH2	CDH2	cadherin 2, type 1, N-cadherin (neuronal)	18	18q11.2	+
CDH20	CDH20	cadherin 20, type 2	18	18q21.33	+
CDK6	CDK6	cyclin-dependent kinase 6	7	7q21-q22	+
CDKN1B	CDKN1B	cyclin-dependent kinase inhibitor 1B (p27, Kip1)	12	12p13.1-p12	+
CDKN2B	CDKN2B	cyclin-dependent kinase inhibitor 2B (p15, inhibits CDK4)	9	9p21	+
CDRT4	CDRT4	CMT1A duplicated region transcript 4	17	17p12	+
CDS2	CDS2	CDP-diacylglycerol synthase (phosphatidate cytidyltransferase) 2	20	20p13	+
CELSR3	CELSR3	cadherin, EGF LAG seven-pass G-type receptor 3 (flamingo homolog, Drosophila)	3	3p21.31	+

CENTG1	AGAP2	centaurin, gamma 1	12	12q14.1	+
CENTG2	AGAP1	centaurin, gamma 2	2	2q37	+
CENTG3	AGAP3	centaurin, gamma 3	7	7q36.1	+
CEP350	CEP350	centrosomal protein 350kDa	1	1p36.13-q41	+
CGGBP1	CGGBP1	CGG triplet repeat binding protein 1	3	3p12-p11.1	+
CGNL1	CGNL1	cingulin-like 1	15	15q21.3	+
CHD2	CHD2	chromodomain helicase DNA binding protein 2	15	15q26	+
CHD6	CHD6	chromodomain helicase DNA binding protein 6	20	20q12	+
CHD9	CHD9	chromodomain helicase DNA binding protein 9	16	16q12.2	+
CHIC1	CHIC1	cysteine-rich hydrophobic domain 1	X	Xq13.2	+
CHL1	CHL1	cell adhesion molecule with homology to L1CAM (close homolog of L1)	3	3p26.1	+
CHODL	CHODL	chondrolectin	21	21q11.2	+
CHRD	CHRD	chordin	3	3q27	+
CHRM1	CHRM1	cholinergic receptor, muscarinic 1	11	11q13	+
CHSY1	CHSY1	carbohydrate (chondroitin) synthase 1	15	15q26.3	+
CHSY3	CHSY3	chondroitin sulfate synthase 3	5	5q23.3	+
CIITA	CIITA	class II, major histocompatibility complex, transactivator	16	16p13	+
CLCN4	CLCN4	chloride channel 4	X	Xp22.3	+
CLCN5	CLCN5	chloride channel 5 (nephrolithiasis 2, X-linked, Dent disease)	X	Xp11.23-p11.22	+
CLDN11	CLDN11	claudin 11 (oligodendrocyte transmembrane protein)	3	3q26.2-q26.3	+
CLDN2	CLDN2	claudin 2	X	Xq22.3-q23	+
CLEC1A	CLEC1A	C-type lectin domain family 1, member A	12	12p13.2	+
CLIP2	CLIP2	CAP-GLY domain containing linker protein 2	7	7q11.23	+
CLLU1	CLLU1	chronic lymphocytic leukemia up-regulated 1	12	12q22	+

CLTA	CLTA	clathrin, light chain (Lca)	9	9p13	+
CLTC	CLTC	clathrin, heavy chain (Hc)	17	17q11-qter	+
CMPK1	CMPK1	cytidine monophosphate (UMP-CMP) kinase 1, cytosolic	1	1p32	+
CMTM4	CMTM4	CKLF-like MARVEL transmembrane domain containing 4	16	16q21-q22.1	+
CNBP	CNBP	CCHC-type zinc finger, nucleic acid binding protein	3	3q21	+
CNGA2	CNGA2	cyclic nucleotide gated channel alpha 2	X	Xq27	+
CNIH2	CNIH2	cornichon homolog 2 (Drosophila)	11	11q13.2	+
CNN1	CNN1	calponin 1, basic, smooth muscle	19	19p13.2-p13.1	+
CNN2	CNN2	calponin 2	19	19p13.3	+
CNNM1	CNNM1	cyclin M1	10	10q24.2	+
CNNM3	CNNM3	cyclin M3	2	2p12-p11.2	+
CNOT2	CNOT2	CCR4-NOT transcription complex, subunit 2	12	12q15	+
CNP	CNP	2',3'-cyclic nucleotide 3' phosphodiesterase	17	17q21	+
CNTD1	CNTD1	cyclin N-terminal domain containing 1	17	17q21.31	+
CNTLN	CNTLN	centlein, centrosomal protein	9	9p22.2	+
CNTN3	CNTN3	contactin 3 (plasmacytoma associated)	3	3p26	+
CNTNAP2	CNTNAP2	contactin associated protein-like 2	7	7q35	+
COG3	COG3	component of oligomeric golgi complex 3	13	13q14.13	+
COL12A1	COL12A1	collagen, type XII, alpha 1	6	6q12-q13	+
COL19A1	COL19A1	collagen, type XIX, alpha 1	6	6q12-q13	+
COL23A1	COL23A1	collagen, type XXIII, alpha 1	5	5q35.3	+
COL24A1	COL24A1	collagen, type XXIV, alpha 1	1	1p22.3	+
COL2A1	COL2A1	collagen, type II, alpha 1 (primary osteoarthritis, spondyloepiphyseal dysplasia, congenital)	12	12q13.11	+
COL4A3	COL4A3	collagen, type IV, alpha 3 (Goodpasture antigen)	2	2q36-q37	+

COL5A1	COL5A1	collagen, type V, alpha 1	9	9q34.2-q34.3	+
COL6A3	COL6A3	collagen, type VI, alpha 3	2	2q37	+
COL8A2	COL8A2	collagen, type VIII, alpha 2	1	1p34.2	+
COPS2	COPS2	COP9 constitutive photomorphogenic homolog subunit 2 (Arabidopsis)	15	15q21.2	+
CORO1C	CORO1C	coronin, actin binding protein, 1C	12	12q24.1	+
CORO2A	CORO2A	coronin, actin binding protein, 2A	9	9q22.3	+
COX4NB	COX4NB	COX4 neighbor	16	16q24	+
CPD	CPD	carboxypeptidase D	17	17q11.2	+
CPEB2	CPEB2	cytoplasmic polyadenylation element binding protein 2	4	4p15.33	+
CPEB3	CPEB3	cytoplasmic polyadenylation element binding protein 3	10	10q23.32	+
CPLX1	CPLX1	complexin 1	4	4p16.3	+
CPLX2	CPLX2	complexin 2	5	5q35.2	+
CPNE3	CPNE3	copine III	8	8q21.3	+
CPS1	CPS1	carbamoyl-phosphate synthetase 1, mitochondrial	2	2q35	+
CPSF6	CPSF6	cleavage and polyadenylation specific factor 6, 68kDa	12	12q15	+
CREB1	CREB1	cAMP responsive element binding protein 1	2	2q34	+
CREB5	CREB5	cAMP responsive element binding protein 5	7	7p15.1	+
CREBBP	CREBBP	CREB binding protein (Rubinstein-Taybi syndrome)	16	16p13.3	+
CREBL1	ATF6B	cAMP responsive element binding protein-like 1	6	6p21.3	+
CREBZF	CREBZF	CREB/ATF bZIP transcription factor	11	11q14	+
CRNN	CRNN	cornulin	1	1q21	+
CROP	LUC7L3	LUC7-like 3 (<i>S. cerevisiae</i>)	17	17q21.33	+
CROT	CROT	carnitine O-octanoyltransferase	7	7q21.1	+
CRTAP	CRTAP	cartilage associated protein	3	3p22.3	+
CSDC2	CSDC2	cold shock domain containing C2, RNA binding	22	22q13.2	+
CSMD3	CSMD3	CUB and Sushi multiple domains 3	8	8q23.3	+

CSNK1D	CSNK1D	casein kinase 1, delta	17	17q25	+
CSNK1G1	CSNK1G1	casein kinase 1, gamma 1	15	15q22.1-q22.31	+
CSNK2B	CSNK2B	casein kinase 2, beta polypeptide	6	6p21-p12 6p21.3	+
CTNNB1	CTNNB1	catenin (cadherin-associated protein), beta 1, 88kDa	3	3p21	+
CTNND2	CTNND2	catenin (cadherin-associated protein), delta 2 (neural plakophilin-related arm-repeat protein)	5	5p15.2	+
CTTNBP2	CTTNBP2	cortactin binding protein 2	7	7q31	+
CUGBP2	CELF2	CUG triplet repeat, RNA binding protein 2	10	10p13	+
CUL2	CUL2	cullin 2	10	10p11.21	+
CUX2	CUX2	cut-like homeobox 2	12	12q24.12	+
CXCL12	CXCL12	chemokine (C-X-C motif) ligand 12 (stromal cell-derived factor 1)	10	10q11.1	+
CXCL5	CXCL5	chemokine (C-X-C motif) ligand 5	4	4q13.3	+
CXorf36	CXorf36	chromosome X open reading frame 36	X	Xp11.3	+
CYB5D1	CYB5D1	cytochrome b5 domain containing 1	17	17p13.1	+
CYB5R4	CYB5R4	cytochrome b5 reductase 4	6	6pter-q22.33	+
CYBRD1	CYBRD1	cytochrome b reductase 1	2	2q31.1	+
CYLC2	CYLC2	cylicin, basic protein of sperm head cytoskeleton 2	9	9q31.1	+
CYP26B1	CYP26B1	cytochrome P450, family 26, subfamily B, polypeptide 1	2	2p13.2	+
CYP27B1	CYP27B1	cytochrome P450, family 27, subfamily B, polypeptide 1	12	12q13.1-q13.3	+
D4S234E	D4S234E	DNA segment on chromosome 4 (unique) 234 expressed sequence	4	4p16.3	+
DAB2	DAB2	disabled homolog 2, mitogen-responsive phosphoprotein (Drosophila)	5	5p13	+
DACH1	DACH1	dachshund homolog 1 (Drosophila)	13	13q22	+
DACT1	DACT1	dapper, antagonist of beta-catenin, homolog 1	14	14q23.1	+

		(Xenopus laevis)			
DAG1	DAG1	dystroglycan 1 (dystrophin-associated glycoprotein 1)	3	3p21	+
DAGLA	DAGLA	diacylglycerol lipase, alpha	11	11q12.2	+
DAZAP2	DAZAP2	DAZ associated protein 2	12	12q12	+
DBN1	DBN1	drebrin 1	5	5q35.3	+
DBT	DBT	dihydrolipoamide branched chain transacylase E2	1	1p31	+
DCLK1	DCLK1	doublecortin-like kinase 1	13	13q13	+
DCLRE1A	DCLRE1A	DNA cross-link repair 1A (PSO2 homolog, <i>S. cerevisiae</i>)	10	10q25.1	+
DCP1A	DCP1A	DCP1 decapping enzyme homolog A (<i>S. cerevisiae</i>)	3	3p21.1	+
DCUN1D3	DCUN1D3	DCN1, defective in cullin neddylation 1, domain containing 3 (<i>S. cerevisiae</i>)	16	16p12.3	+
DCX	DCX	doublecortex; lissencephaly, X-linked (doublecortin)	X	Xq22.3-q23	+
DDEFL1	ASAP3	development and differentiation enhancing factor-like 1	1	1p36.12	+
DDR1	DDR1	discoidin domain receptor family, member 1	6	6p21.3	+
DDX17	DDX17	DEAD (Asp-Glu-Ala-Asp) box polypeptide 17	22	22q13.1	+
DDX3X	DDX3X	DEAD (Asp-Glu-Ala-Asp) box polypeptide 3, X-linked	X	Xp11.3-p11.23	+
DDX6	DDX6	DEAD (Asp-Glu-Ala-Asp) box polypeptide 6	11	11q23.3	+
DENND2D	DENND2D	DENN/MADD domain containing 2D	1	1p13.3	+
DEPDC1	DEPDC1	DEP domain containing 1	1	1p31.2	+
DES	DES	desmin	2	2q35	+
DEXI	DEXI	Dexi homolog (mouse)	16	16p13.13	+
DGCR2	DGCR2	DiGeorge syndrome critical region gene 2	22	22q11.21	+
DGCR8	DGCR8	DiGeorge syndrome critical region gene 8	22	22q11.2	+
DGKG	DGKG	diacylglycerol kinase, gamma 90kDa	3	3q27.2-q27.3	+
DHDDS	DHDDS	dehydrodolichyl diphosphate synthase	1	1p36.11	+
DHX15	DHX15	DEAH (Asp-Glu-Ala-His) box polypeptide 15	4	4p15.3	+

DHX40	DHX40	DEAH (Asp-Glu-Ala-His) box polypeptide 40	17	17q23.1	+
DHX8	DHX8	DEAH (Asp-Glu-Ala-His) box polypeptide 8	17	17q21.31	+
DIP2B	DIP2B	DIP2 disco-interacting protein 2 homolog B (Drosophila)	12	12q13.12	+
DIXDC1	DIXDC1	DIX domain containing 1	11	11q23.1	+
DLG2	DLG2	discs, large homolog 2, chapsyn-110 (Drosophila)	11	11q14.1	+
DLG3	DLG3	discs, large homolog 3 (neuroendocrine-dlg, Drosophila)	X	Xq13.1	+
DLG4	DLG4	discs, large homolog 4 (Drosophila)	17	17p13.1	+
DLGAP2	DLGAP2	discs, large (Drosophila) homolog-associated protein 2	8	8p23	+
DLL4	DLL4	delta-like 4 (Drosophila)	15	15q14	+
DLX6	DLX6	distal-less homeobox 6	7	7q22	+
DMRTC2	DMRTC2	DMRT-like family C2	19	19q13.2	+
DNAJB5	DNAJB5	DnaJ (Hsp40) homolog, subfamily B, member 5	9	9p13.3	+
DNAJC13	DNAJC13	DnaJ (Hsp40) homolog, subfamily C, member 13	3	3q22.1	+
DNAJC16	DNAJC16	DnaJ (Hsp40) homolog, subfamily C, member 16	1	1p36.1	+
DNAJC5G	DNAJC5G	DnaJ (Hsp40) homolog, subfamily C, member 5 gamma	2	2p23.3	+
DNM1L	DNM1L	dynamamin 1-like	12	12p11.21	+
DNM3	DNM3	dynamamin 3	1	1q24.3	+
DOCK9	DOCK9	dedicator of cytokinesis 9	13	13q32.3	+
DPP6	DPP6	dipeptidyl-peptidase 6	7	7q36.2	+
DPP8	DPP8	dipeptidyl-peptidase 8	15	15q22	+
DPYSL2	DPYSL2	dihydropyrimidinase-like 2	8	8p22-p21	+
DR1	DR1	down-regulator of transcription 1, TBP-binding (negative cofactor 2)	1	1p22.1	+
DRP2	DRP2	dystrophin related protein 2	X	Xq22	+
DSC2	DSC2	desmocollin 2	18	18q12.1	+

DSTN	DSTN	destrin (actin depolymerizing factor)	20	20p12.1	+
DTL	DTL	denticleless homolog (Drosophila)	1	1q32	+
DTNB	DTNB	dystrobrevin, beta	2	2p24	+
DTX1	DTX1	deltex homolog 1 (Drosophila)	12	12q24.13	+
DTX4	DTX4	deltex 4 homolog (Drosophila)	11	11q12.1	+
DUSP3	DUSP3	dual specificity phosphatase 3 (vaccinia virus phosphatase VH1-related)	17	17q21	+
DYRK1A	DYRK1A	dual-specificity tyrosine-(Y)-phosphorylation regulated kinase 1A	21	21q22.13	+
DYRK2	DYRK2	dual-specificity tyrosine-(Y)-phosphorylation regulated kinase 2	12	12q15	+
DYRK4	DYRK4	dual-specificity tyrosine-(Y)-phosphorylation regulated kinase 4	12	12p13.32	+
E2F2	E2F2	E2F transcription factor 2	1	1p36	+
E2F3	E2F3	E2F transcription factor 3	6	6p22	+
E2F7	E2F7	E2F transcription factor 7	12	12q21.2	+
EAF1	EAF1	ELL associated factor 1	3	3p25.1	+
EBF1	EBF1	early B-cell factor 1	5	5q34	+
EBF3	EBF3	early B-cell factor 3	10	10q26.3	+
EDC3	EDC3	enhancer of mRNA decapping 3 homolog (S. cerevisiae)	15	15q24.1	+
EDEM1	EDEM1	ER degradation enhancer, mannosidase alpha-like 1	3	3p26.1	+
EDN1	EDN1	endothelin 1	6	6p24.1	+
EDNRB	EDNRB	endothelin receptor type B	13	13q22	+
EEA1	EEA1	early endosome antigen 1, 162kD	12	12q22	+
EFHA2	EFHA2	EF-hand domain family, member A2	8	8p22	+
EFNA5	EFNA5	ephrin-A5	5	5q21	+
EFNB1	EFNB1	ephrin-B1	X	Xq12	+

EFNB2	EFNB2	ephrin-B2	13	13q33	+
EFNB3	EFNB3	ephrin-B3	17	17p13.1	+
EFR3A	EFR3A	EFR3 homolog A (<i>S. cerevisiae</i>)	8	8q24.22	+
EFS	EFS	embryonal Fyn-associated substrate	14	14q11.2-q12	+
EGR3	EGR3	early growth response 3	8	8p23-p21	+
EHHADH	EHHADH	enoyl-Coenzyme A, hydratase/3-hydroxyacyl Coenzyme A dehydrogenase	3	3q26.3-q28	+
EHMT1	EHMT1	euchromatic histone-lysine N-methyltransferase 1	9	9q34.3	+
EID1	EID1	EP300 interacting inhibitor of differentiation 1	15	15q21.1	+
EIF1AX	EIF1AX	eukaryotic translation initiation factor 1A, X-linked	X	Xp22.12	+
EIF2C1	EIF2C1	eukaryotic translation initiation factor 2C, 1	1	1p34.3	+
EIF2S2	EIF2S2	eukaryotic translation initiation factor 2, subunit 2 beta, 38kDa	20	20pter-q12	+
EIF4E3	EIF4E3	eukaryotic translation initiation factor 4E member 3	3	3p14	+
EIF4EBP1	EIF4EBP1	eukaryotic translation initiation factor 4E binding protein 1	8	8p12	+
EIF4G2	EIF4G2	eukaryotic translation initiation factor 4 gamma, 2	11	11p15	+
EIF5	EIF5	eukaryotic translation initiation factor 5	14	14q32.32	+
ELAVL1	ELAVL1	ELAV (embryonic lethal, abnormal vision, <i>Drosophila</i>)-like 1 (Hu antigen R)	19	19p13.2	+
ELAVL2	ELAVL2	ELAV (embryonic lethal, abnormal vision, <i>Drosophila</i>)-like 2 (Hu antigen B)	9	9p21	+
ELAVL4	ELAVL4	ELAV (embryonic lethal, abnormal vision, <i>Drosophila</i>)-like 4 (Hu antigen D)	1	1p34	+
ELFN2	ELFN2	ELK1, member of ETS oncogene family	22	22q13.1	+
ELK1	ELK1	ELK1, member of ETS oncogene family	X	Xp11.2	+
ELK3	ELK3	ELK3, ETS-domain protein (SRF accessory protein 2)	12	12q23	+
ELK4	ELK4	ELK4, ETS-domain protein (SRF accessory protein 1)	1	1q32	+

ELL2	ELL2	elongation factor, RNA polymerase II, 2	5	5q15	+
ELOVL2	ELOVL2	elongation of very long chain fatty acids (FEN1/Elo2, SUR4/Elo3, yeast)-like 2	6	6p24.2	+
ELOVL6	ELOVL6	ELOVL family member 6, elongation of long chain fatty acids (FEN1/Elo2, SUR4/Elo3-like, yeast)	4	4q25	+
EML4	EML4	echinoderm microtubule associated protein like 4	2	2p21	+
EN2	EN2	engrailed homolog 2	7	7q36	+
ENAH	ENAH	enabled homolog (Drosophila)	1	1q42.12	+
ENOX2	ENOX2	ecto-NOX disulfide-thiol exchanger 2	X	Xq25	+
ENPEP	ENPEP	glutamyl aminopeptidase (aminopeptidase A)	4	4q25	+
ENPP5	ENPP5	ectonucleotide pyrophosphatase/phosphodiesterase 5 (putative function)	6	6p21.1-p11.2	+
ENSA	ENSA	endosulfine alpha	1	1q21.3	+
ENTPD1	ENTPD1	ectonucleoside triphosphate diphosphohydrolase 1	10	10q24	+
EPB41L1	EPB41L1	erythrocyte membrane protein band 4.1-like 1	20	20q11.2-q12	+
EPB49	EPB49	erythrocyte membrane protein band 4.9 (dematin)	8	8p21.1	+
EPHA3	EPHA3	EPH receptor A3	3	3p11.2	+
EPHA4	EPHA4	EPH receptor A4	2	2q36.1	+
EPHA7	EPHA7	EPH receptor A7	6	6q16.1	+
EPHB2	EPHB2	EPH receptor B2	1	1p36.1-p35	+
EPHB6	EPHB6	EPH receptor B6	7	7q33-q35	+
EPM2A	EPM2A	epilepsy, progressive myoclonus type 2A, Lafora disease (laforin)	6	6q24	+
EPS15	EPS15	epidermal growth factor receptor pathway substrate 15	1	1p32	+
EPS8	EPS8	epidermal growth factor receptor pathway substrate 8	12	12p12.3	+
ERAP1	ERAP1	endoplasmic reticulum aminopeptidase 1	5	5q15	+
ERBB4	ERBB4	v-erb-a erythroblastic leukemia viral oncogene homolog 4 (avian)	2	2q33.3-q34	+

ERC2	ERC2	ELKS/RAB6-interacting/CAST family member 2	3	3p14.3	+
ERF	ERF	Ets2 repressor factor	19	19q13	+
ERGIC2	ERGIC2	ERGIC and golgi 2	12	12p11.22	+
ERLIN2	ERLIN2	ER lipid raft associated 2	8	8p11.2	+
ERRFI1	ERRFI1	ERBB receptor feedback inhibitor 1	1	1p36	+
ESRRG	ESRRG	estrogen-related receptor gamma	1	1q41	+
ETNK1	ETNK1	ethanolamine kinase 1	12	12p12.1	+
ETS1	ETS1	v-ets erythroblastosis virus E26 oncogene homolog 1 (avian)	11	11q23.3	+
ETS2	ETS2	v-ets erythroblastosis virus E26 oncogene homolog 2 (avian)	21	21q22.3 21q22.2	+
ETV6	ETV6	ets variant gene 6 (TEL oncogene)	12	12p13	+
EXOC5	EXOC5	exocyst complex component 5	14	14q22.3	+
EXT2	EXT2	exostoses (multiple) 2	11	11p12-p11	+
EZR	EZR	coagulation factor III (thromboplastin, tissue factor)	6	6q25.3	+
F3	F3	coagulation factor III (thromboplastin, tissue factor)	1	1p22-p21	+
FAIM2	FAIM2	Fas apoptotic inhibitory molecule 2	12	12q13	+
FAM102A	FAM102A	family with sequence similarity 102, member A	9	9q34.11	+
FAM102B	FAM102B	family with sequence similarity 102, member B	1	1p13.3	+
FAM105B	FAM105B	family with sequence similarity 105, member B	5	5p15.2	+
FAM116A	FAM116A	family with sequence similarity 116, member A	3	3p14.3	+
FAM119B	METTL21B	family with sequence similarity 119, member B	12	12q14.1	-
FAM120A	FAM120A	family with sequence similarity 120A	9	9q22.31	+
FAM120C	FAM120C	family with sequence similarity 120C	X	Xp11.22	-
FAM126A	FAM126A	family with sequence similarity 126, member A	7	7p15.3	+
FAM130A1	CSRNP2	cysteine-serine-rich nuclear protein 2	12	12q13.11-q13.12	-
FAM131A	FAM131A	family with sequence similarity 131, member A	3	3q27.1	+

FAM131B	FAM131B	family with sequence similarity 131, member B	7	7q34	-
FAM134A	FAM134A	family with sequence similarity 134, member A	2	2q35	+
FAM134C	FAM134C	family with sequence similarity 134, member C	17	17q21.2	+
FAM135A	FAM135A	family with sequence similarity 135, member A	6	6q13	-
FAM135B	FAM135B	family with sequence similarity 135, member B	8	8q24.23	-
FAM150B	FAM150B	family with sequence similarity 150, member B	2	2p25.3	+
FAM152A	PPPDE1	PPPDE peptidase domain containing 1	1	1q44	+
FAM155B	FAM155B	family with sequence similarity 155, member B	X	Xq13.1	+
FAM160A2	FAM160A2	family with sequence similarity 160, member A2	11	11p15.4	+
FAM160B1	FAM160B1	family with sequence similarity 160, member B1	10	10q25.3	+
FAM160B2	FAM160B2	family with sequence similarity 160, member B2	8	8p21.3	+
FAM163A	FAM163A	family with sequence similarity 163, member A	1	1q25.2	+
FAM168B	FAM168B	family with sequence similarity 168, member B	2	2q21.1	+
FAM176A	FAM176A	family with sequence similarity 176, member A	2	2p12	+
FAM19A5	FAM19A5	family with sequence similarity 19 (chemokine (C-C motif)-like), member A5	22	22q13.32	+
FAM46C	FAM46C	family with sequence similarity 46, member C	1	1p12	-
FAM53C	FAM53C	family with sequence similarity 53, member C	5	5q31	+
FAM57A	FAM57A	family with sequence similarity 57, member A	17	17p13.3	+
FAM58A	FAM58A	family with sequence similarity 58, member A	X	Xq28	+
FAM62B	ESYT2	family with sequence similarity 62 (C2 domain containing) member B	7	7q36.3	+
FAM69A	FAM69A	family with sequence similarity 69, member A	1	1p22.1	+
FAM70A	FAM70A	family with sequence similarity 70, member A	X	Xq24	+
FAM80A	RIMKLA	family with sequence similarity 80, member A	1	1p34.2	-
FAM80B	RIMKLB	family with sequence similarity 80, member B	12	12p13.31	+
FAM81A	FAM81A	family with sequence similarity 81, member A	15	15q22.2	+

FAM82A2	FAM82A2	family with sequence similarity 82, member A2	15	15q15.1	+
FAM84B	FAM84B	family with sequence similarity 84, member B	8	8q24.21	+
FAM86B1	FAM86B1	family with sequence similarity 86, member B1	8	8p23.1	+
FAM86C	FAM86C	family with sequence similarity 86, member C	11	11q13.4	+
FAM8A1	FAM8A1	family with sequence similarity 8, member A1	6	6p23	+
FAM91A1	FAM91A1	family with sequence similarity 91, member A1	8	8q24.13	+
FAT2	FAT2	FAT tumor suppressor homolog 2 (Drosophila)	5	5q33.1	+
FAT3	FAT3	FAT tumor suppressor homolog 3 (Drosophila)	11	11q14.3	+
FBN1	FBN1	fibrillin 1	15	15q21.1	+
FBN2	FBN2	fibrillin 2 (congenital contractural arachnodactyly)	5	5q23-q31	+
FBXL7	FBXL7	F-box and leucine-rich repeat protein 7	5	5p15.1	+
FBXO21	FBXO21	F-box protein 21	12	12q24.22	+
FBXO24	FBXO24	F-box protein 24	7	7q22	+
FBXO33	FBXO33	F-box protein 33	14	14q21.1	-
FBXO40	FBXO40	F-box protein 40	3	3q13.33	+
FBXO6	FBXO6	F-box protein 6	1	1p36.22	+
FBXW11	FBXW11	F-box and WD-40 domain protein 11	5	5q35.1	+
FBXW2	FBXW2	F-box and WD-40 domain protein 2	9	9q34	+
FBXW7	FBXW7	F-box and WD-40 domain protein 7 (archipelago homolog, Drosophila)	4	4q31.3	+
FCHO2	FCHO2	FCH domain only 2	5	5q13.2	+
FCHSD2	FCHSD2	FCH and double SH3 domains 2	11	11q13.4	+
FCRL4	FCRL4	Fc receptor-like 4	1	1q21	+
FEM1C	FEM1C	fem-1 homolog c (C.elegans)	5	5q22	+
FGD1	FGD1	FYVE, RhoGEF and PH domain containing 1 (faciogenital dysplasia)	X	Xp11.21	+
FGF13	FGF13	fibroblast growth factor 13	X	Xq26.3	+

FGF7	FGF7	fibroblast growth factor 7 (keratinocyte growth factor)	15	15q21.2	+
FHDC1	FHDC1	FH2 domain containing 1	4	4q31.3	+
FIBIN	FIBIN	fin bud initiation factor homolog (zebrafish)	11	11p14.2	+
FIGN	FIGN	fidgetin	2	2q24.3	+
FIGNL2	FIGNL2	fidgetin-like 2	12	12q13.13	+
FILIP1L	FILIP1L	filamin A interacting protein 1-like	3	3q12.1	+
FKBP4	FKBP4	FK506 binding protein 4, 59kDa	12	12p13.33	+
FKBP5	FKBP5	FK506 binding protein 5	6	6p21.31	+
FLG2	FLG2	filaggrin family member 2	1	1q21.3	+
FLJ12529	CPSF7	cleavage and polyadenylation specific factor 7, 59kDa	11	11q12.2	+
FLJ20309	INO80D	INO80 complex subunit D	2	2q33.3	+
FLJ30851	LOC375190	uncharacterized protein LOC375190	2	2p23.3	+
FLJ37543	C5orf64	chromosome 5 open reading frame 64	5	5q12.1	-
FLJ43582	C8orf86	chromosome 8 open reading frame 86	8	8p11.22	-
FLJ44815	C17orf102	chromosome 17 open reading frame 102	17	17q12	-
FLJ44838	FLJ44838	FLJ44838 uncharacterized LOC644767	17	-	-
FLRT2	FLRT2	fibronectin leucine rich transmembrane protein 2	14	14q24-q32	+
FMNL2	FMNL2	formin-like 2	2	2q23.3	+
FMR1	FMR1	fragile X mental retardation 1	X	Xq27.3	+
FN1	FN1	fibronectin 1	2	2q34	+
FNDC3A	FNDC3A	fibronectin type III domain containing 3A	13	13q14.2	+
FNDC3B	FNDC3B	fibronectin type III domain containing 3B	3	3q26.31	+
FNDC5	FNDC5	fibronectin type III domain containing 5	1	1p35.1	+
FNIP1	FNIP1	folliculin interacting protein 1	5	5q23.3	+
FOXC1	FOXC1	forkhead box C1	6	6p25	+
FOXF1	FOXF1	forkhead box F1	16	16q24	+
FO XK2	FO XK2	forkhead box K2	17	17q25	+

FOXL2	FOXL2	forkhead box L2	3	3q23	+
FOXM1	FOXM1	forkhead box M1	12	12p13	+
FOXN2	FOXN2	forkhead box N2	2	2p22-p16	+
FOXN3	FOXN3	forkhead box N3	14	14q31.3	+
FOXO1	FOXO1	forkhead box O1	13	13q14.1	+
FOXO3	FOXO3	forkhead box O3	6	6q21	+
FOXO4	FOXO4	forkhead box O4	X	Xq13.1	+
FOXP1	FOXP1	forkhead box P1	3	3p14.1	+
FOXP2	FOXP2	forkhead box P2	7	7q31	+
FOXQ1	FOXQ1	forkhead box Q1	6	6p25	+
FRAG1	PGAP2	post-GPI attachment to proteins 2	11	11p15.5	+
FRAS1	FRAS1	Fraser syndrome 1	4	4q21.21	+
FRMD4A	FRMD4A	FERM domain containing 4A	10	10p13	+
FRMD6	FRMD6	FERM domain containing 6	14	14q22.1	+
FRMPD4	FRMPD4	FERM and PDZ domain containing 4	X	Xp22.2	+
FRS2	FRS2	fibroblast growth factor receptor substrate 2	12	12q15	+
FSTL4	FSTL4	follistatin-like 4	5	5q31.1	+
FTL	FTL	ferritin, light polypeptide	19	19q13.33	+
FUBP1	FUBP1	far upstream element (FUSE) binding protein 1	1	1p31.1	+
FURIN	FURIN	furin (paired basic amino acid cleaving enzyme)	15	15q26.1	+
FXN	FXN	frataxin	9	9q21.11	+
FXR1	FXR1	fragile X mental retardation, autosomal homolog 1	3	3q28	+
FXR2	FXR2	fragile X mental retardation, autosomal homolog 2	17	17p13.1	+
FYB	FYB	FYN binding protein (FYB-120/130)	5	5p13.1	+
FYCO1	FYCO1	FYVE and coiled-coil domain containing 1	3	3p21.31	+
FZD5	FZD5	frizzled homolog 5 (Drosophila)	2	2q33.3	+
FZD6	FZD6	frizzled homolog 6 (Drosophila)	8	8q22.3-q23.1	+

FZD7	FZD7	frizzled homolog 7 (Drosophila)	2	2q33	+
FZD8	FZD8	frizzled homolog 8 (Drosophila)	10	10p11.21	+
G3BP2	G3BP2	GTPase activating protein (SH3 domain) binding protein 2	4	4q21.1	+
GAB2	GAB2	GRB2-associated binding protein 2	11	11q14.1	+
GABBR2	GABBR2	gamma-aminobutyric acid (GABA) B receptor, 2	9	9q22.1-q22.3	+
GABPA	GABPA	GA binding protein transcription factor, alpha subunit 60kDa	21	21q21-q22.1 21q21.3	+
GABRA3	GABRA3	gamma-aminobutyric acid (GABA) A receptor, alpha 3	X	Xq28	+
GABRA4	GABRA4	gamma-aminobutyric acid (GABA) A receptor, alpha 4	4	4p12	+
GABRB2	GABRB2	gamma-aminobutyric acid (GABA) A receptor, beta 2	5	5q34	+
GALNT13	GALNT13	UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 13 (GalNAc-T13)	2	2q24.1	+
GALNT17	GALNTL6	UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase-like 6	4	4q34.1	-
GALNT2	GALNT2	UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 2 (GalNAc-T2)	1	1q41-q42	+
GAN	GAN	giant axonal neuropathy (gigaxonin)	16	16q24.1	+
GATA4	GATA4	GATA binding protein 4	8	8p23.1-p22	+
GATA6	GATA6	GATA binding protein 6	18	18q11.1-q11.2	+
GATAD2B	GATAD2B	GATA zinc finger domain containing 2B	1	1q21.3	+
GBF1	GBF1	golgi-specific brefeldin A resistance factor 1	10	10q24	+
GCC2	GCC2	GRIP and coiled-coil domain containing 2	2	2q12.3	+
GCH1	GCH1	GTP cyclohydrolase 1 (dopa-responsive dystonia)	14	14q22.1-q22.2	+
GCLC	GCLC	glutamate-cysteine ligase, catalytic subunit	6	6p12	+
GCLM	GCLM	glutamate-cysteine ligase, modifier subunit	1	1p22.1	+
GCNT2	GCNT2	glucosaminyl (N-acetyl) transferase 2, I-branching enzyme (I blood group)	6	6p24.2	+

Gcom1	GCOM1	GRINL1A complex locus	15	15q21.3	+
GDAP1	GDAP1	ganglioside-induced differentiation-associated protein 1	8	8q21.11	+
GDF6	GDF6	growth differentiation factor 6	8	8q22.1	+
GDI1	GDI1	GDP dissociation inhibitor 1	X	Xq28	+
GDPD5	GDPD5	glycerophosphodiester phosphodiesterase domain containing 5	11	11q13.4-q13.5	+
GEM	GEM	GTP binding protein overexpressed in skeletal muscle	8	8q13-q21	+
GEMIN8	GEMIN8	gem (nuclear organelle) associated protein 8	X	Xp22.2	+
GGA2	GGA2	golgi associated, gamma adaptin ear containing, ARF binding protein 2	16	16p12	+
GGCX	GGCX	gamma-glutamyl carboxylase	2	2p12	+
GIT1	GIT1	G protein-coupled receptor kinase interactor 1	17	17p11.2	+
GJA1	GJA1	gap junction protein, alpha 1, 43kDa (connexin 43)	6	6q21-q23.2	+
GJB7	GJB7	gap junction protein, beta 7	6	6q15	+
GJC1	GJC1	gap junction protein, chi 1, 31.9kDa (connexin 31.9)	17	17q21.31	+
GK	GK	glycerol kinase	X	Xp21.3	+
GK5	GK5	glycerol kinase 5 (putative)	3	3q23	+
GLCCI1	GLCCI1	glucocorticoid induced transcript 1	7	7p21.3	+
GLCE	GLCE	UDP-glucuronic acid epimerase	15	15q23	+
GLI3	GLI3	GLI-Kruppel family member GLI3 (Greig cephalopolysyndactyly syndrome)	7	7p13	+
GLIS3	GLIS3	GLIS family zinc finger 3	9	9p24.2	-
GLP1R	GLP1R	glucagon-like peptide 1 receptor	6	6p21	+
GLT8D3	GXYLT1	glycosyltransferase 8 domain containing 3	12	12q12	-
GLTSCR1	GLTSCR1	glioma tumor suppressor candidate region gene 1	19	19q13.3	+
GNAI2	GNAI2	guanine nucleotide binding protein (G protein), alpha inhibiting activity polypeptide 2	3	3p21	+
GNAI3	GNAI3	guanine nucleotide binding protein (G protein), alpha	1	1p13	+

		inhibiting activity polypeptide 3			
GNB5	GNB5	guanine nucleotide binding protein (G protein), beta 5	15	15q21.2	+
GNE	GNE	glucosamine (UDP-N-acetyl)-2-epimerase/N-acetylmannosamine kinase	9	9p13.3	+
GNG4	GNG4	guanine nucleotide binding protein (G protein), gamma 4	1	1q42.3	+
GNPDA2	GNPDA2	glucosamine-6-phosphate deaminase 2	4	4p12	+
GNPNAT1	GNPNAT1	glucosamine-phosphate N-acetyltransferase 1	14	14q22.1	+
GNS	GNS	glucosamine (N-acetyl)-6-sulfatase (Sanfilippo disease IIID)	12	12q14	+
GOLGA1	GOLGA1	golgi autoantigen, golgin subfamily a, 1	9	9q33.3	+
GOLGA3	GOLGA3	golgi autoantigen, golgin subfamily a, 3	12	12q24.33	+
GOLGA8A	GOLGA8A	golgi autoantigen, golgin subfamily a, 8A	15	15q11.2	+
GOSR2	GOSR2	golgi SNAP receptor complex member 2	17	17q21	+
GPAM	GPAM	glycerol-3-phosphate acyltransferase, mitochondrial	10	10q25.2	+
GPATCH8	GPATCH8	G patch domain containing 8	17	17q21.31	+
GPD2	GPD2	glycerol-3-phosphate dehydrogenase 2 (mitochondrial)	2	2q24.1	+
GPM6A	GPM6A	glycoprotein M6A	4	4q34	+
GPM6B	GPM6B	glycoprotein M6B	X	Xp22.2	+
GPR107	GPR107	G protein-coupled receptor 107	9	9q34.11	+
GPR137C	GPR137C	G protein-coupled receptor 137C	14	14q22.1	+
GPR155	GPR155	G protein-coupled receptor 155	2	2q31.1	+
GPR158	GPR158	G protein-coupled receptor 158	10	10p12.1	+
GPR162	GPR162	G protein-coupled receptor 162	12	12p13	+
GPR173	GPR173	G protein-coupled receptor 173	X	Xp11	+
GPR37L1	GPR37L1	G protein-coupled receptor 37 like 1	1	1q32.1	+
GPR85	GPR85	G protein-coupled receptor 85	7	7q31	+

GPX3	GPX3	glutathione peroxidase 3 (plasma)	5	5q23	+
GREM2	GREM2	gremlin 2, cysteine knot superfamily, homolog (Xenopus laevis)	1	1q43	+
GRHL1	GRHL1	grainyhead-like 1 (Drosophila)	2	2p25.1	+
GRHL2	GRHL2	grainyhead-like 2 (Drosophila)	8	8q22.3	+
GRIA2	GRIA2	glutamate receptor, ionotropic, AMPA 2	4	4q32-q33	+
GRIK2	GRIK2	glutamate receptor, ionotropic, kainate 2	6	6q16.3-q21	+
GRIK3	GRIK3	glutamate receptor, ionotropic, kainate 3	1	1p34-p33	+
GRIN2A	GRIN2A	glutamate receptor, ionotropic, N-methyl D-aspartate 2A	16	16p13.2	+
GRIN3A	GRIN3A	glutamate receptor, ionotropic, N-methyl-D-aspartate 3A	9	9q31.1	+
GRINL1A	GRINL1A	glutamate receptor, ionotropic, N-methyl D-aspartate-like 1A	15	15q22.1	+
GRLF1	GRLF1	glucocorticoid receptor DNA binding factor 1	19	19q13.3	+
GRM3	GRM3	glutamate receptor, metabotropic 3	7	7q21.1-q21.2	+
GRM5	GRM5	glutamate receptor, metabotropic 5	11	11q14.3	+
GSG1L	GSG1L	GSG1-like	16	16p12.1	+
GTDC1	GTDC1	glycosyltransferase-like domain containing 1	2	2q22.3	+
GTF2I	GTF2I	general transcription factor II, i	7	7q11.23	+
GTPBP2	GTPBP2	GTP binding protein 2	6	6p21	+
GUCY1A3	GUCY1A3	guanylate cyclase 1, soluble, alpha 3	4	4q31.3-q33 4q31.1-q31.2	+
GULP1	GULP1	GULP, engulfment adaptor PTB domain containing 1	2	2q32.3-q33	+
H3F3B	H3F3B	H3 histone, family 3B (H3.3B)	17	17q25	+
HCLS1	HCLS1	hematopoietic cell-specific Lyn substrate 1	3	3q13	+
HCN1	HCN1	hyperpolarization activated cyclic nucleotide-gated potassium channel 1	5	5p12	+

HDAC4	HDAC4	histone deacetylase 4	2	2q37.3	+
HDAC5	HDAC5	histone deacetylase 5	17	17q21	+
HDGFRP3	HDGFRP3	hepatoma-derived growth factor, related protein 3	15	15q25.2	+
HECA	HECA	headcase homolog (Drosophila)	6	6q23-q24	+
HEG1	HEG1	HEG homolog 1 (zebrafish)	3	3q21.2	+
HELZ	HELZ	helicase with zinc finger	17	17q24.2	+
HERPUD2	HERPUD2	HERPUD family member 2	7	7p14.2	+
HES7	HES7	hairy and enhancer of split 7 (Drosophila)	17	17p13.1	+
HGSNAT	HGSNAT	heparan-alpha-glucosaminide N-acetyltransferase	8	8p11.1	+
HIAT1	HIAT1	hippocampus abundant transcript 1	1	1p21.2	+
HIF1AN	HIF1AN	hypoxia-inducible factor 1, alpha subunit inhibitor	10	10q24	+
HIF3A	HIF3A	hypoxia inducible factor 3, alpha subunit	19	19q13.32	+
HIGD1A	HIGD1A	HIG1 domain family, member 1A	3	3p22.1	+
HIPK2	HIPK2	homeodomain interacting protein kinase 2	7	7q32-q34	+
HIVEP2	HIVEP2	human immunodeficiency virus type I enhancer binding protein 2	6	6q23-q24	+
HLA-DOA	HLA-DOA	major histocompatibility complex, class II, DO alpha	6	6p21.3	+
HLCS	HLCS	holocarboxylase synthetase (biotin-(propionyl-Coenzyme A-carboxylase (ATP-hydrolysing)) ligase)	21	21q22.1 21q22.13	+
HLF	HLF	hepatic leukemia factor	17	17q22	+
HMGB1	HMGB1	high-mobility group box 1	13	13q12	+
HMGB3	HMGB3	high-mobility group box 3	X	Xq28	+
HMX2	HMX2	homeobox (H6 family) 2	10	10q26.13	+
HN1L	HN1L	hematological and neurological expressed 1-like	16	16p13.3	+
HNF1B	HNF1B	HNF1 homeobox B	17	17cen-q21.3	+
HNRNPA2B1	HNRNPA2B1	heterogeneous nuclear ribonucleoprotein A2/B1	7	7p15	+
HNRNPA3	HNRNPA3	heterogeneous nuclear ribonucleoprotein A3	2	2q31.2	+

HNRNPU	HNRNPU	heterogeneous nuclear ribonucleoprotein U (scaffold attachment factor A)	1	1q44	+
HOOK3	HOOK3	hook homolog 3 (Drosophila)	8	8p11.21	+
HOXA10	HOXA10	homeobox A10	7	7p15.2	+
HOXA13	HOXA13	homeobox A13	7	7p15.2	+
HOXA3	HOXA3	homeobox A3	7	7p15.2	+
HOXB13	HOXB13	homeobox B13	17	17q21.2	+
HOXB3	HOXB3	homeobox B3	17	17q21.3	+
HOXB5	HOXB5	homeobox B5	17	17q21.3	+
HOXD13	HOXD13	homeobox D13	2	2q31.1	+
HPCA	HPCA	hippocalcin	1	1p35-p34.2	+
HPS5	HPS5	Hermansky-Pudlak syndrome 5	11	11p14	+
HRBL	AGFG2	HIV-1 Rev binding protein-like	7	7q22.1	+
HS3ST1	HS3ST1	heparan sulfate (glucosamine) 3-O-sulfotransferase 1	4	4p16	+
HS3ST3B1	HS3ST3B1	heparan sulfate (glucosamine) 3-O-sulfotransferase 3B1	17	17p12	+
HS6ST3	HS6ST3	heparan sulfate 6-O-sulfotransferase 3	13	13q32.1	+
HSD11B2	HSD11B2	hydroxysteroid (11-beta) dehydrogenase 2	16	16q22	+
HSF5	HSF5	heat shock transcription factor family member 5	17	17q22	+
HSPA5	HSPA5	heat shock 70kDa protein 5 (glucose-regulated protein, 78kDa)	9	9q33.3	+
HSPA8	HSPA8	heat shock 70kDa protein 8	11	11q24.1	+
HSPC159	HSPC159	lectin, galactoside-binding-like	2	2p14	+
HTT	HTT	huntingtin	4	4p16.3	+
IAPP	IAPP	islet amyloid polypeptide	12	12p12.1	+
IBSP	IBSP	integrin-binding sialoprotein (bone sialoprotein, bone sialoprotein II)	4	4q21.1	+
ICHTHYIN	NIPAL4	NIPA-like domain containing 4	5	5q33.3	+

IER2	IER2	immediate early response 2	19	19p13.2	+
IER3	IER3	immediate early response 3	6	6p21.3	+
IER5	IER5	immediate early response 5	1	1q25.3	+
IFT20	IFT20	intraflagellar transport 20 homolog (Chlamydomonas)	17	17q11.2	+
IGF1	IGF1	insulin-like growth factor 1 (somatomedin C)	12	12q23.2	+
IGF1R	IGF1R	insulin-like growth factor 1 receptor	15	15q26.3	+
IGF2BP1	IGF2BP1	insulin-like growth factor 2 mRNA binding protein 1	17	17q21.32	+
IGF2BP2	IGF2BP2	insulin-like growth factor 2 mRNA binding protein 2	3	3q27.2	+
IGF2BP3	IGF2BP3	insulin-like growth factor 2 mRNA binding protein 3	7	7p11	+
IGFBP5	IGFBP5	insulin-like growth factor binding protein 5	2	2q33-q36	+
IGSF1	IGSF1	immunoglobulin superfamily, member 1	X	Xq25	+
IGSF11	IGSF11	immunoglobulin superfamily, member 11	3	3q13.32	+
IGSF9B	IGSF9B	immunoglobulin superfamily, member 9B	11	11q25	-
IKZF2	IKZF2	IKAROS family zinc finger 2 (Helios)	2	2q34	+
IKZF4	IKZF4	IKAROS family zinc finger 4 (Eos)	12	12q13	+
IL1F5	IL1F5	interleukin 1 family, member 5 (delta)	2	2q14	+
IL20RA	IL20RA	interleukin 20 receptor, alpha	6	6q23.3	+
IL28RA	IL28RA	interleukin 28 receptor, alpha (interferon, lambda receptor)	1	1p36.11	+
IMMP2L	IMMP2L	IMP2 inner mitochondrial membrane peptidase-like (S. cerevisiae)	7	7q31	+
ING4	ING4	inhibitor of growth family, member 4	12	12p13.31	+
ING5	ING5	inhibitor of growth family, member 5	2	2q37.3	+
INPP5B	INPP5B	inositol polyphosphate-5-phosphatase, 75kDa	1	1p34	+
INSIG2	INSIG2	insulin induced gene 2	2	2q14.2	+
INSR	INSR	insulin receptor	19	19p13.3-p13.2	+
INTS6	INTS6	integrator complex subunit 6	13	13q14.3	+

INTS8	INTS8	integrator complex subunit 8	8	8q22.1	+
IPO8	IPO8	importin 8	12	12p11.21	+
IPO9	IPO9	importin 9	1	1q32.1	+
IPPK	IPPK	inositol 1,3,4,5,6-pentakisphosphate 2-kinase	9	9q22.31	+
IQWD1	DCAF6	IQ motif and WD repeats 1	1	1q24.2	+
IRAK1	IRAK1	interleukin-1 receptor-associated kinase 1	X	Xq28	+
IRAK2	IRAK2	interleukin-1 receptor-associated kinase 2	3	3p25.3	+
IREB2	IREB2	iron-responsive element binding protein 2	15	15q25.1	+
IRS2	IRS2	insulin receptor substrate 2	13	13q34	+
IRX5	IRX5	iroquois homeobox protein 5	16	16q12.2	+
ISL1	ISL1	ISL1 transcription factor, LIM/homeodomain, (islet-1)	5	5q11.1	+
ISL2	ISL2	ISL2 transcription factor, LIM/homeodomain, (islet-2)	15	15q23	+
ITGA2	ITGA2	integrin, alpha 2 (CD49B, alpha 2 subunit of VLA-2 receptor)	5	5q11.2	+
ITGA9	ITGA9	integrin, alpha 9	3	3p21.3	+
ITGAV	ITGAV	integrin, alpha V (vitronectin receptor, alpha polypeptide, antigen CD51)	2	2q31-q32	+
ITGB1BP1	ITGB1BP1	integrin beta 1 binding protein 1	2	2p25.2	+
ITGB8	ITGB8	integrin, beta 8	7	7p21.1	+
ITM2C	ITM2C	integral membrane protein 2C	2	2q37	+
ITPKB	ITPKB	inositol 1,4,5-trisphosphate 3-kinase B	1	1q42.13	+
ITPR1	ITPR1	inositol 1,4,5-triphosphate receptor, type 1	3	3p26.1	+
ITSN1	ITSN1	intersectin 1 (SH3 domain protein)	21	21q22.1-q22.2	+
IVNS1ABP	IVNS1ABP	influenza virus NS1A binding protein	1	1q25.1-q31.1	+
JARID1A	KDM5A	jumonji, AT rich interactive domain 1A	12	12p11	+
JARID1B	KDM5B	jumonji, AT rich interactive domain 1B	1	1q32.1	+
JDP2	JDP2	Jun dimerization protein 2	14	14q24.3	+

JHDM1D	JHDM1D	jumonji C domain containing histone demethylase 1 homolog D (<i>S. cerevisiae</i>)	7	7q34	+
JMJD2A	KDM4A	jumonji domain containing 2A	1	1p34.1	+
JOSD1	JOSD1	Josephin domain containing 1	22	22q13.1	+
JRKL	JRKL	jerky homolog-like (mouse)	11	11q21	+
KAL1	KAL1	Kallmann syndrome 1 sequence	X	Xp22.32	+
KANK4	KANK4	KN motif and ankyrin repeat domains 4	1	1p31.3	-
KAT2B	KAT2B	K(lysine) acetyltransferase 2B	3	3p24	+
KCMF1	KCMF1	potassium channel modulatory factor 1	2	2p11.2	+
KCNA6	KCNA6	potassium voltage-gated channel, shaker-related subfamily, member 6	12	12p13	+
KCNAB1	KCNAB1	potassium voltage-gated channel, shaker-related subfamily, beta member 1	3	3q26.1	+
KCNB2	KCNB2	potassium voltage-gated channel, Shab-related subfamily, member 2	8	8q13.2	+
KCNC1	KCNC1	potassium voltage-gated channel, Shaw-related subfamily, member 1	11	11p15	+
KCNC4	KCNC4	potassium voltage-gated channel, Shaw-related subfamily, member 4	1	1p21	+
KCND1	KCND1	potassium voltage-gated channel, Shal-related subfamily, member 1	X	Xp11.23	+
KCNE4	KCNE4	potassium voltage-gated channel, Isk-related family, member 4	2	2q36.3	+
KCNIP1	KCNIP1	Kv channel interacting protein 1	5	5q35.1	+
KCNIP3	KCNIP3	Kv channel interacting protein 3, calsenilin	2	2q21.1	+
KCNJ11	KCNJ11	potassium inwardly-rectifying channel, subfamily J, member 11	11	11p15.1	+
KCNJ2	KCNJ2	potassium inwardly-rectifying channel, subfamily J, member 2	17	17q24.3	+

KCNK2	KCNK2	potassium channel, subfamily K, member 2	1	1q41	+
KCNMA1	KCNMA1	potassium large conductance calcium-activated channel, subfamily M, alpha member 1	10	10q22.3	+
KCNMB4	KCNMB4	potassium large conductance calcium-activated channel, subfamily M, beta member 4	12	12q	+
KCTD10	KCTD10	potassium channel tetramerisation domain containing 10	12	12q24.11	+
KCTD20	KCTD20	potassium channel tetramerisation domain containing 20	6	6p21.31	+
KCTD5	KCTD5	potassium channel tetramerisation domain containing 5	16	16p13.3	+
KERA	KERA	keratocan	12	12q22	+
KHDRBS1	KHDRBS1	KH domain containing, RNA binding, signal transduction associated 1	1	1p32	+
KIAA0152	MLEC	KIAA0152	12	12q24.31	+
KIAA0182	KIAA0182	KIAA0182	16	16q24.1	+
KIAA0232	KIAA0232	KIAA0232	4	4p16.1	+
KIAA0256	SECISBP2L	SECIS binding protein 2-like	15	15q21.1	-
KIAA0319L	KIAA0319L	KIAA0319-like	1	1p34.2	+
KIAA0323	KHNYN	KIAA0323	14	14q12	+
KIAA0355	KIAA0355	KIAA0355	19	19q13.11	-
KIAA0430	KIAA0430	KIAA0430	16	16p13.11	+
KIAA0494	KIAA0494	KIAA0494	1	1pter-p22.1	+
KIAA0515	PPAPDC3	KIAA0515	9	9q34.13	+
KIAA0831	ATG14	KIAA0831	14	14q22.3	+
KIAA0999	SIK3	SIK family kinase 3	11	11q23.3	+
KIAA1045	KIAA1045	KIAA1045	9	9p13.3	+
KIAA1109	KIAA1109	KIAA1109	4	4q27	+
KIAA1128	FAM190B	KIAA1128	10	10q23.1	+

KIAA1161	KIAA1161	KIAA1161	9	9p13.3	+
KIAA1191	KIAA1191	KIAA1191	5	5q35.2	+
KIAA1219	RALGAPB	KIAA1219	20	20q11.23	+
KIAA1279	KIAA1279	KIAA1279	10	10q22.1	+
KIAA1324L	KIAA1324L	KIAA1324-like	7	7q21.12	+
KIAA1394	CARNS1	carnosine synthase 1	11	11q13.2	-
KIAA1429	KIAA1429	KIAA1429	8	8q22.1	+
KIAA1539	KIAA1539	KIAA1539	9	9p13.3	+
KIAA1632	EPG5	KIAA1632	18	18q12.3	+
KIAA1715	KIAA1715	KIAA1715	2	2q31	+
KIAA1787	NEURL4	neuralized homolog 4 (Drosophila)	17	17p13	-
KIAA1804	KIAA1804	mixed lineage kinase 4	1	1q42	+
KIAA1853	SRRM4	KIAA1853	12	12q24.23	-
KIAA2018	KIAA2018	KIAA2018	3	3q13.2	+
KIAA2022	KIAA2022	KIAA2022	X	Xq13.3	+
KIF11	KIF11	kinesin family member 11	10	10q24.1	+
KIF13B	KIF13B	kinesin family member 13B	8	8p12	+
KIF1B	KIF1B	kinesin family member 1B	1	1p36.2	+
KIF2A	KIF2A	kinesin heavy chain member 2A	5	5q12-q13	+
KIF3B	KIF3B	kinesin family member 3B	20	20q11.21	+
KIF3C	KIF3C	kinesin family member 3C	2	2p23	+
KIF5A	KIF5A	kinesin family member 5A	12	12q13.13	+
KIF5C	KIF5C	kinesin family member 5C	2	2q23.1	+
KIFC2	KIFC2	kinesin family member C2	8	8q24.3	+
KLF12	KLF12	Kruppel-like factor 12	13	13q22	+
KLF17	KLF17	Kruppel-like factor 17	1	1p34.1	+
KLF3	KLF3	Kruppel-like factor 3 (basic)	4	4p14	+

KLF4	KLF4	Kruppel-like factor 4 (gut)	9	9q31	+
KLF6	KLF6	Kruppel-like factor 6	10	10p15	+
KLF9	KLF9	Kruppel-like factor 9	9	9q13	+
KLHDC8A	KLHDC8A	kelch domain containing 8A	1	1q32.1	-
KLHL12	KLHL12	kelch-like 12 (Drosophila)	1	1q32.1	+
KLHL14	KLHL14	kelch-like 14 (Drosophila)	18	18q12.1	+
KLHL18	KLHL18	kelch-like 18 (Drosophila)	3	3p21.31	+
KLHL28	KLHL28	kelch-like 28 (Drosophila)	14	14q21.2	+
KLHL3	KLHL3	kelch-like 3 (Drosophila)	5	5q31	+
KLHL6	KLHL6	kelch-like 6 (Drosophila)	3	-	+
KNCN	KNCN	karyopherin alpha 1 (importin alpha 5)	1	1p33	+
KPNA1	KPNA1	karyopherin alpha 3 (importin alpha 4)	3	3q21	+
KPNA3	KPNA3	karyopherin alpha 6 (importin alpha 7)	13	13q14.3	+
KPNA6	KPNA6	v-Ki-ras2 Kirsten rat sarcoma viral oncogene homolog	1	1p35.1	+
KRAS	KRAS	KRIT1, ankyrin repeat containing	12	12p12.1	+
KRIT1	KRIT1	keratin 77	7	7q21.2	+
KRT77	KRT77	kinase suppressor of ras 2	12	12q13.13	+
KSR2	KSR2	kyphoscoliosis peptidase	12	12q24.22-q24.23	+
KY	KY	L-2-hydroxyglutarate dehydrogenase	3	3q22.2	+
L2HGDH	L2HGDH	laminin, gamma 1 (formerly LAMB2)	14	14q21.3	+
LAMC1	LAMC1	laminin, gamma 1 (formerly LAMB2)	1	1q31	+
LAMC2	LAMC2	laminin, gamma 2	1	1q25-q31	+
LAMP2	LAMP2	lysosomal-associated membrane protein 2	X	Xq24	+
LANCL2	LANCL2	LanC lantibiotic synthetase component C-like 2 (bacterial)	7	7q31.1-q31.33	+
LARP1	LARP1	La ribonucleoprotein domain family, member 1	5	5q33.2	+
LARP2	LARP1B	La ribonucleoprotein domain family, member 2	4	4q28.2	+

LARP4	LARP4	La ribonucleoprotein domain family, member 4	12	12q13.12	+
LARP6	LARP6	La ribonucleoprotein domain family, member 6	15	15q23	+
LASP1	LASP1	LIM and SH3 protein 1	17	17q11-q21.3	+
LASS6	LASS6	LAG1 homolog, ceramide synthase 6 (<i>S. cerevisiae</i>)	2	2q24.3	+
LATS2	LATS2	LATS, large tumor suppressor, homolog 2 (<i>Drosophila</i>)	13	13q11-q12	+
LBA1	TRANK1	tetratricopeptide repeat and ankyrin repeat containing 1	3	3p22.2	+
LCORL	LCORL	ligand dependent nuclear receptor corepressor-like	4	4p15.31	+
LDHB	LDHB	lactate dehydrogenase B	12	12p12.2-p12.1	+
LDLRAP1	LDLRAP1	low density lipoprotein receptor adaptor protein 1	1	1p36-p35	+
LDOC1L	LDOC1L	leucine zipper, down-regulated in cancer 1-like	22	22q13.31	+
LEAP2	LEAP2	liver expressed antimicrobial peptide 2	5	5q31.1	+
LEFTY1	LEFTY1	left-right determination factor 1	1	1q42.1	+
LEMD2	LEMD2	LEM domain containing 2	6	6p21.31	+
LHFP	LHFP	lipoma HMGIC fusion partner	13	13q12	+
LHFPL1	LHFPL1	lipoma HMGIC fusion partner-like 1	X	Xq23	+
LHFPL2	LHFPL2	lipoma HMGIC fusion partner-like 2	5	5q14.1	+
LHX6	LHX6	LIM homeobox 6	9	9q33.2	+
LIF	LIF	leukemia inhibitory factor (cholinergic differentiation factor)	22	22q12.2	+
LIMD1	LIMD1	LIM domains containing 1	3	3p21.3	+
LIMD2	LIMD2	LIM domain containing 2	17	17q23.3	+
LIN28B	LIN28B	lin-28 homolog B (<i>C. elegans</i>)	6	6q21	+
LIN7C	LIN7C	lin-7 homolog C (<i>C. elegans</i>)	11	11p14	+
LIX1	LIX1	Lix1 homolog (mouse)	5	5q15	-
LMBR1	LMBR1	limb region 1 homolog (mouse)	7	7q36	+
LMO3	LMO3	LIM domain only 3 (rhombotin-like 2)	12	12p12.3	+
LMOD1	LMOD1	leiomodin 1 (smooth muscle)	1	1q32	+

LMX1A	LMX1A	LIM homeobox transcription factor 1, alpha	1	1q24.1	+
LOC162073	ITPRIPL2	inositol 1,4,5-trisphosphate receptor interacting protein-like 2	16	16p12.3	-
LOC26010		[não consta na base de dados do NCBI]			
LOC283514	SIAH3	seven in absentia homolog 3 (Drosophila)	13	13q14.13	-
LOC285636	C5orf51	chromosome 5 open reading frame 51	5	5p13.1	-
LPAL2	LPAL2	lipoprotein, Lp(a)-like 2	6	6q26-q27	-
LPCAT3	LPCAT3	lysophosphatidylcholine acyltransferase 3	12	12p13	+
LPHN1	LPHN1	latrophilin 1	19	19p13.2	+
LPPR4	LPPR4	lipid phosphate phosphatase-related protein type 4	1	1p21.2	+
LRIT1	LRIT1	leucine-rich repeat, immunoglobulin-like and transmembrane domains 1	10	10q23	+
LRP1B	LRP1B	low density lipoprotein-related protein 1B (deleted in tumors)	2	2q21.2	+
LRP5	LRP5	low density lipoprotein receptor-related protein 5	11	11q13.4	+
LRP6	LRP6	low density lipoprotein receptor-related protein 6	12	12p13.2	+
LRRC15	LRRC15	leucine rich repeat containing 15	3	3q29	+
LRRC41	LRRC41	leucine rich repeat containing 41	1	1p34.1	+
LRRC57	LRRC57	leucine rich repeat containing 57	15	15q15.2	+
LRRC59	LRRC59	leucine rich repeat containing 59	17	17q21.33	+
LRRC7	LRRC7	leucine rich repeat containing 7	1	1p31.1	+
LRRC8B	LRRC8B	leucine rich repeat containing 8 family, member B	1	1p22.2	+
LRRFIP1	LRRFIP1	leucine rich repeat (in FLII) interacting protein 1	2	2q37.3	+
LRRTM2	LRRTM2	leucine rich repeat transmembrane neuronal 2	5	5q31.2	+
LRRTM3	LRRTM3	leucine rich repeat transmembrane neuronal 3	10	10q21.3	+
LRTM2	LRTM2	leucine-rich repeats and transmembrane domains 2	12	12p13.33	+
LSM12	LSM12	LSM12 homolog (S. cerevisiae)	17	17q21.31	+

LSM14B	LSM14B	LSM14 homolog B (SCD6, <i>S. cerevisiae</i>)	20	20q13.33	+
LUC7L2	LUC7L2	LUC7-like 2 (<i>S. cerevisiae</i>)	7	7q34	+
LUZP1	LUZP1	leucine zipper protein 1	1	1p36	+
LYNX1	LYNX1	Ly6/neurotoxin 1	8	8q24.3	+
LYPLA1	LYPLA1	lysophospholipase I	8	8q11.23	+
LYPLA2	LYPLA2	lysophospholipase II	1	1p36.11	+
LYRM2	LYRM2	LYR motif containing 2	6	6q15	+
LYRM4	LYRM4	LYR motif containing 4	6	6p25.1	+
LYST	LYST	lysosomal trafficking regulator	1	1q42.1-q42.2	+
LYZL1	LYZL1	lysozyme-like 1	10	10p12.1	+
LYZL2	LYZL2	lysozyme-like 2	10	10p11.23	+
LZTS1	LZTS1	leucine zipper, putative tumor suppressor 1	8	8p22	+
M6PR	M6PR	mannose-6-phosphate receptor (cation dependent)	12	12p13	+
MAB21L1	MAB21L1	mab-21-like 1 (<i>C. elegans</i>)	13	13q13	+
MAB21L2	MAB21L2	mab-21-like 2 (<i>C. elegans</i>)	4	4q31	+
MAEA	MAEA	macrophage erythroblast attacher	4	4p16.3	+
MAF	MAF	v-maf musculoaponeurotic fibrosarcoma oncogene homolog (avian)	16	16q22-q23	+
MAFG	MAFG	v-maf musculoaponeurotic fibrosarcoma oncogene homolog G (avian)	17	17q25.3	+
MAGI2	MAGI2	membrane associated guanylate kinase, WW and PDZ domain containing 2	7	7q21	+
MAGIX	MAGIX	MAGI family member, X-linked	X	Xp11.23	-
MAGT1	MAGT1	magnesium transporter 1	X	Xq21.1	+
MAL2	MAL2	mal, T-cell differentiation protein 2	8	8q23	+
MAML1	MAML1	mastermind-like 1 (<i>Drosophila</i>)	5	5q35	+
MAML3	MAML3	mastermind-like 3 (<i>Drosophila</i>)	4	4q28	+

MAN1A1	MAN1A1	mannosidase, alpha, class 1A, member 1	6	6q22	+
MAN1A2	MAN1A2	mannosidase, alpha, class 1A, member 2	1	1p13	+
MAN2A1	MAN2A1	mannosidase, alpha, class 2A, member 1	5	5q21-q22	+
MAP1B	MAP1B	microtubule-associated protein 1B	5	5q13	+
MAP2K4	MAP2K4	mitogen-activated protein kinase kinase 4	17	17p11.2	+
MAP4K4	MAP4K4	mitogen-activated protein kinase kinase kinase kinase 4	2	2q11.2-q12	+
MAP6	MAP6	microtubule-associated protein 6	11	11q13.5	+
MAPK1	MAPK1	mitogen-activated protein kinase 1	22	22q11.2 22q11.21	+
MAPK10	MAPK10	mitogen-activated protein kinase 10	4	4q22.1-q23	+
MAPKBP1	MAPKBP1	mitogen activated protein kinase binding protein 1	15	15q15.1	+
MAPRE1	MAPRE1	microtubule-associated protein, RP/EB family, member 1	20	20q11.1-q11.23	+
MAPRE2	MAPRE2	microtubule-associated protein, RP/EB family, member 2	18	18q12.1	+
MARCH3	MARCH3	membrane-associated ring finger (C3HC4) 3	5	5q23.2	+
MARCH5	MARCH5	membrane-associated ring finger (C3HC4) 5	10	10q23.32-q23.33	+
MARCH9	MARCH9	membrane-associated ring finger (C3HC4) 9	12	12q14.1	+
MARCKS	MARCKS	myristoylated alanine-rich protein kinase C substrate	6	6q22.2	+
MARCKSL1	MARCKSL1	MARCKS-like 1	1	1p35.1	+
MARK4	MARK4	MAP/microtubule affinity-regulating kinase 4	19	19q13.3	+
MASP1	MASP1	mannan-binding lectin serine peptidase 1 (C4/C2 activating component of Ra-reactive factor)	3	3q27-q28	+
MAST3	MAST3	microtubule associated serine/threonine kinase 3	19	19p13.11	+
MATR3	MATR3	matrin 3	5	5q31.2	+
MBD5	MBD5	methyl-CpG binding domain protein 5	2	2q23.1	+
MBD6	MBD6	methyl-CpG binding domain protein 6	12	-	+
MBNL1	MBNL1	muscleblind-like (Drosophila)	3	3q25	+

MBNL2	MBNL2	muscleblind-like 2 (Drosophila)	13	13q32.1	+
MBTD1	MBTD1	mbt domain containing 1	17	17q21.33	+
MCART6	MCART6	mitochondrial carrier triple repeat 6	X	Xq22.2	+
MDS1	MECOM	myelodysplasia syndrome 1	3	3q26	-
ME1	ME1	malic enzyme 1, NADP(+)-dependent, cytosolic	6	6q12	+
MECP2	MECP2	methyl CpG binding protein 2 (Rett syndrome)	X	Xq28	+
MED1	MED1	mediator complex subunit 1	17	17q12	+
MED13	MED13	mediator complex subunit 13	17	17q22-q23	+
MED22	MED22	mediator complex subunit 22	9	9q34.2	+
MED26	MED26	mediator complex subunit 26	19	19p13.11	+
MEGF11	MEGF11	multiple EGF-like-domains 11	15	15q22.31	+
MEGF8	MEGF8	multiple EGF-like-domains 8	19	19q12	+
MEIS1	MEIS1	Meis1, myeloid ecotropic viral integration site 1 homolog (mouse)	2	2p14	+
MEMO1	MEMO1	mediator of cell motility 1	2	2p22-p21	+
MEOX1	MEOX1	mesenchyme homeobox 1	17	17q21	+
MET	MET	met proto-oncogene (hepatocyte growth factor receptor)	7	7q31	+
METAP2	METAP2	methionyl aminopeptidase 2	12	12q22	+
METT10D	METT16	methyltransferase 10 domain containing	17	17p13.3	+
METTL10	METTL10	methyltransferase like 10	10	10q26.13	+
METTL8	METTL8	methyltransferase like 8	2	2q31.1	+
MEX3A	MEX3A	mex-3 homolog A (C. elegans)	1	1q22	+
MEX3D	MEX3D	mex-3 homolog D (C. elegans)	19	19p13.3	+
MFAP3L	MFAP3L	microfibrillar-associated protein 3-like	4	4q32.3	+
MFHAS1	MFHAS1	malignant fibrous histiocytoma amplified sequence 1	8	8p23.1	+
MGAT3	MGAT3	mannosyl (beta-1,4-)-glycoprotein beta-1,4-N-	22	22q13.1	+

		acetylglucosaminyltransferase			
MGAT4A	MGAT4A	mannosyl (alpha-1,3-)-glycoprotein beta-1,4-N-acetylglucosaminyltransferase, isozyme A	2	2q12	+
MGC16169	TBCK	TBC1 domain containing kinase	4	4q24	+
MGC21874	TADA2B	transcriptional adaptor 2B	4	4p16.1	+
MICAL3	MICAL3	microtubule associated monooxygenase, calponin and LIM domain containing 3	22	22q11.21	+
MID1IP1	MID1IP1	MID1 interacting protein 1 (gastrulation specific G12 homolog (zebrafish))	X	Xp11.4	+
MIER3	MIER3	mesoderm induction early response 1, family member 3	5	5q11.2	+
MINK1	MINK1	misshapen-like kinase 1 (zebrafish)	17	17p13.2	+
MITF	MITF	microphthalmia-associated transcription factor	3	3p14.2-p14.1	+
MKLN1	MKLN1	muskelin 1, intracellular mediator containing kelch motifs	7	7q32	+
MLKL	MLKL	mixed lineage kinase domain-like	16	16q23.1	+
MLL2	MLL2	myeloid/lymphoid or mixed-lineage leukemia 2	12	12q12-q14	+
MLL4	MLL4	myeloid/lymphoid or mixed-lineage leukemia 4	19	19q13.1	+
MLLT6	MLLT6	myeloid/lymphoid or mixed-lineage leukemia (trithorax homolog, Drosophila); translocated to, 6	17	17q21	+
MLXIP	MLXIP	MLX interacting protein	12	12q24.31	+
MMD	MMD	monocyte to macrophage differentiation-associated	17	17q	+
MMD2	MMD2	monocyte to macrophage differentiation-associated 2	7	7p22.1	+
MOBKL1A	MOBKL1A	MOB1, Mps One Binder kinase activator-like 1A (yeast)	4	4q13.3	+
MOBKL2B	MOBKL2B	MOB1, Mps One Binder kinase activator-like 2B (yeast)	9	9p21.2	+
MOBKL2C	MOBKL2C	MOB1, Mps One Binder kinase activator-like 2C (yeast)	1	1p33	+

MON2	MON2	MON2 homolog (<i>S. cerevisiae</i>)	12	12q14.1	+
MORC3	MORC3	MORC family CW-type zinc finger 3	21	21q22.13	+
MORF4L1	MORF4L1	mortality factor 4 like 1	15	15q24	+
MORN4	MORN4	MORN repeat containing 4	10	10q24.2	+
MOSPD1	MOSPD1	motile sperm domain containing 1	X	Xq26.3	+
MOSPD3	MOSPD3	motile sperm domain containing 3	7	7q22	+
MPP2	MPP2	membrane protein, palmitoylated 2 (MAGUK p55 subfamily member 2)	17	17q12-q21	+
MPP5	MPP5	membrane protein, palmitoylated 5 (MAGUK p55 subfamily member 5)	14	14q23.3	+
MPZ	MPZ	myelin protein zero (Charcot-Marie-Tooth neuropathy 1B)	1	1q23.3	+
MRVI1	MRVI1	murine retrovirus integration site 1 homolog	11	11p15	+
MS4A2	MS4A2	membrane-spanning 4-domains, subfamily A, member 2 (Fc fragment of IgE, high affinity I, receptor for; beta polypeptide)	11	11q13	+
MSL-1	MSL1	male-specific lethal 1 homolog (<i>Drosophila</i>)	17	17q21.1	+
MSRB3	MSRB3	methionine sulfoxide reductase B3	12	12q14.3	+
MST150	C5orf62	chromosome 5 open reading frame 62	5	5q33.1	+
MSTO1	MSTO1	misato homolog 1 (<i>Drosophila</i>)	1	1q22	+
MTA2	MTA2	metastasis associated 1 family, member 2	11	11q12-q13.1	+
MTCH2	MTCH2	mitochondrial carrier homolog 2 (<i>C. elegans</i>)	11	11p11.2	+
MTDH	MTDH	metadherin	8	8q22.1	+
MTF1	MTF1	metal-regulatory transcription factor 1	1	1p33	+
MTF2	MTF2	metal response element binding transcription factor 2	1	1p22.1	+
MTMR14	MTMR14	myotubularin related protein 14	3	3p26	+
MTMR3	MTMR3	myotubularin related protein 3	22	22q12.2	+
MTMR4	MTMR4	myotubularin related protein 4	17	17q22-q23	+

MTMR6	MTMR6	myotubularin related protein 6	13	13q12	+
MTMR7	MTMR7	myotubularin related protein 7	8	8p22	+
MTMR8	MTMR8	myotubularin related protein 8	X	Xq11.2	+
MTPN	MTPN	myotrophin	7	7q33	+
MTX3	MTX3	metaxin 3	5	5q14.1	+
MXD1	MXD1	MAX dimerization protein 1	2	2p13-p12	+
MXRA7	MXRA7	matrix-remodelling associated 7	17	17q25.1	+
MYCBP	MYCBP	c-myc binding protein	1	1p33-p32.2	+
MYCL1	MYCL1	v-myc myelocytomatosis viral oncogene homolog 1, lung carcinoma derived (avian)	1	1p34.2	+
MYCN	MYCN	v-myc myelocytomatosis viral related oncogene, neuroblastoma derived (avian)	2	2p24.1	+
MYEF2	MYEF2	myelin expression factor 2	15	15q21.1	+
MYH10	MYH10	myosin, heavy chain 10, non-muscle	17	17p13	+
MYH14	MYH14	myosin, heavy chain 14	19	19q13.33	+
MYLK3	MYLK3	myosin X	16	16q11.2	+
MYO10	MYO10	myosin XVA	5	5p15.1-p14.3	+
MYO15A	MYO15A	myosin IB	17	17p11.2	+
MYO1B	MYO1B	myosin VA (heavy chain 12, myoxin)	2	2q12-q34	+
MYO5A	MYO5A	myosin VC	15	15q21	+
MYO5C	MYO5C	myosin VC	15	15q21	+
MYST2	MYST2	MYST histone acetyltransferase 2	17	17q21.32	+
MYT1L	MYT1L	myelin transcription factor 1-like	2	2p25.3	+
N4BP1	N4BP1	NEDD4 binding protein 1	16	16q12.1	+
NAALADL2	NAALADL2	N-acetylated alpha-linked acidic dipeptidase-like 2	3	3q26.31	+
NAP1L5	NAP1L5	nucleosome assembly protein 1-like 5	4	4q22.1 4q21-q22	+
NAPEPLD	NAPEPLD	N-acyl phosphatidylethanolamine phospholipase D	7	7q22.1	+

NARG2	NARG2	NMDA receptor regulated 2	15	15q22.2	+
NAV1	NAV1	neuron navigator 1	1	1q32.3	+
NAV3	NAV3	neuron navigator 3	12	12q14.3	+
NBR1	NBR1	neighbor of BRCA1 gene 1	17	17q21.31	+
NCAM1	NCAM1	neural cell adhesion molecule 1	11	11q23.1	+
NCBP1	NCBP1	nuclear cap binding protein subunit 1, 80kDa	9	9q34.1	+
NCDN	NCDN	neurochondrin	1	1p34.3	+
NCLN	NCLN	nicalin homolog (zebrafish)	19	19p13.3	+
NCOA1	NCOA1	nuclear receptor coactivator 1	2	2p23	+
NCOA2	NCOA2	nuclear receptor coactivator 2	8	8q13.3	+
NCOA7	NCOA7	nuclear receptor coactivator 7	6	6q22.32	+
NCOR2	NCOR2	nuclear receptor co-repressor 2	12	12q24	+
NDEL1	NDEL1	nudE nuclear distribution gene E homolog like 1 (A. nidulans)	17	17p13.1	+
NDRG3	NDRG3	NDRG family member 3	20	20q11.21-q11.23	+
NDST1	NDST1	N-deacetylase/N-sulfotransferase (heparan glucosaminyl) 1	5	5q33.1	+
NECAP1	NECAP1	NECAP endocytosis associated 1	12	12p13.31	+
NEFL	NEFL	neurofilament, light polypeptide 68kDa	8	8p21	+
NEFM	NEFM	neurofilament, medium polypeptide	8	8p21	+
NEGR1	NEGR1	neuronal growth regulator 1	1	1p31.1	+
NEK11	NEK11	NIMA (never in mitosis gene a)- related kinase 11	3	3q22.1	+
NEO1	NEO1	neogenin homolog 1 (chicken)	15	15q22.3-q23	+
NEU3	NEU3	sialidase 3 (membrane sialidase)	11	11q13.5	+
NF1	NF1	neurofibromin 1 (neurofibromatosis, von Recklinghausen disease, Watson disease)	17	17q11.2	+
NFAM1	NFAM1	NFAT activating protein with ITAM motif 1	22	22q13.2	+

NFASC	NFASC	neurofascin homolog (chicken)	1	1q32.1	+
NFAT5	NFAT5	nuclear factor of activated T-cells 5, tonicity-responsive	16	16q22.1	+
NFATC2IP	NFATC2IP	nuclear factor of activated T-cells, cytoplasmic, calcineurin-dependent 2 interacting protein	16	16p11.2	+
NFE2L1	NFE2L1	nuclear factor (erythroid-derived 2)-like 1	17	17q21.3	+
NFIA	NFIA	nuclear factor I/A	1	1p31.3-p31.2	+
NFIB	NFIB	nuclear factor I/B	9	9p24.1	+
NFIX	NFIX	nuclear factor I/X (CCAAT-binding transcription factor)	19	19p13.3	+
NFKB1	NFKB1	nuclear factor of kappa light polypeptide gene enhancer in B-cells 1 (p105)	4	4q24	+
NFYA	NFYA	nuclear transcription factor Y, alpha	6	6p21.3	+
NHS	NHS	Nance-Horan syndrome (congenital cataracts and dental anomalies)	X	Xp22.13	+
NINJ1	NINJ1	ninjurin 1	9	9q22	+
NIPA1	NIPA1	non imprinted in Prader-Willi/Angelman syndrome 1	15	15q11.2	+
NIPBL	NIPBL	Nipped-B homolog (Drosophila)	5	5p13.2	+
NLGN1	NLGN1	neuroligin 1	3	3q26.31	+
NLGN2	NLGN2	neuroligin 2	17	17p13.1	+
NLGN3	NLGN3	neuroligin 3	X	Xq13.1	+
NLRC3	NLRC3	NLR family, CARD domain containing 3	16	16p13.3	+
NMT1	NMT1	N-myristoyltransferase 1	17	17q21.31	+
NONO	NONO	non-POU domain containing, octamer-binding	X	Xq13.1	+
NOPE	IGDCC4	immunoglobulin superfamily, DCC subclass, member 4	15	15q22.31	-
NOTCH2	NOTCH2	Notch homolog 2 (Drosophila)	1	1p13-p11	+
NOTUM	NOTUM	notum pectinacetyltransferase homolog (Drosophila)	17	17q25.3	+
NOVA1	NOVA1	neuro-oncological ventral antigen 1	14	14q	+
N-PAC	GLYR1	glyoxylate reductase 1 homolog (Arabidopsis)	16	16p13.3	+

NPAL3	NIPAL3	NIPA-like domain containing 3	1	1p36.12-p35.1	+
NPAS4	NPAS4	neuronal PAS domain protein 4	11	11q13	+
NPLOC4	NPLOC4	nuclear protein localization 4 homolog (<i>S. cerevisiae</i>)	17	17qter	+
NPNT	NPNT	nephronectin	4	4q24	+
NR2C2	NR2C2	nuclear receptor subfamily 2, group C, member 2	3	3p25	+
NR3C1	NR3C1	nuclear receptor subfamily 3, group C, member 1 (glucocorticoid receptor)	5	5q31.3	+
NR3C2	NR3C2	nuclear receptor subfamily 3, group C, member 2	4	4q31.1	+
NR4A3	NR4A3	nuclear receptor subfamily 4, group A, member 3	9	9q22	+
NRIP1	NRIP1	nuclear receptor interacting protein 1	21	21q11.2	+
NRIP3	NRIP3	nuclear receptor interacting protein 3	11	11p15.3	+
NRK	NRK	Nik related kinase	X	Xq22.3	+
NRP1	NRP1	neuropilin 1	10	10p12	+
NRSN2	NRSN2	neurensin 2	20	20p13	+
NRXN1	NRXN1	neurexin 1	2	2p16.3	+
NRXN2	NRXN2	neurexin 2	11	11q13	+
NRXN3	NRXN3	neurexin 3	14	14q31	+
NSF	NSF	N-ethylmaleimide-sensitive factor	17	17q21	+
NSUN7	NSUN7	NOL1/NOP2/Sun domain family, member 7	4	4p14	+
NTF3	NTF3	neurotrophin 3	12	12p13	+
NTN1	NTN1	netrin 1	17	17p13-p12	+
NTNG1	NTNG1	netrin G1	1	1p13.3	+
NUAK1	NUAK1	NUAK family, SNF1-like kinase, 1	12	12q23.3	+
NUDT10	NUDT10	nudix (nucleoside diphosphate linked moiety X)-type motif 10	X	Xp11.23	+
NUFIP2	NUFIP2	nuclear fragile X mental retardation protein interacting protein 2	17	17q11.2	+

NUP153	NUP153	nucleoporin 153kDa	6	6p22.3	+
NUP160	NUP160	nucleoporin 160kDa	11	11p11.2	+
NUP210	NUP210	nucleoporin 210kDa	3	3p25.1	+
NUS1	NUS1	nuclear undecaprenyl pyrophosphate synthase 1 homolog (<i>S. cerevisiae</i>)	6	6q22.1	+
NXF1	NXF1	nuclear RNA export factor 1	11	11q12-q13	+
NXPH1	NXPH1	neurexophilin 1	7	7p22	+
NXT2	NXT2	nuclear transport factor 2-like export factor 2	X	Xq23	+
NYX	NYX	nyctalopin	X	Xp11.4	+
ODZ2	ODZ2	odz, odd Oz/ten-m homolog 2 (<i>Drosophila</i>)	5	5q34	+
ODZ4	ODZ4	odz, odd Oz/ten-m homolog 4 (<i>Drosophila</i>)	11	11q14.1	+
OGDH	OGDH	oxoglutarate (alpha-ketoglutarate) dehydrogenase (lipoamide)	7	7p14-p13	+
OLA1	OLA1	Obg-like ATPase 1	2	2q31.1	+
OMG	OMG	oligodendrocyte myelin glycoprotein	17	17q11.2	+
ONECUT2	ONECUT2	one cut domain, family member 2	18	18q21.31	+
ORAI3	ORAI3	ORAI calcium release-activated calcium modulator 3	16	16p11.2	+
ORMDL2	ORMDL2	ORM1-like 2 (<i>S. cerevisiae</i>)	12	12q13.2	+
OSBPL7	OSBPL7	oxysterol binding protein-like 7	17	17q21	+
OSGIN2	OSGIN2	oxidative stress induced growth inhibitor family member 2	8	8q21	+
OTOR	OTOR	otoraplin	20	20p12.1-p11.23	+
OTP	OTP	orthopedia homolog (<i>Drosophila</i>)	5	5q13.3	+
OTUD3	OTUD3	OTU domain containing 3	1	1p36.13	+
OTUD4	OTUD4	OTU domain containing 4	4	4q31.21	+
OTUD6B	OTUD6B	OTU domain containing 6B	8	8q21.3	+
OXR1	OXR1	oxidation resistance 1	8	8q23	+

OXR1	OXR1	oxidative-stress responsive 1	3	3p22.2	+
PACSIN1	PACSIN1	protein kinase C and casein kinase substrate in neurons 1	6	6p21.3	+
PADI2	PADI2	peptidyl arginine deiminase, type II	1	1p36.13	+
PAFAH2	PAFAH2	platelet-activating factor acetylhydrolase 2, 40kDa	1	1p36	+
PALM2-AKAP2	PALM2-AKAP2	PALM2-AKAP2 readthrough	9	9q31.3	+
PAN3	PAN3	PAN3 polyA specific ribonuclease subunit homolog (S. cerevisiae)	13	13q12.2	+
PANK1	PANK1	pantothenate kinase 1	10	10q23.31	+
PAP2D	LPPR5	lipid phosphate phosphatase-related protein type 5	1	1p21.3	-
PAPD5	PAPD5	PAP associated domain containing 5	16	16q12.1	+
PAPOLA	PAPOLA	poly(A) polymerase alpha	14	14q32.31	+
PAPOLB	PAPOLB	poly(A) polymerase beta (testis specific)	7	7p22.1	+
PAPSS2	PAPSS2	3'-phosphoadenosine 5'-phosphosulfate synthase 2	10	10q24	+
PAQR9	PAQR9	progesterone and adiponectin receptor family member IX	3	3q23	+
PARP8	PARP8	poly (ADP-ribose) polymerase family, member 8	5	5q11.1	+
PATZ1	PATZ1	POZ (BTB) and AT hook containing zinc finger 1	22	22q12.2	+
PAX2	PAX2	paired box gene 2	10	10q24	+
PAX3	PAX3	paired box gene 3 (Waardenburg syndrome 1)	2	2q35-q37 2q35	+
PAX6	PAX6	paired box gene 6 (aniridia, keratitis)	11	11p13	+
PAX8	PAX8	paired box gene 8	2	2q13	+
PBX1	PBX1	pre-B-cell leukemia transcription factor 1	1	1q23	+
PCDH11X	PCDH11X	protocadherin 11 X-linked	X	Xq21.3	+
PCDH11Y	PCDH11Y	protocadherin 11 Y-linked	Y	Yp11.2	+
PCDH7	PCDH7	BH-protocadherin (brain-heart)	4	4p15	+
PCGF5	PCGF5	polycomb group ring finger 5	10	10q23.32	+

PCLO	PCLO	piccolo (presynaptic cytomatrix protein)	7	7q11.23-q21.3	+
PCMTD2	PCMTD2	protein-L-isoaspartate (D-aspartate) O-methyltransferase domain containing 2	20	20q13.33	+
PCOLCE2	PCOLCE2	procollagen C-endopeptidase enhancer 2	3	3q21-q24	+
PCSK2	PCSK2	proprotein convertase subtilisin/kexin type 2	20	20p11.2	+
PCTK1	CDK16	PCTAIRE protein kinase 1	X	Xp11	+
PCTK3	CDK18	PCTAIRE protein kinase 3	1	1q31-q32	-
PDAP1	PDAP1	PDGFA associated protein 1	7	7q22.1	+
PDCD7	PDCD7	programmed cell death 7	15	15q22.31	+
PDE11A	PDE11A	phosphodiesterase 11A	2	2q31.2	+
PDE1B	PDE1B	phosphodiesterase 1B, calmodulin-dependent	12	12q13	+
PDE1C	PDE1C	phosphodiesterase 1C, calmodulin-dependent 70kDa	7	7p14.3	+
PDE4A	PDE4A	phosphodiesterase 4A, cAMP-specific (phosphodiesterase E2 dunce homolog, Drosophila)	19	19p13.2	+
PDE4D	PDE4D	phosphodiesterase 4D, cAMP-specific (phosphodiesterase E3 dunce homolog, Drosophila)	5	5q12	+
PDE5A	PDE5A	phosphodiesterase 5A, cGMP-specific	4	4q27	+
PDE8B	PDE8B	phosphodiesterase 8B	5	5q13.3	+
PDGFRA	PDGFRA	platelet-derived growth factor receptor, alpha polypeptide	4	4q12	+
PDGFRB	PDGFRB	platelet-derived growth factor receptor, beta polypeptide	5	5q33.1	+
PDHX	PDHX	pyruvate dehydrogenase complex, component X	11	11p13	+
PDIA3	PDIA3	protein disulfide isomerase family A, member 3	15	15q15	+
PDIA6	PDIA6	protein disulfide isomerase family A, member 6	2	2p25.1	+
PDIK1L	PDIK1L	PDLIM1 interacting kinase 1 like	1	1p36.11	+
PDLIM2	PDLIM2	PDZ and LIM domain 2 (mystique)	8	8p21.2	+
PDPR	PDPR	pyruvate dehydrogenase phosphatase regulatory	16	16q22.1	+

		subunit			
PDRG1	PDRG1	p53 and DNA damage regulated 1	20	20q11.21	+
PDZD2	PDZD2	PDZ domain containing 2	5	5p13.3	+
PDZD4	PDZD4	PDZ domain containing 4	X	Xq28	+
PEG10	PEG10	paternally expressed 10	7	7q21	+
PELI2	PELI2	pellino homolog 2 (Drosophila)	14	14q21	+
PEX7	PEX7	peroxisomal biogenesis factor 7	6	6q23.3	+
PFAS	PFAS	phosphoribosylformylglycinamide synthase (FGAR amidotransferase)	17	17p13.1	+
PFTK1	CDK14	PFTAIRE protein kinase 1	7	7q21-q22	+
PGAP1	PGAP1	post-GPI attachment to proteins 1	2	2q33.1	+
PGBD5	PGBD5	piggyBac transposable element derived 5	1	1q42.13	+
PGM5	PGM5	phosphoglucomutase 5	9	9q13	+
PGR	PGR	progesterone receptor	11	11q22-q23	+
PHACTR4	PHACTR4	phosphatase and actin regulator 4	1	1p35.3	+
PHC2	PHC2	polyhomeotic homolog 2 (Drosophila)	1	1p34.3	+
PHC3	PHC3	polyhomeotic homolog 3 (Drosophila)	3	3q26.2	+
PHF14	PHF14	PHD finger protein 14	7	7p21.3	+
PHF15	PHF15	PHD finger protein 15	5	5q31.1	+
PHF21A	PHF21A	PHD finger protein 21A	11	11p11.2	+
PHF8	PHF8	PHD finger protein 8	X	Xp11.22	+
PHKA2	PHKA2	phosphorylase kinase, alpha 2 (liver)	X	Xp22.2-p22.1	+
PHLDA1	PHLDA1	pleckstrin homology-like domain, family A, member 1	12	12q15	+
PHLDB2	PHLDB2	pleckstrin homology-like domain, family B, member 2	3	3q13.2	+
PHLPP1	PHLPP2	PH domain and leucine rich repeat protein phosphatase-like	16	16q22.2	+
PHOX2B	PHOX2B	paired-like homeobox 2b	4	4p12	+

PI15	PI15	peptidase inhibitor 15	8	8q21.11	+
PIGA	PIGA	phosphatidylinositol glycan anchor biosynthesis, class A (paroxysmal nocturnal hemoglobinuria)	X	Xp22.1	+
PIGH	PIGH	phosphatidylinositol glycan anchor biosynthesis, class H	14	14q24.1	+
PIK3AP1	PIK3AP1	phosphoinositide-3-kinase adaptor protein 1	10	10q24.1	+
PIK3C2B	PIK3C2B	phosphoinositide-3-kinase, class 2, beta polypeptide	1	1q32	+
PIK3R3	PIK3R3	phosphoinositide-3-kinase, regulatory subunit 3 (p55, gamma)	1	1p34.1	+
PIP5K3	PIKFYVE	phosphatidylinositol-3-phosphate/phosphatidylinositol 5-kinase, type III	2	2q34	+
PKHD1L1	PKHD1L1	polycystic kidney and hepatic disease 1 (autosomal recessive)-like 1	8	8q23	+
PKM2	PKM2	pyruvate kinase, muscle	15	15q22	+
PKN2	PKN2	protein kinase N2	1	1p22.2	+
PKNOX2	PKNOX2	PBX/knotted 1 homeobox 2	11	11q24.2	+
PLAGL2	PLAGL2	pleiomorphic adenoma gene-like 2	20	20q11.21	+
PLCXD3	PLCXD3	phosphatidylinositol-specific phospholipase C, X domain containing 3	5	5p13.1	+
PLEKHA1	PLEKHA1	pleckstrin homology domain containing, family A (phosphoinositide binding specific) member 1	10	10q26.13	+
PLEKHG3	PLEKHG3	pleckstrin homology domain containing, family G (with RhoGef domain) member 3	14	14q23.3	+
PLEKHG5	PLEKHG5	pleckstrin homology domain containing, family G (with RhoGef domain) member 5	1	1p36.31	+
PLXNA2	PLXNA2	plexin A2	1	1q32.2	+
PLXNA4	PLXNA4	plexin A4	7	7q32.3	+
PLXND1	PLXND1	plexin D1	3	3q22.1	+
PODXL	PODXL	podocalyxin-like	7	7q32-q33	+

POGK	POGK	pogo transposable element with KRAB domain	1	1q24.1	+
POGZ	POGZ	pogo transposable element with ZNF domain	1	1q21.3	+
POLK	POLK	polymerase (DNA directed) kappa	5	5q13	+
POLM	POLM	polymerase (DNA directed), mu	7	7p13	+
POLR3D	POLR3D	polymerase (RNA) III (DNA directed) polypeptide D, 44kDa	8	8q21	+
POLR3H	POLR3H	polymerase (RNA) III (DNA directed) polypeptide H (22.9kD)	22	22q13.2	+
POM121	POM121	POM121 membrane glycoprotein (rat)	7	7q11.23	+
POM121C	POM121C	POM121 membrane glycoprotein C	7	7q11.2	+
POMT2	POMT2	protein-O-mannosyltransferase 2	14	14q24	+
POU2AF1	POU2AF1	POU domain, class 2, associating factor 1	11	11q23.1	+
POU2F2	POU2F2	POU domain, class 2, transcription factor 2	19	19q13.2	+
POU3F1	POU3F1	POU domain, class 3, transcription factor 1	1	1p34.1	+
PPAPDC2	PPAPDC2	phosphatidic acid phosphatase type 2 domain containing 2	9	9p24.1	+
PPARA	PPARA	peroxisome proliferative activated receptor, alpha	22	22q12-q13.1 22q13.31	+
PPCS	PPCS	phosphopantothencysteine synthetase	1	1p34.2	+
PPFIA3	PPFIA3	protein tyrosine phosphatase, receptor type, f polypeptide (PTPRF), interacting protein (liprin), alpha 3	19	19q13.33	+
PPIL6	PPIL6	peptidylprolyl isomerase (cyclophilin)-like 6	6	6q21	+
PPM1E	PPM1E	protein phosphatase 1E (PP2C domain containing)	17	17q22	+
PPM1K	PPM1K	protein phosphatase 1K (PP2C domain containing)	4	4q22.1	+
PPP1R10	PPP1R10	protein phosphatase 1, regulatory subunit 10	6	6p21.3	+
PPP1R12A	PPP1R12A	protein phosphatase 1, regulatory (inhibitor) subunit 12A	12	12q15-q21	+

PPP1R12C	PPP1R12C	protein phosphatase 1, regulatory (inhibitor) subunit 12C	19	19q13.42	+
PPP1R16B	PPP1R16B	protein phosphatase 1, regulatory (inhibitor) subunit 16B	20	20q11.23	+
PPP1R2	PPP1R2	protein phosphatase 1, regulatory (inhibitor) subunit 2	3	3q29	+
PPP1R3F	PPP1R3F	protein phosphatase 1, regulatory (inhibitor) subunit 3F	X	Xp11.23	+
PPP1R7	PPP1R7	protein phosphatase 1, regulatory subunit 7	2	2q37.3	+
PPP1R8	PPP1R8	protein phosphatase 1, regulatory (inhibitor) subunit 8	1	1p35	+
PPP1R9B	PPP1R9B	protein phosphatase 1, regulatory subunit 9B, spinophilin	17	17q21.33	+
PPP2CA	PPP2CA	protein phosphatase 2 (formerly 2A), catalytic subunit, alpha isoform	5	5q31.1	+
PPP2CB	PPP2CB	protein phosphatase 2 (formerly 2A), catalytic subunit, beta isoform	8	8p12	+
PPP2R1B	PPP2R1B	protein phosphatase 2 (formerly 2A), regulatory subunit A (PR 65), beta isoform	11	11q23.2	+
PPP2R2A	PPP2R2A	protein phosphatase 2 (formerly 2A), regulatory subunit B (PR 52), alpha isoform	8	8p21.2	+
PPP2R2D	PPP2R2D	protein phosphatase 2, regulatory subunit B, delta isoform	10	10q26.3	+
PPP3CB	PPP3CB	protein phosphatase 3 (formerly 2B), catalytic subunit, beta isoform (calcineurin A beta)	10	10q22.2	+
PRDM1	PRDM1	PR domain containing 1, with ZNF domain	6	6q21	+
PRDM2	PRDM2	PR domain containing 2, with ZNF domain	1	1p36.21	+
PRDM4	PRDM4	PR domain containing 4	12	12q23-q24.1	+
PRDM8	PRDM8	PR domain containing 8	4	4q21	+
PRIC285	PRIC285	peroxisomal proliferator-activated receptor A interacting complex 285	20	20q13.33	+
PRICKLE2	PRICKLE2	prickle homolog 2 (Drosophila)	3	3p14.1	+

PRKAA1	PRKAA1	protein kinase, AMP-activated, alpha 1 catalytic subunit	5	5p12	+
PRKAB1	PRKAB1	protein kinase, AMP-activated, beta 1 non-catalytic subunit	12	12q24.1	+
PRKAG2	PRKAG2	protein kinase, AMP-activated, gamma 2 non-catalytic subunit	7	7q36.1	+
PRKCE	PRKCE	protein kinase C, epsilon	2	2p21	+
PRKCG	PRKCG	protein kinase C, gamma	19	19q13.4	+
PRKD3	PRKD3	protein kinase D3	2	2p21	+
PRNT	PRNT	prion protein (testis specific)	20	20p13	-
PRPF40A	PRPF40A	PRP40 pre-mRNA processing factor 40 homolog A (yeast)	2	2q23.3	+
PRR3	PRR3	proline rich 3	6	6p21.33	+
PRRC1	PRRC1	proline-rich coiled-coil 1	5	5q23.2	+
PRRT2	PRRT2	proline-rich transmembrane protein 2	16	16p11.2	+
PRRX1	PRRX1	paired related homeobox 1	1	1q24	+
PSCD1	CYTH1	pleckstrin homology, Sec7 and coiled-coil domains 1(cytohesin 1)	17	17q25	+
PSCDBP	CYTIP	pleckstrin homology, Sec7 and coiled-coil domains, binding protein	2	2q11.2	+
PSD3	PSD3	pleckstrin and Sec7 domain containing 3	8	8p21.3	+
PSEN1	PSEN1	presenilin 1 (Alzheimer disease 3)	14	14q24.3	+
PSIP1	PSIP1	PC4 and SFRS1 interacting protein 1	9	9p22.3	+
PSMD10	PSMD10	proteasome (prosome, macropain) 26S subunit, non-ATPase, 10	X	Xq22.3	+
PSME1	PSME1	proteasome (prosome, macropain) activator subunit 1 (PA28 alpha)	14	14q11.2	+
PSME3	PSME3	proteasome (prosome, macropain) activator subunit 3 (PA28 gamma; Ki)	17	17q21	+

PTAR1	PTAR1	protein prenyltransferase alpha subunit repeat containing 1	9	9q21.12	+
PTBP1	PTBP1	polypyrimidine tract binding protein 1	19	19p13.3	+
PTCH1	PTCH1	patched homolog 1 (Drosophila)	9	9q22.3	+
PTEN	PTEN	phosphatase and tensin homolog (mutated in multiple advanced cancers 1)	10	10q23.3	+
PTGDR	PTGDR	prostaglandin D2 receptor (DP)	14	14q22.1	+
PTGES3	PTGES3	prostaglandin E synthase 3 (cytosolic)	12	12q13.3 12	+
PTGFRN	PTGFRN	prostaglandin F2 receptor negative regulator	1	1p13.1	+
PTHR1	PTH1R	parathyroid hormone receptor 1	3	3p22-p21.1	-
PTP4A1	PTP4A1	protein tyrosine phosphatase type IVA, member 1	6	6q12	+
PTPDC1	PTPDC1	protein tyrosine phosphatase domain containing 1	9	9q22.32	+
PTPLAD1	PTPLAD1	protein tyrosine phosphatase-like A domain containing 1	15	15q22.2	+
PTPLB	PTPLB	protein tyrosine phosphatase-like (proline instead of catalytic arginine), member b	3	3q21.1	+
PTPN1	PTPN1	protein tyrosine phosphatase, non-receptor type 1	20	20q13.1-q13.2	+
PTPN11	PTPN11	protein tyrosine phosphatase, non-receptor type 11 (Noonan syndrome 1)	12	12q24	+
PTPN4	PTPN4	protein tyrosine phosphatase, non-receptor type 4 (megakaryocyte)	2	2q14.2	+
PTPN5	PTPN5	protein tyrosine phosphatase, non-receptor type 5 (striatum-enriched)	11	11p15.1	+
PTPN7	PTPN7	protein tyrosine phosphatase, non-receptor type 7	1	1q32.1	+
PTPRD	PTPRD	protein tyrosine phosphatase, receptor type, D	9	9p23-p24.3	+
PTPRG	PTPRG	protein tyrosine phosphatase, receptor type, G	3	3p21-p14	+
PTPRJ	PTPRJ	protein tyrosine phosphatase, receptor type, J	11	11p11.2	+
PTPRK	PTPRK	protein tyrosine phosphatase, receptor type, K	6	6q22.2-q22.3	+

PTPRM	PTPRM	protein tyrosine phosphatase, receptor type, M	18	18p11.2	+
PTPRU	PTPRU	protein tyrosine phosphatase, receptor type, U	1	1p35.3	+
PTPRZ1	PTPRZ1	protein tyrosine phosphatase, receptor-type, Z polypeptide 1	7	7q31.3	+
PUM2	PUM2	pumilio homolog 2 (Drosophila)	2	2p22-p21	+
PUNC	IGDCC3	putative neuronal cell adhesion molecule	15	15q22.3-q23	-
PURA	PURA	purine-rich element binding protein A	5	5q31	+
PURB	PURB	purine-rich element binding protein B	7	7p13	+
PVALB	PVALB	parvalbumin	22	22q12-q13.1 22q13.1	+
PXMP4	PXMP4	peroxisomal membrane protein 4, 24kDa	20	20q11.22	+
QKI	QKI	quaking homolog, KH domain RNA binding (mouse)	6	6q26	+
QSER1	QSER1	glutamine and serine rich 1	11	11p13	+
QSOX2	QSOX2	quiescin Q6 sulfhydryl oxidase 2	9	9q34.3	+
RAB10	RAB10	RAB10, member RAS oncogene family	2	2p23.3	+
RAB11A	RAB11A	RAB11A, member RAS oncogene family	15	15q22.31	+
RAB11FIP1	RAB11FIP1	RAB11 family interacting protein 1 (class I)	8	8p11.22	+
RAB15	RAB15	RAB15, member RAS oncogene family	14	14q23.3	+
RAB22A	RAB22A	RAB22A, member RAS oncogene family	20	20q13.32	+
RAB23	RAB23	RAB23, member RAS oncogene family	6	6p11	+
RAB27A	RAB27A	RAB27A, member RAS oncogene family	15	15q15-q21.1	+
RAB2B	RAB2B	RAB2B, member RAS oncogene family	14	14q11.2	+
RAB30	RAB30	RAB30, member RAS oncogene family	11	11q12-q14	+
RAB35	RAB35	RAB35, member RAS oncogene family	12	12q24.31	+
RAB40B	RAB40B	RAB40B, member RAS oncogene family	17	17q25.3	+
RAB43	RAB43	RAB43, member RAS oncogene family	3	3q21.3	+
RAB5A	RAB5A	RAB5A, member RAS oncogene family	3	3p24-p22	+

RAB6IP1	DENND5A	RAB6 interacting protein 1	11	11p15.4	+
RABEP1	RABEP1	rabaptin, RAB GTPase binding effector protein 1	17	17p13.2	+
RACGAP1	RACGAP1	Rac GTPase activating protein 1	12	12q13.12	+
RAD23B	RAD23B	RAD23 homolog B (<i>S. cerevisiae</i>)	9	9q31.2	+
RAD51	RAD51	RAD51 homolog (RecA homolog, <i>E. coli</i>) (<i>S. cerevisiae</i>)	15	15q15.1	+
RAD9A	RAD9A	RAD9 homolog A (<i>S. pombe</i>)	11	11q13.1-q13.2	+
RAG1	RAG1	recombination activating gene 1	11	11p13	+
RAG1AP1	SLC50A1	recombination activating gene 1 activating protein 1	1	1q22	+
RAI1	RAI1	retinoic acid induced 1	17	17p11.2	+
RALA	RALA	v-ral simian leukemia viral oncogene homolog A (ras related)	7	7p15-p13	+
RALGPS1	RALGPS1	Ral GEF with PH domain and SH3 binding motif 1	9	9q33.3	+
RAN	RAN	RAN, member RAS oncogene family	12	12q24.3	+
RANBP10	RANBP10	RAN binding protein 10	16	16q22.1	+
RAP1B	RAP1B	RAP1B, member of RAS oncogene family	12	12q14	+
RAP2B	RAP2B	RAP2B, member of RAS oncogene family	3	3q25.2	+
RAP2C	RAP2C	RAP2C, member of RAS oncogene family	X	Xq25	+
RAPGEF1	RAPGEF1	Rap guanine nucleotide exchange factor (GEF) 1	9	9q34.3	+
RAPGEF5	RAPGEF5	Rap guanine nucleotide exchange factor (GEF) 5	7	7p15.3	+
RAPH1	RAPH1	Ras association (RalGDS/AF-6) and pleckstrin homology domains 1	2	2q33	+
RARB	RARB	retinoic acid receptor, beta	3	3p24	+
RASD1	RASD1	RAS, dexamethasone-induced 1	17	17p11.2	+
RBAK	RBAK	RB-associated KRAB zinc finger	7	7p22.1	+
RBBP5	RBBP5	retinoblastoma binding protein 5	1	1q32	+
RBJ	DNAJC27	DnaJ (Hsp40) homolog, subfamily C, member 27	2	2p23.3	-

RBM23	RBM23	RNA binding motif protein 23	14	14q11.2	+
RBM24	RBM24	RNA binding motif protein 24	6	6p22.3	+
RBM35A	ESRP1	RNA binding motif protein 35A	8	8q22.1	-
RBM47	RBM47	RNA binding motif protein 47	4	4p14	+
RBM8A	RBM8A	RNA binding motif protein 8A	1	1q12	+
RBM9	RBFOX2	RNA binding motif protein 9	22	22q13.1	-
RBMX	RBMX	RNA binding motif protein, X-linked	X	Xq26.3	+
RBPJL	RBPJL	recombination signal binding protein for immunoglobulin kappa J region-like	20	20q12-q13.1	+
RCHY1	RCHY1	ring finger and CHY zinc finger domain containing 1	4	4q21.1	+
RCOR1	RCOR1	REST corepressor 1	14	14q32.31	+
RCOR3	RCOR3	REST corepressor 3	1	1q32.2	+
RDX	RDX	radixin	11	11q23	+
REEP1	REEP1	receptor accessory protein 1	2	2p11.2	+
REEP3	REEP3	receptor accessory protein 3	10	10q21.3	+
RELL1	RELL1	RELT-like 1	4	4p14	+
RELN	RELN	reelin	7	7q22	+
RELT	RELT	RELT tumor necrosis factor receptor	11	11q13.4	+
REPS1	REPS1	RALBP1 associated Eps domain containing 1	6	6q24.1	+
RER1	RER1	RER1 retention in endoplasmic reticulum 1 homolog (<i>S. cerevisiae</i>)	1	1p36	+
RFFL	RFFL	ring finger and FYVE-like domain containing 1	17	17q12	+
RFX5	RFX5	regulatory factor X, 5 (influences HLA class II expression)	1	1q21	+
RFXDC2	RFX7	regulatory factor X domain containing 2	15	15q21.3	+
RGAG1	RGAG1	retrotransposon gag domain containing 1	X	Xq23	-
RGL1	RGL1	ral guanine nucleotide dissociation stimulator-like 1	1	1q25.3	+

RGMB	RGMB	RGM domain family, member B	5	5q15	+
RGS4	RGS4	regulator of G-protein signalling 4	1	1q23.3	+
RGS7	RGS7	regulator of G-protein signalling 7	1	1q43 1q23.1	+
RHBDL3	RHBDL3	rhomboid, veinlet-like 3 (Drosophila)	17	17q11.2	+
RHOBTB3	RHOBTB3	Rho-related BTB domain containing 3	5	5q15	+
RHPN2	RHPN2	rhophilin, Rho GTPase binding protein 2	19	19q13.11	+
RIC3	RIC3	resistance to inhibitors of cholinesterase 3 homolog (C. elegans)	11	11p15.4	+
RIMBP2	RIMBP2	RIMS binding protein 2	12	12q24.33	+
RIMS2	RIMS2	regulating synaptic membrane exocytosis 2	8	8q22.3	+
RIMS3	RIMS3	regulating synaptic membrane exocytosis 3	1	1pter-p22.2	+
RIPK4	RIPK4	receptor-interacting serine-threonine kinase 4	21	21q22.3	+
RMND5A	RMND5A	required for meiotic nuclear division 5 homolog A (S. cerevisiae)	2	2p11.2	+
RNASE11	RNASE11	ribonuclease, RNase A family, 11 (non-active)	14	14q11.2	+
RND2	RND2	Rho family GTPase 2	17	17q21	+
RNF121	RNF121	ring finger protein 121	11	11q13.4	+
RNF138	RNF138	ring finger protein 138	18	18q12.1	+
RNF139	RNF139	ring finger protein 139	8	8q24	+
RNF141	RNF141	ring finger protein 141	11	11p15.4	+
RNF144A	RNF144A	ring finger protein 144A	2	2p25.2	+
RNF145	RNF145	ring finger protein 145	5	5q33.3	+
RNF146	RNF146	ring finger protein 146	6	6q22.1-q22.33	+
RNF165	RNF165	ring finger protein 165	18	18q21.1	+
RNF169	RNF169	ring finger protein 169	11	11q13.4	+
RNF180	RNF180	ring finger protein 180	5	5q12.3	+
RNF207	RNF207	ring finger protein 207	1	1p36.31	+

RNF38	RNF38	ring finger protein 38	9	9p13	+
RNF4	RNF4	ring finger protein 4	4	4p16.3	+
RNF41	RNF41	ring finger protein 41	12	12q13.13	+
RNF43	RNF43	ring finger protein 43	17	17q22	+
RNF8	RNF8	ring finger protein 8	6	6p21.3	+
ROBO2	ROBO2	roundabout, axon guidance receptor, homolog 2 (Drosophila)	3	3p12.3	+
ROCK2	ROCK2	Rho-associated, coiled-coil containing protein kinase 2	2	2p24	+
RP11-68I18.1	GABPB2	GA binding protein transcription factor, beta subunit 2	1	1q21.3	+
RP3-402G11.5	SELO	selenoprotein O	22	22q13.33	+
RP5-1000E10.4	SIKE1	SIKE1 (suppressor of IKBKE 1)	1	1p13.2	+
RPA1	RPA1	replication protein A1, 70kDa	17	17p13.3	+
RPL15	RPL15	ribosomal protein L15	3	3p24.2	+
RPP25	RPP25	ribonuclease P 25kDa subunit	15	15q24.2	+
RPRM	RPRM	reprimo, TP53 dependent G2 arrest mediator candidate	2	2q23.3	+
RPS6KA2	RPS6KA2	ribosomal protein S6 kinase, 90kDa, polypeptide 2	6	6q27	+
RPS6KA3	RPS6KA3	ribosomal protein S6 kinase, 90kDa, polypeptide 3	X	Xp22.2-p22.1	+
RPS6KA4	RPS6KA4	ribosomal protein S6 kinase, 90kDa, polypeptide 4	11	11q11-q13	+
RSBN1	RSBN1	round spermatid basic protein 1	1	1p13.2	+
RSPO4	RSPO4	R-spondin family, member 4	20	20p13	+
RSU1	RSU1	Ras suppressor protein 1	10	10p13	+
RTF1	RTF1	Rtf1, Paf1/RNA polymerase II complex component, homolog (S. cerevisiae)	15	15q15.1	+
RTKN2	RTKN2	rhotekin 2	10	10q21.2	+
RUNX1	RUNX1	runt-related transcription factor 1 (acute myeloid leukemia 1; aml1 oncogene)	21	21q22.3	+

RUNX1T1	RUNX1T1	runt-related transcription factor 1; translocated to, 1 (cyclin D-related)	8	8q22	+
RUNX2	RUNX2	runt-related transcription factor 2	6	6p21	+
RYBP	RYBP	RING1 and YY1 binding protein	3	3p13	+
S100BPB	S100BPB	S100P binding protein	1	1p35.1	+
S1PR1	S1PR1	sterile alpha motif domain containing 12	1	1p21	+
SAMD12	SAMD12	sterile alpha motif domain containing 5	8	8q24.12	+
SAMD5	SAMD5	secretory carrier membrane protein 5	6	6q24.3	-
SCAMP5	SCAMP5	secretory carrier membrane protein 5	15	15q24.2	+
SCD	SCD	stearoyl-CoA desaturase (delta-9-desaturase)	10	10q24.31	+
SCD5	SCD5	stearoyl-CoA desaturase 5	4	4q21.22	+
SCML4	SCML4	sex comb on midleg-like 4 (Drosophila)	6	6q21	+
SCN2B	SCN2B	sodium channel, voltage-gated, type II, beta	11	11q23	+
SCN5A	SCN5A	sodium channel, voltage-gated, type V, alpha (long QT syndrome 3)	3	3p21	+
SCRG1	SCRG1	stimulator of chondrogenesis 1	4	4q34.1	+
SDHC	SDHC	succinate dehydrogenase complex, subunit C, integral membrane protein, 15kDa	1	1q23.3	+
SEC14L1	SEC14L1	SEC14-like 1 (<i>S. cerevisiae</i>)	17	17q25.2	+
SEC14L5	SEC14L5	SEC14-like 5 (<i>S. cerevisiae</i>)	16	16p13.3	+
SEC23A	SEC23A	Sec23 homolog A (<i>S. cerevisiae</i>)	14	14q21.1	+
SEC61B	SEC61B	Sec61 beta subunit	9	9q22.32-q31.3	+
SEC62	SEC62	SEC62 homolog (<i>S. cerevisiae</i>)	3	3q26.2	+
SEMA3A	SEMA3A	sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3A	7	7p12.1	+
SEMA3F	SEMA3F	sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3F	3	3p21.3	+
SEMA3G	SEMA3G	sema domain, immunoglobulin domain (Ig), short basic	3	3p21.1	+

		domain, secreted, (semaphorin) 3G			
SEMA4C	SEMA4C	sema domain, immunoglobulin domain (Ig), transmembrane domain (TM) and short cytoplasmic domain, (semaphorin) 4C	2	2q11.2	+
SEMA4G	SEMA4G	sema domain, immunoglobulin domain (Ig), transmembrane domain (TM) and short cytoplasmic domain, (semaphorin) 4G	10	10q24.31	+
SENP5	SENP5	SUMO1/sentrin specific peptidase 5	3	3q29	+
SEPHS1	SEPHS1	selenophosphate synthetase 1	10	10p14	+
SEPT2	SEPT2	septin 2	2	2q37	+
SERBP1	SERBP1	SERPINE1 mRNA binding protein 1	1	1p31	+
SERINC1	SERINC1	serine incorporator 1	6	6q22.31	+
SERP1	SERP1	stress-associated endoplasmic reticulum protein 1	3	3q25.1	+
SERPINE1	SERPINE1	serpin peptidase inhibitor, clade E (nexin, plasminogen activator inhibitor type 1), member 1	7	7q21.3-q22	+
SERTAD2	SERTAD2	SERTA domain containing 2	2	2p14	+
SERTAD4	SERTAD4	SERTA domain containing 4	1	1q32.1-q41	+
SESN2	SESN2	sestrin 2	1	1p35.3	+
SFN	SFN	stratifin	1	1p36.11	+
SFRP1	SFRP1	secreted frizzled-related protein 1	8	8p11.21	+
SFRP4	SFRP4	secreted frizzled-related protein 4	7	7p14.1	+
SFRS1	SRSF1	splicing factor, arginine/serine-rich 1 (splicing factor 2, alternate splicing factor)	17	17q22	+
SFRS10	TRA2B	splicing factor, arginine/serine-rich 10 (transformer 2 homolog, Drosophila)	3	3q26.2-q27	+
SFRS12IP1	SREK1IP1	SREK1-interacting protein 1	5	5q12.3	+
SFRS2	SRSF2	splicing factor, arginine/serine-rich 2	17	17q25.1	+
SFRS2IP	SCAF11	splicing factor, arginine/serine-rich 2, interacting	12	12q12	+

		protein			
SFRS3	SRSF3	splicing factor, arginine/serine-rich 3	6	6p21	+
SFRS7	SRSF7	splicing factor, arginine/serine-rich 7, 35kDa	2	2p22.1	+
SFRS9	SRSF9	splicing factor, arginine/serine-rich 9	12	12q24.31	+
SFTPH	SFTA3	surfactant associated protein H	14	14q13.3	-
SFXN5	SFXN5	sideroflexin 5	2	-	+
SGCD	SGCD	sarcoglycan, delta (35kDa dystrophin-associated glycoprotein)	5	5q33-q34	+
SGEF	ARHGEF26	Rho guanine nucleotide exchange factor (GEF) 26	3	3q25.2	-
SGK1	SGK1	serum/glucocorticoid regulated kinase 1	6	6q23	+
SGK269	PEAK1	NKF3 kinase family member	15	15q24.3	+
SGK3	SGK3	serum/glucocorticoid regulated kinase family, member 3	8	8q12	+
SGMS2	SGMS2	sphingomyelin synthase 2	4	4q25	+
SGPP1	SGPP1	sphingosine-1-phosphate phosphatase 1	14	14q23.2	+
SGTB	SGTB	small glutamine-rich tetratricopeptide repeat (TPR)-containing, beta	5	5q12.3	+
SH2B3	SH2B3	SH2B adaptor protein 3	12	12q24	+
SH2D1A	SH2D1A	SH2 domain protein 1A, Duncan's disease (lymphoproliferative syndrome)	X	Xq25	+
SH2D2A	SH2D2A	SH2 domain protein 2A	1	1q21	+
SH3BGRL	SH3BGRL	SH3 domain binding glutamic acid-rich protein like	X	Xq13.3	+
SH3PXD2A	SH3PXD2A	SH3 and PX domains 2A	10	10q24.33	+
SH3PXD2B	SH3PXD2B	SH3 and PX domains 2B	5	5q35.1	+
SH3RF2	SH3RF2	SH3 domain containing ring finger 2	5	5q32	+
SH3TC2	SH3TC2	SH3 domain and tetratricopeptide repeats 2	5	5q32	+
SHE	SHE	Src homology 2 domain containing E	1	1q21.3	+
SHF	SHF	Src homology 2 domain containing F	15	15q21.1	+

SHOX2	SHOX2	short stature homeobox 2	3	3q25.32	+
SIPA1L2	SIPA1L2	signal-induced proliferation-associated 1 like 2	1	1q42.2	+
SIX4	SIX4	sine oculis homeobox homolog 4 (Drosophila)	14	14q23	+
SIX5	SIX5	sine oculis homeobox homolog 5 (Drosophila)	19	19q13.32	+
SKAP2	SKAP2	src kinase associated phosphoprotein 2	7	7p15.2	+
SKI	SKI	v-ski sarcoma viral oncogene homolog (avian)	1	1q22-q24	+
SKIP	SPHKAP	SPHK1 interactor, AKAP domain containing	2	2q36	-
SKP1	SKP1	S-phase kinase-associated protein 1	5	5q31	+
SLA	SLA	Src-like-adaptor	8	8q22.3-qter 8q24	+
SLA2	SLA2	Src-like-adaptor 2	20	20q11.23	+
SLAIN2	SLAIN2	SLAIN motif family, member 2	4	4p11	+
SLAMF8	SLAMF8	SLAM family member 8	1	1q23.2	+
SLC10A3	SLC10A3	solute carrier family 10 (sodium/bile acid cotransporter family), member 3	X	Xq28	+
SLC10A7	SLC10A7	solute carrier family 10 (sodium/bile acid cotransporter family), member 7	4	4q31.22	+
SLC12A5	SLC12A5	solute carrier family 12, (potassium-chloride transporter) member 5	20	20q13.12	+
SLC16A2	SLC16A2	solute carrier family 16, member 2 (monocarboxylic acid transporter 8)	X	Xq13.2	+
SLC16A3	SLC16A3	solute carrier family 16, member 3 (monocarboxylic acid transporter 4)	17	17q25	+
SLC16A6	SLC16A6	solute carrier family 16, member 6 (monocarboxylic acid transporter 7)	17	17q24.2	+
SLC17A5	SLC17A5	solute carrier family 17 (anion/sugar transporter), member 5	6	6q14-q15	+
SLC17A6	SLC17A6	solute carrier family 17 (sodium-dependent inorganic phosphate cotransporter), member 6	11	11p14.3	+

SLC22A7	SLC22A7	solute carrier family 22 (organic anion transporter), member 7	6	6p21.1	+
SLC23A3	SLC23A3	solute carrier family 23 (nucleobase transporters), member 3	2	2q35	+
SLC24A3	SLC24A3	solute carrier family 24 (sodium/potassium/calcium exchanger), member 3	20	20p13	+
SLC2A13	SLC2A13	solute carrier family 2 (facilitated glucose transporter), member 13	12	12q12	+
SLC30A4	SLC30A4	solute carrier family 30 (zinc transporter), member 4	15	15q21.1 15q21.1	+
SLC30A7	SLC30A7	solute carrier family 30 (zinc transporter), member 7	1	1p21.2	+
SLC31A1	SLC31A1	solute carrier family 31 (copper transporters), member 1	9	9q31-q32	+
SLC35B4	SLC35B4	solute carrier family 35, member B4	7	7q33	+
SLC35E4	SLC35E4	solute carrier family 35, member E4	22	22q12.2	+
SLC35F1	SLC35F1	solute carrier family 35, member F1	6	6q22.31	+
SLC36A1	SLC36A1	solute carrier family 36 (proton/amino acid symporter), member 1	5	5q33.1	+
SLC37A3	SLC37A3	solute carrier family 37 (glycerol-3-phosphate transporter), member 3	7	7q34	+
SLC38A3	SLC38A3	solute carrier family 38, member 3	3	3p21.3	+
SLC39A1	SLC39A1	solute carrier family 39 (zinc transporter), member 1	1	1q21	+
SLC39A10	SLC39A10	solute carrier family 39 (zinc transporter), member 10	2	2q32.3	+
SLC41A1	SLC41A1	solute carrier family 41, member 1	1	1q32.1	+
SLC44A1	SLC44A1	solute carrier family 44, member 1	9	9q31.2	+
SLC4A4	SLC4A4	solute carrier family 4, sodium bicarbonate cotransporter, member 4	4	4q21	+
SLC4A7	SLC4A7	solute carrier family 4, sodium bicarbonate cotransporter, member 7	3	3p22	+
SLC5A3	SLC5A3	solute carrier family 5 (inositol transporters), member 3	21	21q22.12	+

SLC6A1	SLC6A1	solute carrier family 6 (neurotransmitter transporter, GABA), member 1	3	3p25-p24	+
SLC7A11	SLC7A11	solute carrier family 7, (cationic amino acid transporter, y+ system) member 11	4	4q28-q32	+
SLC7A8	SLC7A8	solute carrier family 7 (cationic amino acid transporter, y+ system), member 8	14	14q11.2	+
SLC8A1	SLC8A1	solute carrier family 8 (sodium/calcium exchanger), member 1	2	2p23-p22	+
SLC9A2	SLC9A2	solute carrier family 9 (sodium/hydrogen exchanger), member 2	2	2q11.2	+
SLC9A3R2	SLC9A3R2	solute carrier family 9 (sodium/hydrogen exchanger), member 3 regulator 2	16	16p13.3	+
SLC9A9	SLC9A9	solute carrier family 9 (sodium/hydrogen exchanger), member 9	3	3q24	+
SLITRK2	SLITRK2	SLIT and NTRK-like family, member 2	X	Xq27.3	+
SMAD3	SMAD3	SMAD, mothers against DPP homolog 3 (Drosophila)	15	15q22.33	+
SMAD4	SMAD4	SMAD, mothers against DPP homolog 4 (Drosophila)	18	18q21.1	+
SMAD5	SMAD5	SMAD, mothers against DPP homolog 5 (Drosophila)	5	5q31	+
SMARCD1	SMARCD1	SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 1	12	12q13-q14	+
SMARCD2	SMARCD2	SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 2	17	17q23-q24	+
SMC1A	SMC1A	structural maintenance of chromosomes 1A	X	Xp11.22-p11.21	+
SMC6	SMC6	structural maintenance of chromosomes 6	2	2p24.2	+
SMG1	SMG1	smg-1 homolog, phosphatidylinositol 3-kinase-related kinase (C. elegans)	16	16p12.3	+
SMURF1	SMURF1	SMAD specific E3 ubiquitin protein ligase 1	7	7q22.1	+
SNAPC1	SNAPC1	small nuclear RNA activating complex, polypeptide 1, 43kDa	14	14q22	+

SNAPIN	SNAPIN	small nuclear RNA activating complex, polypeptide 1, 43kDa	1	1q21.3	+
SNCA	SNCA	synuclein, alpha (non A4 component of amyloid precursor)	4	4q21	+
SNRK	SNRK	SNF related kinase	3	3p22.1	+
SNTB2	SNTB2	syntrophin, beta 2 (dystrophin-associated protein A1, 59kDa, basic component 2)	16	16q22.1	+
SNX1	SNX1	sorting nexin 1	15	15q22.31	+
SNX13	SNX13	sorting nexin 13	7	7p21.1	+
SNX16	SNX16	sorting nexin 16	8	8q21.13	+
SNX18	SNX18	sorting nexin 18	5	5q11.2	+
SNX27	SNX27	sorting nexin family member 27	1	1q21.3	+
SNX4	SNX4	sorting nexin 4	3	3q21.2	+
SNX6	SNX6	sorting nexin 6	14	14q13.1	+
SOBP	SOBP	sine oculis binding protein homolog (Drosophila)	6	6q21	+
SOLH	SOLH	small optic lobes homolog (Drosophila)	16	16p13.3	+
SORCS1	SORCS1	sortilin-related VPS10 domain containing receptor 1	10	10q23-q25	+
SORCS3	SORCS3	sortilin-related VPS10 domain containing receptor 3	10	10q23-q25	+
SOS1	SOS1	son of sevenless homolog 1 (Drosophila)	2	2p21	+
SOX11	SOX11	SRY (sex determining region Y)-box 11	2	2p25	+
SOX12	SOX12	SRY (sex determining region Y)-box 12	20	20p13	+
SOX21	SOX21	SRY (sex determining region Y)-box 21	13	13q31-q32	+
SOX4	SOX4	SRY (sex determining region Y)-box 4	6	6p22.3	+
SOX5	SOX5	SRY (sex determining region Y)-box 5	12	12p12.1	+
SOX6	SOX6	SRY (sex determining region Y)-box 6	11	11p15.3	+
SOX9	SOX9	SRY (sex determining region Y)-box 9 (campomelic dysplasia, autosomal sex-reversal)	17	17q23	+
SP1	SP1	Sp1 transcription factor	12	12q13.1	+

SP2	SP2	Sp2 transcription factor	17	17q21.32	+
SP3	SP3	Sp3 transcription factor	2	2q31	+
SP7	SP7	Sp7 transcription factor	12	12q13.13	+
SPHAR	SPHAR	S-phase response (cyclin related)	1	1q42.13	+
SPINK4	SPINK4	serine peptidase inhibitor, Kazal type 4	9	9p13.3	+
SPOPL	SPOPL	speckle-type POZ protein-like	2	2q22.1	+
SPRED1	SPRED1	sprouty-related, EVH1 domain containing 1	15	15q14	+
SPRY1	SPRY1	sprouty homolog 1, antagonist of FGF signaling (Drosophila)	4	4q28.1	+
SPRY3	SPRY3	sprouty homolog 3 (Drosophila)	X	Xq28 and Yq12	+
SPTLC2	SPTLC2	serine palmitoyltransferase, long chain base subunit 2	14	14q24.3	+
SR140	U2SURP	U2 snRNP-associated SURP domain containing	3	3q23	+
SRC	SRC	v-src sarcoma (Schmidt-Ruppin A-2) viral oncogene homolog (avian)	20	20q12-q13	+
SRF	SRF	serum response factor (c-fos serum response element-binding transcription factor)	6	6p21.1	+
SRGAP1	SRGAP1	SLIT-ROBO Rho GTPase activating protein 1	12	12q14.2	+
SRI	SRI	sorcini	7	7q21.1	+
SRP72	SRP72	signal recognition particle 72kDa	4	4q11	+
SRPR	SRPR	signal recognition particle receptor ('docking protein')	11	11q24.2	+
SRPX2	SRPX2	sushi-repeat-containing protein, X-linked 2	X	Xq21.33-q23	+
SRRM2	SRRM2	serine/arginine repetitive matrix 2	16	16p13.3	+
SRrp35	SRSF12	serine/arginine-rich splicing factor 12	6	6q15	-
SS18	SS18	synovial sarcoma translocation, chromosome 18	18	18q11.2	+
SSR1	SSR1	signal sequence receptor, alpha (translocon-associated protein alpha)	6	6p24.3	+
SSX2IP	SSX2IP	synovial sarcoma, X breakpoint 2 interacting protein	1	1p22.3	+
ST3GAL5	ST3GAL5	ST3 beta-galactoside alpha-2,3-sialyltransferase 5	2	2p11.2	+

ST7L	ST7L	suppression of tumorigenicity 7 like	1	1p13.2	+
ST8SIA1	ST8SIA1	ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 1	12	12p12.1-p11.2	+
ST8SIA2	ST8SIA2	ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 2	15	15q26	+
ST8SIA4	ST8SIA4	ST8 alpha-N-acetyl-neuraminide alpha-2,8-sialyltransferase 4	5	5q21	+
STAC	STAC	SH3 and cysteine rich domain	3	3p22.3	+
STAG2	STAG2	stromal antigen 2	X	Xq25	+
STAM2	STAM2	signal transducing adaptor molecule (SH3 domain and ITAM motif) 2	2	2q23.3	+
STAT5B	STAT5B	signal transducer and activator of transcription 5B	17	17q11.2	+
STAT6	STAT6	signal transducer and activator of transcription 6, interleukin-4 induced	12	12q13	+
STAU1	STAU1	staufer, RNA binding protein, homolog 1 (Drosophila)	20	20q13.1	+
STC1	STC1	stanniocalcin 1	8	8p21-p11.2	+
STC2	STC2	stanniocalcin 2	5	5q35.1	+
STEAP4	STEAP4	STEAP family member 4	7	7q21.12	+
STK17A	STK17A	serine/threonine kinase 17a (apoptosis-inducing)	7	7p13	+
STK24	STK24	serine/threonine kinase 24 (STE20 homolog, yeast)	13	13q31.2-q32.3	+
STK3	STK3	serine/threonine kinase 3 (STE20 homolog, yeast)	8	8q22.2	+
STK35	STK35	serine/threonine kinase 35	20	20p13	+
STK4	STK4	serine/threonine kinase 4	20	20q11.2-q13.2	+
STK40	STK40	serine/threonine kinase 40	1	1p34.3	+
STMN3	STMN3	stathmin-like 3	20	20q13.3	+
STMN4	STMN4	stathmin-like 4	8	8p21.2	+
STRN3	STRN3	striatin, calmodulin binding protein 3	14	14q13-q21	+
STX16	STX16	syntaxin 16	20	20q13.32	+

STX17	STX17	syntaxin 17	9	9q31.1	+
STX1B	STX1B	syntaxin 1B	16	16p11.2	+
STXBP4	STXBP4	syntaxin binding protein 4	17	17q22	+
STXBP5L	STXBP5L	syntaxin binding protein 5-like	3	3q13.33	+
STXBP6	STXBP6	syntaxin binding protein 6 (amisyn)	14	14q12	+
STYX	STYX	serine/threonine/tyrosine interacting protein	14	-	+
SULF1	SULF1	sulfatase 1	8	8q13.1	+
SUMO3	SUMO3	SMT3 suppressor of mif two 3 homolog 3 (<i>S. cerevisiae</i>)	21	21q22.3	+
SUPT16H	SUPT16H	suppressor of Ty 16 homolog (<i>S. cerevisiae</i>)	14	14q11.2	+
SUPT6H	SUPT6H	suppressor of Ty 6 homolog (<i>S. cerevisiae</i>)	17	17q11.2	+
SV2A	SV2A	synaptic vesicle glycoprotein 2A	1	1q21.2	+
SV2B	SV2B	synaptic vesicle glycoprotein 2B	15	15q26.1	+
SYDE1	SYDE1	synapse defective 1, Rho GTPase, homolog 1 (<i>C. elegans</i>)	19	19p13.12	+
SYN2	SYN2	synapsin II	3	3p25	+
SYNCRIP	SYNCRIP	synaptotagmin binding, cytoplasmic RNA interacting protein	6	6q14-q15	+
SYNJ1	SYNJ1	synaptojanin 1	21	21q22.2	+
SYP	SYP	synaptophysin	X	Xp11.23-p11.22	+
SYT11	SYT11	synaptotagmin XI	1	1q21.2	+
SYT2	SYT2	synaptotagmin II	1	1q32.1	+
SYT7	SYT7	synaptotagmin VII	11	11q12-q13.1	+
SYT9	SYT9	synaptotagmin IX	11	11p15.4	+
SYVN1	SYVN1	synovial apoptosis inhibitor 1, synoviolin	11	11q13	+
TACR1	TACR1	tachykinin receptor 1	2	2p12	+
TAGAP	TAGAP	T-cell activation GTPase activating protein	6	6q25.3	+

TAGLN2	TAGLN2	transgelin 2	1	1q21-q25	+
TARDBP	TARDBP	TAR DNA binding protein	1	1p36.22	+
TBC1D1	TBC1D1	TBC1 (tre-2/USP6, BUB2, cdc16) domain family, member 1	4	4p14	+
TBC1D13	TBC1D13	TBC1 domain family, member 13	9	9q34.11	+
TBKBP1	TBKBP1	TBK1 binding protein 1	17	17q21.32	+
TBL1XR1	TBL1XR1	transducin (beta)-like 1X-linked receptor 1	3	3q26.32	+
TBX21	TBX21	T-box 21	17	17q21.32	+
TBX4	TBX4	T-box 4	17	17q21-q22	+
TBX6	TBX6	T-box 6	16	16p11.2	+
TC2N	TC2N	tandem C2 domains, nuclear	14	14q32.12	+
tcag7.1177	GATS	GATS, stromal antigen 3 opposite strand	7	7q22.1	+
tcag7.1228	UBN2	ubiquitin 2	7	7q34	-
TCAP	TCAP	titin-cap (telethonin)	17	17q12	+
TCF12	TCF12	transcription factor 12 (HTF4, helix-loop-helix transcription factors 4)	15	15q21	+
TCF4	TCF4	transcription factor 4	18	18q21.1	+
TCHP	TCHP	trichoplein, keratin filament binding	12	12q24.11	+
TDRD9	TDRD9	tudor domain containing 9	14	14q32.33	+
TEAD1	TEAD1	TEA domain family member 1 (SV40 transcriptional enhancer factor)	11	11p15.2	+
TEAD3	TEAD3	TEA domain family member 3	6	6p21.2	+
TEDDM1	TEDDM1	transmembrane epididymal protein 1	1	1q25.3	+
TEF	TEF	thyrotrophic embryonic factor	22	22q13 22q13.2	+
TERF2	TERF2	telomeric repeat binding factor 2	16	16q22.1	+
TET2	TET2	tet methylcytosine dioxygenase 2	4	4q24	+
TEX2	TEX2	testis expressed sequence 2	17	17q23.3	+

TEX261	TEX261	testis expressed sequence 261	2	2p13.3	+
TFAP2A	TFAP2A	transcription factor AP-2 alpha (activating enhancer binding protein 2 alpha)	6	6p24	+
TFAP2D	TFAP2D	transcription factor AP-2 delta (activating enhancer binding protein 2 delta)	6	6p12.1	+
TFAP2E	TFAP2E	transcription factor AP-2 epsilon (activating enhancer binding protein 2 epsilon)	1	1p34.3	+
TFCP2L1	TFCP2L1	transcription factor CP2-like 1	2	2q14	+
TFEC	TFEC	transcription factor EC	7	7q31.2	+
TGFBI	TGFBI	transforming growth factor, beta-induced, 68kDa	5	5q31	+
TGFBR1	TGFBR1	transforming growth factor, beta receptor I (activin A receptor type II-like kinase, 53kDa)	9	9q22	+
TGFBR2	TGFBR2	transforming growth factor, beta receptor II (70/80kDa)	3	3p22	+
THBD	THBD	thrombomodulin	20	20p11.2	+
THEX1	ERI1	three prime histone mRNA exonuclease 1	8	8p23.1	+
THNSL1	THNSL1	threonine synthase-like 1 (bacterial)	10	10p12.1	+
THRB	THRB	thyroid hormone receptor, beta (erythroblastic leukemia viral (v-erb-a) oncogene homolog 2, avian)	3	3p24.2	+
THTPA	THTPA	thiamine triphosphatase	14	14q11.2	+
TIAM1	TIAM1	T-cell lymphoma invasion and metastasis 1	21	21q22.1 21q22.11	+
TIGD5	TIGD5	tigger transposable element derived 5	8	8q24.3	+
TIGD6	TIGD6	tigger transposable element derived 6	5	5q32	+
TIMM17A	TIMM17A	translocase of inner mitochondrial membrane 17 homolog A (yeast)	1	1q32.1	+
TIMP2	TIMP2	TIMP metalloproteinase inhibitor 2	17	17q25	+
TIMP3	TIMP3	TIMP metalloproteinase inhibitor 3 (Sorsby fundus dystrophy, pseudoinflammatory)	22	22q12.1-q13.2 22q12.3	+
TIPARP	TIPARP	TCDD-inducible poly(ADP-ribose) polymerase	3	3q25.31	+

TLE4	TLE4	transducin-like enhancer of split 4 (E(sp1) homolog, Drosophila)	9	9q21.31	+
TLK1	TLK1	tousled-like kinase 1	2	2q31.1	+
TLK2	TLK2	tousled-like kinase 2	17	17q23	+
TLL1	TLL1	tolloid-like 1	4	4q32-q33	+
TLL2	TLL2	tolloid-like 2	10	10q23-q24	+
TLR4	TLR4	toll-like receptor 4	9	9q33.1	+
TLX1	TLX1	T-cell leukemia homeobox 1	10	10q24	+
TM9SF3	TM9SF3	transmembrane 9 superfamily member 3	10	10q24.1	+
TMC7	TMC7	transmembrane channel-like 7	16	16p12.3	+
TMCC1	TMCC1	transmembrane and coiled-coil domain family 1	3	3q22.1	+
TMED10	TMED10	transmembrane emp24-like trafficking protein 10 (yeast)	14	14q24.3	+
TMED5	TMED5	transmembrane emp24 protein transport domain containing 5	1	1pter-q31.3	+
TMEM104	TMEM104	transmembrane protein 104	17	17q25.1	+
TMEM106A	TMEM106A	transmembrane protein 106A	17	17q21.31	+
TMEM119	TMEM119	transmembrane protein 119	12	12q23.3	+
TMEM128	TMEM128	transmembrane protein 128	4	4p16.3	+
TMEM132D	TMEM132D	transmembrane protein 132D	12	12q24.33	+
TMEM133	TMEM133	transmembrane protein 133	11	11q22.1	+
TMEM135	TMEM135	transmembrane protein 135	11	11q14.2	+
TMEM147	TMEM147	transmembrane protein 147	19	19q13.1	+
TMEM155	TMEM155	transmembrane protein 155	4	4q27	+
TMEM161B	TMEM161B	transmembrane protein 161B	5	5q14.3	+
TMEM170B	TMEM170B	transmembrane protein 170B	6	6p24.2	+
TMEM181	TMEM181	transmembrane protein 181	6	6q25.3	+

TMEM182	TMEM182	transmembrane protein 182	2	2q12.1	+
TMEM184A	TMEM184A	transmembrane protein 184A	7	7p22.3	+
TMEM188	TMEM188	transmembrane protein 188	16	16q12.1	+
TMEM194A	TMEM194A	transmembrane protein 194	12	12q13.3	+
TMEM200B	TMEM200B	transmembrane protein 200B	1	1p35	+
TMEM218	TMEM218	transmembrane protein 218	11	11q24.2	+
TMEM35	TMEM35	transmembrane protein 35	X	Xq22.1	+
TMEM63B	TMEM63B	transmembrane protein 63B	6	6p21.1	+
TMEM63C	TMEM63C	transmembrane protein 63C	14	14q24.3	+
TMEM65	TMEM65	transmembrane protein 65	8	8q24.13	+
TMEM79	TMEM79	transmembrane protein 79	1	1q22	+
TMEM87A	TMEM87A	transmembrane protein 87A	15	15q15.1	+
TMEM97	TMEM97	transmembrane protein 97	17	17q11.2	+
TMF1	TMF1	TATA element modulatory factor 1	3	3p21-p12	+
TMIE	TMIE	transmembrane inner ear	3	3p21	+
TMPRSS5	TMPRSS5	transmembrane protease, serine 5 (spinesin)	11	11q	+
TMSB4X	TMSB4X	thymosin, beta 4, X-linked	X	Xq21.3-q22	+
TMSL3	TMSL3	thymosin-like 3	4	4q22.1	+
TMTC1	TMTC1	transmembrane and tetratricopeptide repeat containing 1	12	12p11.22	+
TNFRSF10B	TNFRSF10B	tumor necrosis factor receptor superfamily, member 10b	8	8p22-p21	+
TNFRSF19	TNFRSF19	tumor necrosis factor receptor superfamily, member 19	13	13q12.11-q12.3	+
TNFRSF21	TNFRSF21	tumor necrosis factor receptor superfamily, member 21	6	6p21.1	+
TNKS	TNKS	tankyrase, TRF1-interacting ankyrin-related ADP-ribose polymerase	8	8p23.1	+
TNKS2	TNKS2	tankyrase, TRF1-interacting ankyrin-related ADP-ribose polymerase 2	10	10q23.3	+

TNPO1	TNPO1	transportin 1	5	5q13.2	+
TNPO2	TNPO2	transportin 2 (importin 3, karyopherin beta 2b)	19	19p13.2	+
TNRC4	CELF3	trinucleotide repeat containing 4	1	1q21	-
TNRC6B	TNRC6B	trinucleotide repeat containing 6B	22	22q13.1	+
TNS3	TNS3	tensin 3	7	7p12.3	+
TOB1	TOB1	transducer of ERBB2, 1	17	17q21	+
TOB2	TOB2	transducer of ERBB2, 2	22	22q13.2	+
TOPORS	TOPORS	topoisomerase I binding, arginine/serine-rich	9	9p21	+
TOX	TOX	thymocyte selection-associated high mobility group box	8	8q12.1	+
TOX3	TOX3	TOX high mobility group box family member 3	16	16q12.1	+
TP53INP2	TP53INP2	tumor protein p53 inducible nuclear protein 2	20	20q11.22	+
TPPP	TPPP	tubulin polymerization promoting protein	5	5p15.3	+
TPRG1	TPRG1	tumor protein p63 regulated 1	3	3q28	+
TRAF4	TRAF4	TNF receptor-associated factor 4	17	17q11-q12	+
TRAF7	TRAF7	TNF receptor-associated factor 7	16	16p13.3	+
TRAK2	TRAK2	trafficking protein, kinesin binding 2	2	2q33	+
TRAM2	TRAM2	translocation associated membrane protein 2	6	6p21.1-p12	+
TRDN	TRDN	triadin	6	6q22.31	+
TREML2	TREML2	triggering receptor expressed on myeloid cells-like 2	6	6p21.1	+
TRHDE	TRHDE	thyrotropin-releasing hormone degrading enzyme	12	12q15-q21	+
TRIB2	TRIB2	tribbles homolog 2 (Drosophila)	2	2p24.3	+
TRIB3	TRIB3	tribbles homolog 3 (Drosophila)	20	20p13-p12.2	+
TRIM16	TRIM16	tripartite motif-containing 16	17	17p11.2	+
TRIM2	TRIM2	tripartite motif-containing 2	4	4q31.3	+
TRIM27	TRIM27	tripartite motif-containing 27	6	6p22	+
TRIM44	TRIM44	tripartite motif-containing 44	11	11p13	+

TRIM46	TRIM46	tripartite motif-containing 46	1	1q22	+
TRIM62	TRIM62	tripartite motif-containing 62	1	1p35.1	+
TRIOBP	TRIOBP	TRIO and F-actin binding protein	22	22q13.1	+
TRMT5	TRMT5	TRM5 tRNA methyltransferase 5 homolog (S. cerevisiae)	14	14q23.1	+
TRPC1	TRPC1	transient receptor potential cation channel, subfamily C, member 1	3	3q23	+
TRPC6	TRPC6	transient receptor potential cation channel, subfamily C, member 6	11	11q22.1	+
TRPS1	TRPS1	trichorhinophalangeal syndrome I	8	8q24.12	+
TSC1	TSC1	tuberous sclerosis 1	9	9q34	+
TSC22D2	TSC22D2	TSC22 domain family, member 2	3	3q25.1	+
TSEN34	TSEN34	tRNA splicing endonuclease 34 homolog (S. cerevisiae)	19	19q13.4	+
TSG101	TSG101	tumor susceptibility gene 101	11	11p15	+
TSGA14	TSGA14	testis specific, 14	7	7q32	+
TSN	TSN	translin	2	2q21.1	+
TSR2	TSR2	TSR2, 20S rRNA accumulation, homolog (S. cerevisiae)	X	Xp11.22	+
TTC13	TTC13	tetratricopeptide repeat domain 13	1	1q42.2	+
TLL2	TLL2	tubulin tyrosine ligase-like family, member 2	6	6q27	+
TTPAL	TTPAL	tocopherol (alpha) transfer protein-like	20	20q13.12	+
TTYH1	TTYH1	tweety homolog 1 (Drosophila)	19	19q13.4	+
TTYH3	TTYH3	tweety homolog 3 (Drosophila)	7	7p22	+
TUB	TUB	tubby homolog (mouse)	11	11p15.5	+
TULP1	TULP1	tubby like protein 1	6	6p21.3	+
TULP4	TULP4	tubby like protein 4	6	6q25-q26	+
TUSC2	TUSC2	tumor suppressor candidate 2	3	3p21.3	+

TWF1	TWF1	twinfilin, actin-binding protein, homolog 1	12	12q12	+
TXLNA	TXLNA	taxilin alpha	1	1p35.1	+
TXLNB	TXLNB	taxilin beta	6	6q24.1	+
TXNIP	TXNIP	thioredoxin interacting protein	1	1q21.1	+
UBA2	UBA2	ubiquitin-like modifier activating enzyme 2	19	19q12	+
UBA6	UBA6	ubiquitin-like modifier activating enzyme 6	4	4q13.2	+
UBE2B	UBE2B	ubiquitin-conjugating enzyme E2B (RAD6 homolog)	5	5q31.1	+
UBE2D1	UBE2D1	ubiquitin-conjugating enzyme E2D 1 (UBC4/5 homolog, yeast)	10	10q21.1	+
UBE2D3	UBE2D3	ubiquitin-conjugating enzyme E2D 3 (UBC4/5 homolog, yeast)	4	4q24	+
UBE2G1	UBE2G1	ubiquitin-conjugating enzyme E2G 1 (UBC7 homolog, yeast)	17	1q42 17p13.2	+
UBE2J1	UBE2J1	ubiquitin-conjugating enzyme E2, J1 (UBC6 homolog, yeast)	6	6q15	+
UBE2K	UBE2K	ubiquitin-conjugating enzyme E2K	4	4p14	+
UBE2V2	UBE2V2	ubiquitin-conjugating enzyme E2 variant 2	8	8q11.21	+
UBE2W	UBE2W	ubiquitin-conjugating enzyme E2W (putative)	8	8q21.11	+
UBE3A	UBE3A	ubiquitin protein ligase E3A (human papilloma virus E6-associated protein, Angelman syndrome)	15	15q11.2	+
UBE4A	UBE4A	ubiquitination factor E4A (UFD2 homolog, yeast)	11	11q23.3	+
UBTF	UBTF	upstream binding transcription factor, RNA polymerase I	17	17q21.3	+
UBXD2	UBXN4	UBX domain containing 2	2	2q21.3	+
UCN2	UCN2	urocortin 2	3	3p21.3	+
UCRC	UQCR10	ubiquinol-cytochrome c reductase, complex III subunit X	22	22cen-q12.3	+
UGP2	UGP2	UDP-glucose pyrophosphorylase 2	2	2p14-p13	+

UHRF1	UHRF1	ubiquitin-like, containing PHD and RING finger domains, 1	19	19p13.3	+
ULK2	ULK2	unc-51-like kinase 2 (<i>C. elegans</i>)	17	17p11.2	+
UNC119B	UNC119B	unc-119 homolog B (<i>C. elegans</i>)	12	12q24.31	+
UNC13C	UNC13C	unc-13 homolog C (<i>C. elegans</i>)	15	15q21.3	+
UNC5A	UNC5A	unc-5 homolog A (<i>C. elegans</i>)	5	5q35.2	+
UQCC	UQCC	ubiquinol-cytochrome c reductase complex chaperone	20	20q11.22	+
UQCRB	UQCRB	ubiquinol-cytochrome c reductase binding protein	8	8q22	+
URM1	URM1	ubiquitin related modifier 1	9	9q34.11	+
USF2	USF2	upstream transcription factor 2, c-fos interacting	19	19q13	+
USP24	USP24	ubiquitin specific peptidase 24	1	1p32.3	+
USP25	USP25	ubiquitin specific peptidase 25	21	21q11.2	+
USP28	USP28	ubiquitin specific peptidase 28	11	11q23	+
USP45	USP45	ubiquitin specific peptidase 45	6	6q16.2	+
USP49	USP49	ubiquitin specific peptidase 49	6	6p21	+
USP9X	USP9X	ubiquitin specific peptidase 9, X-linked	X	Xp11.4	+
USP9Y	USP9Y	ubiquitin specific peptidase 9, Y-linked (fat facets-like, <i>Drosophila</i>)	Y	Yq11.2	+
UST	UST	uronyl-2-sulfotransferase	6	6q25.1	+
UTRN	UTRN	utrophin (homologous to dystrophin)	6	6q24	+
UTX	KDM6A	ubiquitously transcribed tetratricopeptide repeat, X chromosome	X	Xp11.2	+
VAMP2	VAMP2	vesicle-associated membrane protein 2 (synaptobrevin 2)	17	17p13.1	+
VAMP4	VAMP4	vesicle-associated membrane protein 4	1	1q24-q25	+
VANGL1	VANGL1	vang-like 1 (van gogh, <i>Drosophila</i>)	1	1p13.1	+
VAPB	VAPB	VAMP (vesicle-associated membrane protein)-associated protein B and C	20	20q13.33	+

VAX1	VAX1	ventral anterior homeobox 1	10	10q26.1	+
VDAC2	VDAC2	voltage-dependent anion channel 2	10	10q22	+
VDR	VDR	vitamin D (1,25- dihydroxyvitamin D3) receptor	12	12q13.11	+
VEGFA	VEGFA	vascular endothelial growth factor A	6	6p12	+
VGLL3	VGLL3	vestigial like 3 (Drosophila)	3	3p12.1	+
VKORC1	VKORC1	vitamin K epoxide reductase complex, subunit 1	16	16p11.2	+
VPS25	VPS25	vacuolar protein sorting 25 homolog (S. cerevisiae)	17	17q21.31	+
VPS36	VPS36	vacuolar protein sorting 36 (yeast)	13	13q14.3	+
VPS37C	VPS37C	vacuolar protein sorting 37 homolog C (S. cerevisiae)	11	11q12.2	+
VPS41	VPS41	vacuolar protein sorting 41 (yeast)	7	7p14-p13	+
VPS4A	VPS4A	vacuolar protein sorting 4 homolog A (S. cerevisiae)	16	16q22.1	+
VPS54	VPS54	vacuolar protein sorting 54 (S. cerevisiae)	2	2p13-p14	+
VSX2	VSX2	visual system homeobox 2	14	14q24.3	+
WAPAL	WAPAL	wings apart-like homolog (Drosophila)	10	10q23.2	+
WASF2	WASF2	WAS protein family, member 2	1	1p36.11	+
WASL	WASL	Wiskott-Aldrich syndrome-like	7	7q31.3	+
WBP2	WBP2	WW domain binding protein 2	17	17q25	+
WDFY3	WDFY3	WD repeat and FYVE domain containing 3	4	4q21.23	+
WDR21A	DCAF4	WD repeat domain 21A	14	14q24.3	+
WDR22	DCAF5	WD repeat domain 22	14	14q23-q24.1	+
WDR23	DCAF11	WD repeat domain 23	14	14q11.2	+
WDR26	WDR26	WD repeat domain 26	1	1q42.13	+
WDR32	DCAF10	WD repeat domain 32	9	9p13.2	+
WDR37	WDR37	WD repeat domain 37	10	10p15.3	+
WDR40A	DCAF12	WD repeat domain 40A	9	9p13.3	+
WDR47	WDR47	WD repeat domain 47	1	1p13.3	-
WDR82	WDR82	WD repeat domain 82	3	3p21.2	+

WHSC1	WHSC1	Wolf-Hirschhorn syndrome candidate 1	4	4p16.3	+
WIPF2	WIPF2	WD repeat domain, phosphoinositide interacting 2	17	17q21.2	+
WIPI2	WIPI2	WD repeat domain, phosphoinositide interacting 2	7	7p22.1	+
WNK1	WNK1	WNK lysine deficient protein kinase 1	12	12p13.3	+
WNK3	WNK3	WNK lysine deficient protein kinase 3	X	Xp11.22	+
WNT10B	WNT10B	wingless-type MMTV integration site family, member 10B	12	12q13	+
WTAP	WTAP	Wilms tumor 1 associated protein	6	6q25-q27	+
WWC2	WWC2	WW, C2 and coiled-coil domain containing 2	4	4q35.1	+
WWC3	WWC3	WWC family member 3	X	Xp22.32	+
WWOX	WWOX	WW domain containing oxidoreductase	16	16q23.3-q24.1	+
XKR5	XKR5	XK, Kell blood group complex subunit-related family, member 5	8	8p23.1	+
XKR6	XKR6	XK, Kell blood group complex subunit-related family, member 6	8	8p23.1	+
XPNPEP2	XPNPEP2	X-prolyl aminopeptidase (aminopeptidase P) 2, membrane-bound	X	Xq25	+
XPO1	XPO1	exportin 1 (CRM1 homolog, yeast)	2	2p16	+
XPO5	XPO5	exportin 5	6	6p21.1	+
XPR1	XPR1	xenotropic and polytropic retrovirus receptor	1	1q25.1	+
XRN1	XRN1	5'-3' exoribonuclease 1	3	3q23	+
XYLT1	XYLT1	xylosyltransferase I	16	16p12.3	+
YAF2	YAF2	YY1 associated factor 2	12	12q12	+
YES1	YES1	v-yes-1 Yamaguchi sarcoma viral oncogene homolog 1	18	18p11.31-p11.21	+
YIPF5	YIPF5	Yip1 domain family, member 5	5	5q31.3	+
YOD1	YOD1	YOD1 OTU deubiquinating enzyme 1 homolog (S. cerevisiae)	1	1q32.2	+
YPEL1	YPEL1	yippee-like 1 (Drosophila)	22	22q11.2	+

YTHDC1	YTHDC1	YTH domain containing 1	4	4q13.2	+
YTHDF2	YTHDF2	YTH domain family, member 2	1	1p35	+
YWHAZ	YWHAZ	tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, zeta polypeptide	8	8q23.1	+
ZAK	ZAK	sterile alpha motif and leucine zipper containing kinase AZK	2	2q24.2	+
ZAR1	ZAR1	zygote arrest 1	4	4p11	+
ZBTB11	ZBTB11	zinc finger and BTB domain containing 11	3	3q12.3	+
ZBTB20	ZBTB20	zinc finger and BTB domain containing 20	3	3q13.2	+
ZBTB38	ZBTB38	zinc finger and BTB domain containing 38	3	3q23	+
ZBTB41	ZBTB41	zinc finger and BTB domain containing 41	1	1q31.3	+
ZBTB44	ZBTB44	zinc finger and BTB domain containing 44	11	11q24.3	+
ZBTB5	ZBTB5	zinc finger and BTB domain containing 5	9	9p13.2	+
ZC3H11A	ZC3H11A	zinc finger CCCH-type containing 11A	1	1q32.1	+
ZC3H12B	ZC3H12B	zinc finger CCCH-type containing 12B	X	Xq12	+
ZC3H12C	ZC3H12C	zinc finger CCCH-type containing 12C	11	11q22.3	+
ZC3H14	ZC3H14	zinc finger CCCH-type containing 14	14	14q31.3	+
ZC3H18	ZC3H18	zinc finger CCCH-type containing 18	16	16q24.2	+
ZC3H6	ZC3H6	zinc finger CCCH-type containing 6	2	2q13	+
ZCCHC14	ZCCHC14	zinc finger, CCHC domain containing 14	16	16q24.2	+
ZCCHC24	ZCCHC24	zinc finger, CCHC domain containing 24	10	10q22.3	+
ZDHHC16	ZDHHC16	zinc finger, DHHC-type containing 16	10	10q24.1	+
ZDHHC21	ZDHHC21	zinc finger, DHHC-type containing 21	9	9p22.3	+
ZEB2	ZEB2	zinc finger E-box binding homeobox 2	2	2q22.3	+
ZFAND5	ZFAND5	zinc finger, AN1-type domain 5	9	9q13-q21	+
ZFAT	ZFAT	zinc finger and AT hook domain containing	8	8q24.22	+
ZFHX3	ZFHX3	zinc finger homeobox 3	16	16q22.3	+

ZFHX4	ZFHX4	zinc finger homeodomain 4	8	8q21.11	+
ZFP36L2	ZFP36L2	zinc finger protein 36, C3H type-like 2	2	2p22.3-p21	+
ZFP91	ZFP91	zinc finger protein 91 homolog (mouse)	11	11q12	+
ZFYVE16	ZFYVE16	zinc finger, FYVE domain containing 16	5	5q14	+
ZFYVE20	ZFYVE20	zinc finger, FYVE domain containing 20	3	3p25.1	+
ZFYVE26	ZFYVE26	zinc finger, FYVE domain containing 26	14	14q24.1	+
ZHX2	ZHX2	zinc fingers and homeoboxes 2	8	8q24.13	+
ZIC1	ZIC1	Zic family member 1 (odd-paired homolog, Drosophila)	3	3q24	+
ZIC2	ZIC2	Zic family member 2 (odd-paired homolog, Drosophila)	13	13q32	+
ZIC3	ZIC3	Zic family member 3 heterotaxy 1 (odd-paired homolog, Drosophila)	X	Xq26.2	+
ZIC4	ZIC4	Zic family member 4	3	3q24	+
ZKSCAN1	ZKSCAN1	zinc finger with KRAB and SCAN domains 1	7	7q22	+
ZMAT5	ZMAT5	zinc finger, matrin type 5	22	22cen-q12.3	+
ZMYM4	ZMYM4	zinc finger, MYM-type 4	1	1p32-p34	+
ZMYND11	ZMYND11	zinc finger, MYND domain containing 11	10	10p14	+
ZNF131	ZNF131	zinc finger protein 131	5	5p12	+
ZNF148	ZNF148	zinc finger protein 148	3	3q21	+
ZNF181	ZNF181	zinc finger protein 181	19	19q13.11	+
ZNF19	ZNF19	zinc finger protein 19	16	16q22	+
ZNF2	ZNF2	zinc finger protein 2	2	2q11.2	+
ZNF25	ZNF25	zinc finger protein 25	10	10p11.1	+
ZNF250	ZNF250	zinc finger protein 250	8	8q24.3	+
ZNF275	ZNF275	zinc finger protein 275	X	Xq28	+
ZNF280C	ZNF280C	zinc finger protein 280C	X	Xq26.1	+

ZNF292	ZNF292	zinc finger protein 292	6	6q14.3	+
ZNF295	ZNF295	zinc finger protein 295	21	21q22.3	+
ZNF302	ZNF302	zinc finger protein 302	19	19q13.11	+
ZNF354A	ZNF354A	zinc finger protein 354A	5	5q35.3	+
ZNF362	ZNF362	zinc finger protein 362	1	1p35.1	+
ZNF37A	ZNF37A	zinc finger protein 37A	10	10p11.2	+
ZNF385B	ZNF385B	zinc finger protein 385B	2	2q31.2-q31.3	+
ZNF440	ZNF440	zinc finger protein 440	19	19p13.2	+
ZNF449	ZNF449	zinc finger protein 449	X	Xq26.3	+
ZNF473	ZNF473	zinc finger protein 473	19	19q13.33	+
ZNF507	ZNF507	zinc finger protein 507	19	19q13.11	+
ZNF514	ZNF514	zinc finger protein 514	2	2q11.1	+
ZNF516	ZNF516	zinc finger protein 516	18	18q23	+
ZNF518A	ZNF518A	zinc finger protein 518A	10	10q24.1	+
ZNF532	ZNF532	zinc finger protein 532	18	18q21.32	+
ZNF544	ZNF544	zinc finger protein 544	19	19q13.43	+
ZNF594	ZNF594	zinc finger protein 594	17	17p13	+
ZNF607	ZNF607	zinc finger protein 607	19	19q13.1	+
ZNF609	ZNF609	zinc finger protein 609	15	15q22.31	+
ZNF618	ZNF618	zinc finger protein 618	9	9q32	+
ZNF629	ZNF629	zinc finger protein 629	16	16p11.2	+
ZNF654	ZNF654	zinc finger protein 654	3	3p11.1	+
ZNF664	ZNF664	zinc finger protein 664	12	12q24.31	+
ZNF697	ZNF697	zinc finger protein 697	1	1p12	+
ZNF701	ZNF701	zinc finger protein 701	19	19q13.41	+
ZNF706	ZNF706	zinc finger protein 706	8	8q22.3	+
ZNF763	ZNF763	zinc finger protein 763	19	19p13.2	+

ZNF781	ZNF781	zinc finger protein 781	19	19q13.12	+
ZNF793	ZNF793	zinc finger protein 793	19	19q13.12	+
ZNF800	ZNF800	zinc finger protein 800	7	7q31.33	+
ZNF804A	ZNF804A	zinc finger protein 804A	2	2q32.1	+
ZNF827	ZNF827	zinc finger protein 827	4	4q31.22	+
ZNRF1	ZNRF1	zinc and ring finger 1	16	16q23.1	+
ZNRF3	ZNRF3	zinc and ring finger 3	22	22q12.1	+
ZRANB1	ZRANB1	zinc finger, RAN-binding domain containing 1	10	10q26.13	+
ZRANB2	ZRANB2	zinc finger, RAN-binding domain containing 2	1	1p31	+
ZSWIM4	ZSWIM4	zinc finger, SWIM-type containing 4	19	19p13.13	+
ZXDC	ZXDC	ZXD family zinc finger C	3	3q21.3	+

B. Distribuição dos genes-alvo expressos em células sanguíneas por cromossomo.

Cromossomo	Nº de genes-alvo
Hsa 1	222
Hsa 2	156
Hsa 3	137
Hsa 4	87
Hsa 5	108
Hsa 6	114
Hsa 7	98
Hsa 8	86
Hsa 9	74
Hsa 10	81
Hsa 11	100
Hsa 12	129
Hsa 13	31
Hsa 14	64
Hsa 15	70
Hsa 16	61
Hsa 17	132
Hsa 18	23
Hsa 19	56
Hsa 20	47
Hsa 21	22
Hsa 22	35
Hsa X	95
Hsa Y	2
TOTAL	2030

Material Suplementar 3. MicroRNAs diferencialmente expressos e seus alvos preditos. A coluna B apresenta o número de microRNAs que regula cada gene alvo. As colunas C a AJ apresentam os microRNAs diferencialmente expressos em pelo menos 50% no presente estudo. O “X” representa a regulação do gene alvo pelo respectivo microRNA. Os microRNAs hsa-miR-516, hsa-miR-10a*, hsa-miR-454*, has-miR-1305, hsa-miR-92a-1*, hsa-miR-23a*, hsa-miR-18a*, hsa-miR-363*, hsa-miR-452* e hsa-miR-148b* não constam na base de dados do *TargetScanHuman* v. 5.2.

Gene alvo	microRNAs reguladores	hsa-miR-219-1-3p	hsa-miR-134	hsa-miR-605	hsa-miR-346	hsa-miR-650	hsa-miR-766	hsa-miR-372	hsa-miR-133a	hsa-miR-564	hsa-miR-1290	hsa-miR-483-5p	hsa-miR-1	hsa-miR-597	hsa-miR-32	hsa-miR-550	hsa-miR-1260	hsa-miR-211	hsa-miR-1254	hsa-miR-520c-3p	hsa-miR-1300	hsa-miR-1275	hsa-miR-452	hsa-miR-1255b	hsa-miR-575	hsa-miR-1285	hsa-miR-337-5p	hsa-miR-1282	hsa-miR-641	hsa-miR-375	hsa-miR-1208	hsa-miR-520d-3p	hsa-miR-206	hsa-miR-548c-5p	hsa-miR-135b		
		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	
TNRC6B	7	X	X	X		X												X																			
TMEM170B	7			X			X	X	X											X																	
SERBP1	6			X																	X	X														X	
MYT1L	6			X				X						X						X												X	X				
NFIB	6			X	X			X						X						X													X				
RPS6KA3	6							X						X						X			X										X				
NR2C2	5	X						X												X								X									
RSBN1	5							X							X					X					X												
ELAVL2	5							X												X			X							X							
GPM6A	5							X	X											X	X												X				
SH3TC2	5			X							X		X					X																X			

Material Supplementar 3

RAB22A	5						X											X									X								
IKZF2	5						X												X								X				X				
ANKRD13C	5						X		X										X							X				X					
GNPDA2	5						X			X																X				X	X				
LHX6	5						X																		X		X			X					
HIF1AN	5						X													X					X				X						
ONECUT2	4	X							X																				X					X	
ITGB8	4		X				X																				X								
AAK1	4			X			X																				X								
PRDM4	4						X						X																	X					
IGF1	4									X									X	X												X			
UBE2G1	4								X		X								X							X									
IPO9	4									X									X							X				X					
ZBTB11	4						X												X										X			X			
NFAT5	4			X																						X			X					X	
ZBTB41	4			X			X													X									X						
WDR26	4			X			X													X									X						
FRMD4A	4						X																					X	X						
E2F7	4			X			X													X									X						
KIAA0831	4					X						X																X						X	
SNRK	4						X	X																					X						
MLL2	4		X		X				X																		X								
CYBRD1	4						X																						X	X					
BRWD1	4			X					X		X																						X		
SOX4	4	X									X	X																							
NRP1	4									X																						X			
MECP2	4						X						X		X													X							
CUGBP2	4		X				X																							X					
MARCH5	4						X																				X				X				
ZRANB1	4						X																				X			X					
CUX2	4						X																						X	X					
PDIK1L	4						X																					X	X						
LATS2	4						X																						X					X	
MSL-1	4						X																						X						
WDR40A	4						X				X																		X						
DDX6	4					X					X																		X						X

SFRS3	3									X													X			X
CROT	3					X									X								X		X	
PUNC	3					X									X								X			
MTF1	3					X									X								X			
LEFTY1	3					X									X								X			
VAPB	3		X			X									X											
HIGD1A	3									X												X			X	
EDNRB	3					X									X								X		X	
SLC44A1	3		X							X															X	
ADO	3																				X		X			X
OXR1	3					X									X								X			
EBF1	3													X								X				X
CDCA7	3					X									X								X			
NAPEPLD	3					X									X								X			
UBE2B	3					X									X								X			
LASP1	3						X			X														X		
HEG1	3									X					X									X		
KPNA1	3							X								X							X			
TXNIP	3					X									X								X			
M6PR	3														X			X				X				
ZCCHC14	3		X							X																X
CREB5	3							X							X							X				
VDR	3					X									X								X		X	
LOC26010	3									X					X									X		X
PRDM8	3					X									X								X			
CNNM1	3			X								X										X				
DGKG	3		X											X			X									
ELK1	3							X					X				X									
ATAD2	3					X									X									X		
SPTLC2	3		X														X			X						
ARRDC3	3							X			X												X			
BRP44L	3					X									X								X			
CXCL12	3					X														X			X			
IGF1R	3			X						X											X		X			
NAV1	3				X																X	X				
STK4	3																				X	X	X			

EIF1AX	2							X																			X				
ERLIN2	2				X																								X		
TACR1	2							X																					X		
GRIK2	2		X																									X			
KIAA0355	2							X				X																			
CHRM1	2										X		X																		
PIP5K3	2						X				X																				
KIF2A	2							X																					X		
TCF4	2			X										X																	
PALM2- AKAP2	2		X																									X			
UBE2W	2														X	X															
VAMP4	2							X																					X		
C7orf60	2																											X		X	
SH3PXD2A	2					X								X																	
YWHAZ	2																										X		X		
TFEC	2			X										X																	
LANCL2	2						X				X																				
RBM9	2				X																					X					
RALGPS1	2		X																											X	
CCDC6	2											X																	X		
MTMR6	2													X																X	
SLC35F1	2														X											X					
TNKS2	2									X																				X	
TIMM17A	2						X						X																		
FRMPD4	2																									X				X	
C3orf59	2																								X					X	
DNAJC16	2												X															X			
C6orf168	2							X																						X	
CSMD3	2									X																	X				
MEMO1	2	X			X																										
SERP1	2									X																				X	
EPHA7	2						X							X																	
EPB49	2														X												X				
RAB5A	2									X																			X		
AKAP2	2		X																								X				

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CORO1C	2								X											X	
NF1	2	X																X			
LPPR4	2								X												X
PFTK1	2								X												X
ZNF362	2			X							X										
IL20RA	2			X						X											
FOXN2	2								X												X
SFRS10	2								X												X
GK5	2							X													X
RUNX1T1	2		X														X				
C11orf61	2								X												X
C7orf41	2										X				X						
IRS2	2				X															X	
KCNAB1	2							X											X		
PDE4D	2								X										X		
ARHGAP26	2										X		X								
ERC2	2													X					X		
TRHDE	2					X						X									
MAP2K4	2									X							X				
SLC7A11	2								X							X					
C2orf69	2								X												X
ZIC3	2					X	X														
GLCE	2				X				X												
C15orf17	2											X								X	
TREML2	2				X														X		
IGFBP5	2										X			X							
CRTAP	2													X					X		
REEP1	2										X				X						
PLXNA4	2						X												X		
GLCCI1	2								X											X	
GPR155	2												X								X
GREM2	2									X									X		
KIAA1045	2	X				X															
NR3C2	2				X																X
SLA2	2										X	X									
MTF2	2													X	X						

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KLHL3	1				X																				
ADCY9	1																	X							
FAM155B	1			X																					
DENND2D	1							X																	
C6orf65	1																					X			
TMF1	1							X																	
FCHO2	1																								X
SCML4	1			X																					
GGA2	1																	X							
TRIB2	1	X																							
SEMA4C	1									X															
ZAK	1									X															
UTX	1		X																						
WAPAL	1					X																			
C3orf21	1						X																		
SLC10A3	1																						X		
SCN5A	1													X											
GRIA2	1																					X			
VDAC2	1		X																						
GATA4	1																					X			
TOB1	1									X															
LMBR1	1																						X		
C8orf44	1																					X			
CENTG3	1									X															
SMAD5	1																								X
WASF2	1																					X			
DNAJC13	1												X												
PPIL6	1			X																					
ODZ4	1														X										
PRR3	1				X																				
XPO5	1										X														
ADRBK2	1																						X		
HCLS1	1				X																				
SGPP1	1						X																		
C10orf11	1											X													
ARNT2	1																						X		

NRSN2	1						X																													
SGEF	1										X																									
RNF169	1																					X														
TOTAL de alvos por microRNA		70	96	100	88	100	100	100	100	19	100	4	100	100	100	100	100	100	100	100	67	100	72	100	100	13	1	100	100	100	100	100	100	100		

Material Suplementar 4. Informações sobre localização celular e função dos genes-alvo dos microRNAs de interesse, bem como processos biológicos nos quais os mesmos estão associados.

Fontes de informações consideradas: Inferido por ensaio direto (*Inferred from Direct Assay - IDA*), Inferido por padrão de expressão (*Inferred from Expression Pattern - IEP*), Inferido por interação genética (*Inferred from Genetic Interaction - IGI*), Inferido por genótipo mutante (*Inferred from Mutant Phenotype - IMP*), Inferido por interação física (*Inferred from Physical Interaction - IPI*), Declaração do autor (*Traceable Author Statement - TAS*).

A. Informações obtidas

Símbolo do gene	Nome do gene	Resultado		Fontes de informação
AAK1	AAK1 AP2 associated kinase 1	Component	cytoplasm	IDA
		Component	mitochondrion	IDA
		Component	plasma membrane	IDA
ABCB10	ABCB10 ATPbinding cassette, subfamily B (MDR/TAP), member 10	Component	integral to mitochondrial membrane	IDA
ABCG4	ABCG4 ATPbinding cassette, subfamily G (WHITE), member 4	Function	protein homodimerization activity	IDA
		Function	protein heterodimerization activity	IPI
		Biological process	cholesterol efflux	TAS
ABI2	ABI2 ablinteractor 2	Component	cytosol	IDA
		Component	filopodium	IDA
		Component	lamellipodium	IDA
		Component	cytoplasm	TAS
		Function	SH3 domain binding	IPI
		Function	proline-rich region binding	IPI

		Function	ubiquitin protein ligase binding	IPI
		Function	DNA binding	TAS
		Function	SH3 domain binding	TAS
		Function	cytoskeletal adaptor activity	TAS
		Biological process	cellular component movement	IDA
		Biological process	peptidyl-tyrosine phosphorylation	IDA
		Biological process	cell migration	TAS
		Biological process	cytoskeleton organization	TAS
ABL2	ABL2 vab1 Abelson murine leukemia viral oncogene homolog 2	Function	magnesium ion binding	IDA
		Function	manganese ion binding	IDA
		Function	protein tyrosine kinase activity	IDA
		Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	peptidyl-tyrosine phosphorylation	IDA
		Biological process	positive regulation of oxidoreductase activity	IDA
		Biological process	axon guidance	TAS
		Biological process	protein modification process	TAS
		Biological process	signal transduction	TAS
ACADL	ACADL acylCoA dehydrogenase, long chain	Component	cytoplasm	IDA
		Component	mitochondrion	IDA
		Component	mitochondrial matrix	TAS
		Function	acyl-CoA dehydrogenase activity	TAS
		Biological process	cellular lipid metabolic process	TAS
		Biological process	fatty acid beta-oxidation	TAS
ACAT2	ACAT2 acetylCoA acetyltransferase 2	Component	cytoplasm	IDA
		Component	mitochondrion	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Function	acetyl-CoA C-acetyltransferase activity	IDA
		Function	protein binding	IPI
ACBD3	ACBD3 acylCoA binding domain containing 3	Component	Golgi apparatus	IDA
		Function	protein binding	IPI
ACCN2	ACCN2 amiloridesensitive cation channel 2, neuronal	Component	integral to plasma membrane	TAS
		Function	protein binding	IPI

		Biological process	response to pH	TAS
		Biological process	signal transduction	TAS
		Biological process	transport	TAS
ACSL3	ACSL3 acylCoA synthetase longchain family member 3	Function	protein binding	IPI
		Function	fatty-acyl-CoA synthase activity	TAS
		Biological process	cellular lipid metabolic process	TAS
		Biological process	long-chain fatty-acyl-CoA biosynthetic process	TAS
ACSL4	ACSL4 acylCoA synthetase longchain family member 4	Component	endoplasmic reticulum membrane	TAS
		Function	long-chain fatty acid-CoA ligase activity	IDA
		Function	long-chain fatty acid-CoA ligase activity	TAS
		Biological process	cellular lipid metabolic process	TAS
		Biological process	learning or memory	TAS
		Biological process	long-chain fatty-acyl-CoA biosynthetic process	TAS
ACTC1	ACTC1 actin, alpha, cardiac muscle 1	Component	actin filament	IDA
		Component	actomyosin, actin part	IDA
		Component	cytoplasm	IDA
		Component	sarcomere	IDA
		Component	cytosol	TAS
		Function	ATP binding	IDA
		Function	ATPase activity	IDA
		Function	myosin binding	IDA
		Function	myosin binding	IPI
		Biological process	actin filament-based movement	IDA
		Biological process	ATP catabolic process	IDA
		Biological process	actin-myosin filament sliding	IMP
		Biological process	heart contraction	IMP
		Biological process	muscle filament sliding	TAS
ACTN1	ACTN1 actinin, alpha 1	Component	actin cytoskeleton	IDA
		Component	nucleolus	IDA
		Component	focal adhesion	IMP
		Component	extracellular region	TAS
		Component	platelet alpha granule lumen	TAS
		Component	pseudopodium	TAS
		Function	integrin binding	IDA
		Function	protein binding	IPI

		Function	vinculin binding	IPI
		Biological process	focal adhesion assembly	IMP
		Biological process	negative regulation of cellular component movement	IMP
		Biological process	blood coagulation	TAS
		Biological process	cell junction assembly	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
ACTN4	ACTN4 actinin, alpha 4	Component	actin cytoskeleton	IDA
		Component	cytoplasm	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Component	perinuclear region of cytoplasm	IDA
		Component	protein complex	IDA
		Component	ribonucleoprotein complex	IDA
		Component	extracellular region	TAS
		Component	platelet alpha granule lumen	TAS
		Component	pseudopodium	TAS
		Function	actin filament binding	IDA
		Function	nucleoside binding	IDA
		Function	protein binding	IPI
		Function	actin binding	TAS
		Function	integrin binding	TAS
		Function	protein homodimerization activity	TAS
		Biological process	positive regulation of cellular component movement	IDA
		Biological process	positive regulation of cellular component movement	IMP
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
ACTR5	ACTR5 ARP5 actinrelated protein 5 homolog (yeast)	Component	Ino80 complex	IDA
		Component	cytoplasm	IDA
		Component	nucleus	IDA
		Biological process	double-strand break repair	IMP

		Biological process	UV-damage excision repair	IMP
ACVR1C	ACVR1C activin A receptor, type IC	Component	activin receptor complex	IDA
		Function	activin receptor activity, type I	IDA
		Biological process	cell differentiation	IDA
		Biological process	regulation of apoptosis	IDA
ACVR2A	ACVR2A activin A receptor, type IIA	Component	cytoplasm	IDA
		Component	inhibin-betaglycan-ActRII complex	IDA
		Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	contributes_to activin receptor activity	IDA
		Function	coreceptor activity	IDA
		Function	inhibin beta-A binding	IDA
		Function	contributes_to activin binding	IPI
		Function	protein binding	IPI
		Function	contributes_to protein binding	IPI
		Function	transmembrane receptor protein serine/threonine kinase activity	TAS
		Biological process	BMP signaling pathway	IDA
		Biological process	positive regulation of activin receptor signaling pathway	IDA
		Biological process	positive regulation of erythrocyte differentiation	IDA
		Biological process	BMP signaling pathway	IMP
		Biological process	positive regulation of bone mineralization	IMP
		Biological process	positive regulation of osteoblast differentiation	IMP
		Biological process	positive regulation of protein phosphorylation	IMP
		Biological process	transmembrane receptor protein serine/threonine kinase signaling pathway	TAS
ACVR2B	ACVR2B activin A receptor, type IIB	Component	cell surface	IDA
		Component	cytoplasm	IDA
		Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	protein serine/threonine kinase activity	IMP
		Function	growth factor binding	IPI
		Function	protein binding	IPI
		Function	contributes_to activin receptor activity, type II	TAS

		Biological process	BMP signaling pathway	IDA
		Biological process	positive regulation of activin receptor signaling pathway	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	signal transduction	IDA
		Biological process	anterior/posterior pattern formation	IMP
		Biological process	positive regulation of bone mineralization	IMP
		Biological process	positive regulation of osteoblast differentiation	IMP
		Biological process	transmembrane receptor protein serine/threonine kinase signaling pathway	TAS
ADAM11	ADAM11 ADAM metallopeptidase domain 11	Component	plasma membrane	TAS
		Function	integrin binding	TAS
		Function	metallopeptidase activity	TAS
		Biological process	integrin-mediated signaling pathway	TAS
ADAM12	ADAM12 ADAM metallopeptidase domain 12	Component	plasma membrane	IDA
		Function	SH3 domain binding	IPI
		Function	protein binding	IPI
		Function	metallopeptidase activity	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	myoblast fusion	TAS
ADAMTS1	ADAMTS1 ADAM metallopeptidase with thrombospondin type 1 motif, 1	Function	metallopeptidase activity	TAS
		Biological process	integrin-mediated signaling pathway	TAS
		Biological process	negative regulation of cell proliferation	TAS
ADAMTS6	ADAMTS6 ADAM metallopeptidase with thrombospondin type 1 motif, 6	Function	metallopeptidase activity	TAS
ADCY9	ADCY9 adenylate cyclase 9	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Biological process	activation of phospholipase C activity	TAS
		Biological process	cAMP biosynthetic process	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	signal transduction	TAS
		Biological process	synaptic transmission	TAS

		Biological process	transmembrane transport	TAS
		Biological process	water transport	TAS
ADCYAP1	ADCYAP1 adenylate cyclase activating polypeptide 1 (pituitary)	Component	extracellular region	TAS
		Component	soluble fraction	TAS
		Function	peptide hormone receptor binding	IDA
		Function	peptide hormone receptor binding	IPI
		Function	receptor binding	IPI
		Function	neuropeptide hormone activity	TAS
		Biological process	regulation of G-protein coupled receptor protein signaling pathway	IDA
		Biological process	cell-cell signaling	TAS
		Biological process	female pregnancy	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
ADD3	ADD3 adducin 3 (gamma)	Component	membrane	TAS
		Function	structural constituent of cytoskeleton	TAS
ADIPOR1	ADIPOR1 adiponectin receptor 1	Component	plasma membrane	IDA
		Function	hormone binding	IDA
		Function	protein kinase binding	IPI
		Biological process	fatty acid oxidation	IDA
		Biological process	hormone-mediated signaling pathway	IDA
ADPRH	ADPRH ADPribosylarginine hydrolase	Function	ADP-ribosylarginine hydrolase activity	IMP
		Biological process	protein modification process	IMP
ADRBK2	ADRBK2 adrenergic, beta, receptor kinase 2	Function	protein kinase activity	TAS
		Biological process	signal transduction	TAS
AFAP1	AFAP1 actin filament associated protein 1	Component	actin cytoskeleton	IDA
		Component	cytoplasm	IDA
		Component	focal adhesion	IDA
AFF1	AFF1 AF4/FMR2 family, member 1	Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription, DNA-dependent	TAS
AFF2	AFF2 AF4/FMR2 family, member 2	Component	nuclear speck	IDA
		Function	protein binding	IPI
		Biological process	regulation of RNA splicing	IMP
		Biological process	brain development	TAS

AFF3	AFF3 AF4/FMR2 family, member 3	Biological process	multicellular organismal development	TAS
AFF4	AFF4 AF4/FMR2 family, member 4	Component	mitochondrion	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
AFTPH	AFTPH aftiphilin	Component	AP-1 adaptor complex	IDA
		Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	clathrin binding	IDA
AGPAT1	AGPAT1 1acylglycerol3phosphate Oacyltransferase 1 (lysophosphatidic acid acyltransferase, alpha)	Component	endoplasmic reticulum	TAS
		Component	endoplasmic reticulum membrane	TAS
		Function	1-acylglycerol-3-phosphate O-acyltransferase activity	IGI
		Function	1-acylglycerol-3-phosphate O-acyltransferase activity	TAS
		Biological process	phosphatidic acid biosynthetic process	IGI
		Biological process	positive regulation of cytokine production	IMP
		Biological process	cellular lipid metabolic process	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	phospholipid metabolic process	TAS
		Biological process	positive regulation of cellular metabolic process	TAS
AGPAT4	AGPAT4 1acylglycerol3phosphate Oacyltransferase 4 (lysophosphatidic acid acyltransferase, delta)	Function	protein binding	IPI
AHCTF1	AHCTF1 AT hook containing transcription factor 1	Component	colocalizes_with Nup107-160 complex	IDA
		Component	colocalizes_with chromatin	IDA
		Component	colocalizes_with condensed chromosome kinetochore	IDA

		Component	nuclear membrane	IDA
		Component	colocalizes_with nuclear pore	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Biological process	cytokinesis	IMP
		Biological process	nuclear pore complex assembly	IMP
		Biological process	M phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic prometaphase	TAS
AHR	AHR aryl hydrocarbon receptor	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytosolic aryl hydrocarbon receptor complex	TAS
		Component	transcription factor complex	TAS
		Function	DNA binding	IDA
		Function	Hsp90 protein binding	IDA
		Function	ligand-dependent nuclear receptor activity	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Function	DNA binding	TAS
		Function	protein dimerization activity	TAS
		Function	protein heterodimerization activity	TAS
		Biological process	regulation of B cell proliferation	IDA
		Biological process	regulation of gene expression	IDA
		Biological process	regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	response to stress	IDA
		Biological process	response to xenobiotic stimulus	IDA
		Biological process	transcription from RNA polymerase II promoter	IDA
		Biological process	apoptosis	TAS
		Biological process	cell cycle	TAS
		Biological process	xenobiotic metabolic process	TAS

AKAP13	AKAP13 A kinase (PRKA) anchor protein 13	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Component	membrane fraction	TAS
		Function	protein binding	IPI
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Function	signal transducer activity	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
AKAP2	AKAP2 A kinase (PRKA) anchor protein 2	Function	protein binding	IPI
AKAP5	AKAP5 A kinase (PRKA) anchor protein 5	Function	adenylate cyclase binding	IPI
		Function	protein binding	IPI
		Function	protein kinase A binding	TAS
		Biological process	positive regulation of cAMP biosynthetic process	IMP
		Biological process	positive regulation of protein kinase A signaling cascade	IMP
		Biological process	energy reserve metabolic process	TAS
		Biological process	regulation of insulin secretion	TAS
		Biological process	synaptic transmission	TAS
AKIRIN1	AKIRIN1 akirin 1	Component	nucleus	IDA
AKT2	AKT2 vakt murine thymoma viral oncogene homolog 2	Component	nucleus	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	cellular response to insulin stimulus	IMP
		Biological process	insulin receptor signaling pathway	IMP
		Biological process	negative regulation of plasma membrane long-chain fatty acid transport	IMP
		Biological process	positive regulation of fatty acid beta-oxidation	IMP
		Biological process	positive regulation of glucose import	IMP
		Biological process	positive regulation of glucose metabolic process	IMP
		Biological process	positive regulation of glycogen biosynthetic process	IMP
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	protein modification process	TAS

AKT3	AKT3 vakt murine thymoma viral oncogene homolog 3 (protein kinase B, gamma)	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	signal transduction	TAS
ALPL	ALPL alkaline phosphatase, liver/bone/kidney	Component	cytoplasm	IDA
		Biological process	response to vitamin D	IEP
		Biological process	skeletal system development	TAS
ANAPC4	ANAPC4 anaphase promoting complex subunit 4	Component	anaphase-promoting complex	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein phosphatase binding	IPI
		Function	ubiquitin-protein ligase activity	TAS
		Biological process	protein K11-linked ubiquitination	IDA
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS
		Biological process	cell cycle checkpoint	TAS
		Biological process	G2/M transition of mitotic cell cycle	TAS
		Biological process	mitosis	TAS
		Biological process	mitotic anaphase	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic cell cycle spindle assembly checkpoint	TAS
		Biological process	protein ubiquitination	TAS
		Biological process	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	TAS
		Biological process	ubiquitin-dependent protein catabolic process	TAS
ANGPT1	ANGPT1 angiotensinogen 1	Component	extracellular space	IDA
		Component	membrane raft	IDA
		Component	microvillus	IDA

	Component	plasma membrane	IDA
	Component	extracellular region	TAS
	Function	protein binding	IPI
	Function	receptor tyrosine kinase binding	IPI
	Biological process	activation of transmembrane receptor protein tyrosine kinase activity	IDA
	Biological process	anti-apoptosis	IDA
	Biological process	heparin biosynthetic process	IDA
	Biological process	negative regulation of apoptosis	IDA
	Biological process	negative regulation of cell adhesion	IDA
	Biological process	negative regulation of endothelial cell apoptosis	IDA
	Biological process	negative regulation of vascular permeability	IDA
	Biological process	NOT regulation of endothelial cell proliferation	IDA
	Biological process	positive chemotaxis	IDA
	Biological process	positive regulation of blood vessel endothelial cell migration	IDA
	Biological process	positive regulation of endothelial cell migration	IDA
	Biological process	positive regulation of ERK1 and ERK2 cascade	IDA
	Biological process	positive regulation of peptidyl-tyrosine phosphorylation	IDA
	Biological process	positive regulation of protein kinase B signaling cascade	IDA
	Biological process	positive regulation of protein ubiquitination	IDA
	Biological process	positive regulation of receptor internalization	IDA
	Biological process	protein localization at cell surface	IDA
	Biological process	regulation of satellite cell proliferation	IDA
	Biological process	sprouting angiogenesis	IDA
	Biological process	Tie receptor signaling pathway	IDA
	Biological process	blood coagulation	TAS
	Biological process	leukocyte migration	TAS
	Component	extracellular space	IDA
	Component	extracellular region	TAS
	Function	protein binding	IPI
	Function	receptor tyrosine kinase binding	IPI
	Function	receptor binding	TAS

		Biological process	negative regulation of blood vessel endothelial cell migration	IDA
		Biological process	negative regulation of positive chemotaxis	IDA
		Biological process	Tie receptor signaling pathway	IDA
		Biological process	blood coagulation	TAS
		Biological process	leukocyte migration	TAS
ANGPTL4	ANGPTL4 angiotensin-like 4	Component	extracellular region	IDA
		Component	extracellular space	IDA
		Biological process	negative regulation of apoptosis	IDA
		Biological process	negative regulation of lipoprotein lipase activity	IDA
		Biological process	cellular lipid metabolic process	TAS
		Biological process	positive regulation of angiogenesis	TAS
ANK2	ANK2 ankyrin 2, neuronal	Component	basolateral plasma membrane	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	axon guidance	TAS
ANKFY1	ANKFY1 ankyrin repeat and FYVE domain containing 1	Component	intracellular membrane-bounded organelle	IDA
		Function	protein binding	IPI
ANKH	ANKH ankylosis, progressive homolog (mouse)	Component	integral to membrane	IDA
		Component	outer membrane	TAS
		Function	inorganic diphosphate transmembrane transporter activity	IDA
		Function	inorganic phosphate transmembrane transporter activity	IDA
		Biological process	inorganic diphosphate transport	IDA
		Biological process	regulation of bone mineralization	TAS
ANKHD1	ANKHD1 ankyrin repeat and KH domain containing 1	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
ANKRD13C	ANKRD13C ankyrin repeat domain 13C	Component	endoplasmic reticulum	IDA
		Component	colocalizes_with endoplasmic reticulum	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	receptor binding	IPI

		Biological process	regulation of anoikis	IDA
		Biological process	regulation of receptor biosynthetic process	IDA
		Biological process	protein retention in ER lumen	IMP
ANKRD27	ANKRD27 ankyrin repeat domain 27 (VPS9 domain)	Component	early endosome	IDA
		Component	lysosome	IDA
		Function	guanyl-nucleotide exchange factor activity	IDA
		Biological process	early endosome to late endosome transport	IDA
ANKRD28	ANKRD28 ankyrin repeat domain 28	Function	protein binding	IPI
ANKRD52	ANKRD52 ankyrin repeat domain 52	Function	protein binding	IPI
ANP32E	ANP32E acidic (leucinerich) nuclear phosphoprotein 32 family, member E	Component	nucleus	IDA
ANTXR1	ANTXR1 anthrax toxin receptor 1	Component	filopodium membrane	IDA
		Component	lamellipodium membrane	IDA
		Function	actin filament binding	IDA
		Function	collagen binding	IDA
		Function	transmembrane receptor activity	IDA
		Function	protein binding	IPI
		Biological process	actin cytoskeleton reorganization	IDA
		Biological process	substrate adhesion-dependent cell spreading	IDA
ANXA4	ANXA4 annexin A4	Component	cytoplasm	IDA
		Component	cytoplasm	TAS
		Function	calcium-dependent phospholipid binding	IDA
		Biological process	anti-apoptosis	TAS
		Biological process	signal transduction	TAS
ANXA7	ANXA7 annexin A7	Function	calcium-dependent protein binding	IPI
		Function	protein binding	IPI
APIG1	APIG1 adaptorrelated protein complex 1, gamma 1 subunit	Component	Golgi apparatus	IDA
		Component	clathrin-coated vesicle	IDA
		Component	recycling endosome	IDA
		Component	AP-type membrane coat adaptor complex	TAS
		Component	Golgi membrane	TAS
		Component	cytoplasm	TAS
		Component	cytoplasmic vesicle membrane	TAS
		Component	cytosol	TAS

		Component	lysosomal membrane	TAS
		Function	kinesin binding	IPI
		Function	protein binding	IPI
		Function	transporter activity	TAS
		Biological process	regulation of defense response to virus by virus	TAS
		Biological process	viral reproduction	TAS
AP1S2	AP1S2 adaptorrelated protein complex 1, sigma 2 subunit	Component	AP-type membrane coat adaptor complex	TAS
		Component	Golgi membrane	TAS
		Component	cytoplasmic vesicle membrane	TAS
		Component	cytosol	TAS
		Component	lysosomal membrane	TAS
		Biological process	regulation of defense response to virus by virus	TAS
		Biological process	viral reproduction	TAS
AP1S3	AP1S3 adaptorrelated protein complex 1, sigma 3 subunit	Component	Golgi membrane	TAS
		Component	cytoplasmic vesicle membrane	TAS
		Component	cytosol	TAS
		Component	lysosomal membrane	TAS
		Biological process	regulation of defense response to virus by virus	TAS
		Biological process	viral reproduction	TAS
AP2M1	AP2M1 adaptorrelated protein complex 2, mu 1 subunit	Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	transporter activity	TAS
		Biological process	axon guidance	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of defense response to virus by virus	TAS
		Biological process	synaptic transmission	TAS
		Biological process	transport	TAS
		Biological process	viral reproduction	TAS
APBB2	APBB2 amyloid beta (A4) precursor proteinbinding,	Function	protein binding	IPI

	family B, member 2			
API5	API5 apoptosis inhibitor 5	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	fibroblast growth factor binding	IPI
		Biological process	anti-apoptosis	IMP
APLN	APLN apelin	Component	extracellular region	TAS
		Function	receptor binding	TAS
		Biological process	immune response	TAS
		Biological process	lactation	TAS
		Biological process	signal transduction	TAS
APLNR	APLNR apelin receptor	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
APOM	APOM apolipoprotein M	Component	discoidal high-density lipoprotein particle	IDA
		Component	low-density lipoprotein particle	IDA
		Component	spherical high-density lipoprotein particle	IDA
		Component	very-low-density lipoprotein particle	IDA
		Component	integral to plasma membrane	TAS
		Function	lipid transporter activity	IDA
		Biological process	cholesterol efflux	IDA
		Biological process	negative regulation of plasma lipoprotein particle oxidation	IDA
		Biological process	cholesterol efflux	IMP
		Biological process	high-density lipoprotein particle remodeling	IMP
APPL2	APPL2 adaptor protein, phosphotyrosine interaction, PH domain and leucine zipper containing 2	Component	colocalizes_with NuRD complex	IDA
		Component	endosome membrane	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	cell proliferation	IDA
		Biological process	signal transduction	TAS
AQP2	AQP2 aquaporin 2 (collecting duct)	Component	apical plasma membrane	IDA
		Component	plasma membrane	IDA
		Component	plasma membrane	TAS

		Component	transport vesicle membrane	TAS
		Function	glycerol transmembrane transporter activity	IDA
		Function	water transmembrane transporter activity	IDA
		Function	water channel activity	TAS
		Biological process	cellular response to copper ion	IDA
		Biological process	cellular response to mercury ion	IDA
		Biological process	glycerol transport	IDA
		Biological process	water transport	IDA
		Biological process	excretion	TAS
		Biological process	transmembrane transport	TAS
		Biological process	water transport	TAS
ARCN1	ARCN1 archain 1	Component	cytosol	TAS
ARF1	ARF1 ADPribosylation factor 1	Component	Golgi membrane	TAS
		Component	cytosol	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	GTPase activity	TAS
		Function	receptor signaling protein activity	TAS
		Biological process	cellular copper ion homeostasis	IMP
		Biological process	GTP catabolic process	TAS
		Biological process	regulation of defense response to virus by virus	TAS
		Biological process	viral reproduction	TAS
ARF3	ARF3 ADPribosylation factor 3	Function	GTPase activity	TAS
		Biological process	GTP catabolic process	TAS
ARFGAP2	ARFGAP2 ADPribosylation factor GTPase activating protein 2	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	nucleolus	IDA
		Component	plasma membrane	IDA
ARHGAP1	ARHGAP1 Rho GTPase activating protein 1	Component	intracellular membrane-bounded organelle	IDA
		Component	cytosol	TAS
		Function	Rho GTPase activator activity	IDA
		Function	protein binding	IPI
		Function	GTPase activator activity	TAS
		Function	SH3/SH2 adaptor activity	TAS

		Biological process	positive regulation of Rho GTPase activity	IDA
		Biological process	small GTPase mediated signal transduction	IDA
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	Rho protein signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGAP11A	ARHGAP11A Rho GTPase activating protein 11A	Component	cytosol	TAS
		Function	GTPase activator activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGAP17	ARHGAP17 Rho GTPase activating protein 17	Component	cytosol	TAS
		Function	GTPase activator activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGAP26	ARHGAP26 Rho GTPase activating protein 26	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	GTPase activator activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGAP30	ARHGAP30 Rho GTPase activating protein 30	Component	cytosol	TAS
		Function	GTPase activator activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGDIA	ARHGDIA Rho GDP dissociation inhibitor (GDI) alpha	Component	cytoskeleton	TAS
		Component	cytosol	TAS
		Function	identical protein binding	IPI

		Function	protein binding	IPI
		Biological process	anti-apoptosis	TAS
		Biological process	cellular component movement	TAS
		Biological process	negative regulation of cell adhesion	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGEF12	ARHGEF12 Rho guanine nucleotide exchange factor (GEF) 12	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Function	G-protein-coupled receptor binding	IDA
		Function	protein binding	IPI
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	IDA
		Biological process	axon guidance	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGEF3	ARHGEF3 Rho guanine nucleotide exchange factor (GEF) 3	Component	intracellular	IDA
		Component	cytosol	TAS
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	Rho protein signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGEF4	ARHGEF4 Rho guanine nucleotide exchange factor (GEF) 4	Component	cytosol	TAS
		Function	Rac guanyl-nucleotide exchange factor activity	IMP
		Function	guanyl-nucleotide exchange factor activity	IMP
		Function	protein binding	IPI

		Function	protein domain specific binding	IPI
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	filopodium assembly	IMP
		Biological process	lamellipodium assembly	IMP
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGEF7	ARHGEF7 Rho guanine nucleotide exchange factor (GEF) 7	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	positive regulation of apoptosis	IMP
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
ARHGEF9	ARHGEF9 Cdc42 guanine nucleotide exchange factor (GEF) 9	Component	cytosol	TAS
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	ion transmembrane transport	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
		Biological process	synaptic transmission	TAS
		Biological process	transmembrane transport	TAS
ARID1A	ARID1A AT rich interactive domain 1A (SWIlike)	Component	SWI/SNF complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA

		Component	nucleus	TAS
		Function	protein binding	IPI
		Biological process	androgen receptor signaling pathway	IDA
		Biological process	estrogen receptor signaling pathway	IDA
		Biological process	glucocorticoid receptor signaling pathway	IDA
		Biological process	chromatin-mediated maintenance of transcription	TAS
		Biological process	nucleosome mobilization	TAS
ARID1B	ARID1B AT rich interactive domain 1B (SWI1like)	Component	SWI/SNF complex	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
ARID2	ARID2 AT rich interactive domain 2 (ARID, RFXlike)	Function	protein binding	IPI
ARL1	ARL1 ADPribosylation factorlike 1	Component	Golgi apparatus	IDA
		Function	protein binding	IPI
		Function	GTPase activity	TAS
		Function	enzyme activator activity	TAS
		Biological process	GTP catabolic process	TAS
		Biological process	positive regulation of catalytic activity	TAS
ARL3	ARL3 ADPribosylation factorlike 3	Component	Golgi apparatus	IDA
		Component	centrosome	IDA
		Component	cytoplasmic microtubule	IDA
		Component	midbody	IDA
		Component	nucleus	IDA
		Component	photoreceptor connecting cilium	IDA
		Component	primary cilium	IDA
		Component	spindle microtubule	IDA
		Function	GDP binding	IDA
		Function	GTP binding	IDA
		Function	microtubule binding	IDA
		Function	protein binding	IPI
		Biological process	cytokinesis	IMP
ARL4C	ARL4C ADPribosylation factorlike 4C	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Component	nucleus	TAS

		Function	alpha-tubulin binding	IDA
		Function	protein binding	IPI
		Function	GTPase activity	TAS
		Biological process	endocytic recycling	IDA
		Biological process	GTP catabolic process	TAS
ARNT2	ARNT2 arylhydrocarbon receptor nuclear translocator 2	Component	nucleus	IDA
		Function	protein heterodimerization activity	IPI
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	response to hypoxia	IDA
ARRDC3	ARRDC3 arrestin domain containing 3	Function	protein binding	IPI
ARSB	ARSB arylsulfatase B	Biological process	lysosomal transport	TAS
		Biological process	lysosome organization	TAS
ASAH1	ASAH1 Nacylsphingosine amidohydrolase (acid ceramidase) 1	Function	catalytic activity	TAS
		Biological process	ceramide metabolic process	TAS
ASCL1	ASCL1 achaetescute complex homolog 1 (Drosophila)	Component	nucleus	IDA
		Function	E-box binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	bHLH transcription factor binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of neuron differentiation	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	neurogenesis	IDA
		Biological process	Notch signaling pathway	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	cerebral cortex GABAergic interneuron differentiation	IEP
		Biological process	response to retinoic acid	IEP
		Biological process	negative regulation of apoptosis	IMP
		Biological process	noradrenergic neuron fate commitment	IMP
ASF1A	ASF1A ASF1 antisilencing function 1 homolog A (S.	Component	chromatin remodeling complex	IDA

	cerevisiae)			
		Component	nucleus	IDA
		Function	histone binding	IDA
		Biological process	DNA repair	IDA
		Biological process	nucleosome assembly	IDA
ASH2L	ASH2L ash2 (absent, small, or homeotic)like (Drosophila)	Component	Set1C/COMPASS complex	IDA
		Component	histone methyltransferase complex	IDA
		Component	nucleus	IDA
		Component	histone methyltransferase complex	IPI
		Function	contributes_to histone methyltransferase activity (H3-K4 specific)	IDA
		Function	protein binding	IPI
		Biological process	histone H3-K4 methylation	IDA
		Biological process	response to estrogen stimulus	IDA
		Biological process	positive regulation of cell proliferation	IMP
		Biological process	transcription from RNA polymerase II promoter	TAS
ASPH	ASPH aspartate betahydroxylase	Function	calcium ion binding	TAS
		Function	electron carrier activity	TAS
		Function	structural constituent of muscle	TAS
		Function	structural molecule activity	TAS
		Biological process	muscle contraction	TAS
		Component	PR-DUB complex	IDA
		Function	protein binding	IPI
ATAD2	ATAD2 ATPase family, AAA domain containing 2	Component	cytoplasm	IDA
		Component	mitochondrion	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
ATF7IP	ATF7IP activating transcription factor 7 interacting protein	Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	DNA methylation	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	positive regulation of transcription, DNA-	IDA

			dependent	
		Biological process	regulation of RNA polymerase II transcriptional preinitiation complex assembly	IDA
ATG12	ATG12 ATG12 autophagy related 12 homolog (S. cerevisiae)	Function	protein binding	IPI
		Biological process	negative regulation of type I interferon production	TAS
ATP2B2	ATP2B2 ATPase, Ca ⁺⁺ transporting, plasma membrane 2	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	ATP binding	IDA
		Function	PDZ domain binding	IDA
		Function	calcium ion binding	IDA
		Function	calcium-transporting ATPase activity	IDA
		Function	calmodulin binding	IDA
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Function	calcium-transporting ATPase activity	TAS
		Biological process	neuron differentiation	IDA
		Biological process	calcium ion transport	IMP
		Biological process	cytosolic calcium ion homeostasis	IMP
		Biological process	sensory perception of sound	IMP
		Biological process	blood coagulation	TAS
		Biological process	ion transmembrane transport	TAS
		Biological process	platelet activation	TAS
ATP2B2	ATP2B2 ATPase, Ca ⁺⁺ transporting, plasma membrane 2	Biological process	transmembrane transport	TAS
ATP2B3	ATP2B3 ATPase, Ca ⁺⁺ transporting, plasma membrane 3	Component	plasma membrane	TAS
		Function	calcium-transporting ATPase activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	ion transmembrane transport	TAS
		Biological process	platelet activation	TAS
		Biological process	transmembrane transport	TAS
		Biological process	transport	TAS

ATP6AP2	ATP6AP2 ATPase, H ⁺ transporting, lysosomal accessory protein 2	Component	external side of plasma membrane	IDA
		Function	protein binding	IPI
		Biological process	angiotensin maturation	IDA
		Biological process	positive regulation of transforming growth factor-beta1 production	IDA
		Biological process	regulation of MAPKKK cascade	IDA
ATP6V1A	ATP6V1A ATPase, H ⁺ transporting, lysosomal 70kDa, V1 subunit A	Component	cytosol	TAS
		Component	integral to plasma membrane	TAS
		Component	proton-transporting two-sector ATPase complex	TAS
		Biological process	cellular iron ion homeostasis	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	transmembrane transport	TAS
		Biological process	transport	TAS
ATP7B	ATP7B ATPase, Cu ⁺⁺ transporting, beta polypeptide	Component	colocalizes_with basolateral plasma membrane	IDA
		Component	colocalizes_with cytoplasmic membrane-bounded vesicle	IDA
		Component	late endosome	IDA
		Component	colocalizes_with perinuclear region of cytoplasm	IDA
		Component	colocalizes_with trans-Golgi network	IDA
		Component	Golgi membrane	TAS
		Component	integral to plasma membrane	TAS
		Function	ATP binding	IDA
		Function	copper ion binding	IDA
		Function	protein binding	IPI
		Function	copper-exporting ATPase activity	TAS
		Function	copper-transporting ATPase activity	TAS
		Biological process	copper ion import	IDA
		Biological process	response to copper ion	IDA
		Biological process	sequestering of calcium ion	IDA
		Biological process	copper ion transport	IGI
		Biological process	cellular copper ion homeostasis	TAS
		Biological process	copper ion export	TAS
		Biological process	ion transmembrane transport	TAS

		Biological process	transmembrane transport	TAS
ATP8A1	ATP8A1 ATPase, aminophospholipid transporter (APLT), class I, type 8A, member 1	Biological process	ion transmembrane transport	TAS
		Biological process	transmembrane transport	TAS
ATP8B2	ATP8B2 ATPase, class I, type 8B, member 2	Biological process	ion transmembrane transport	TAS
		Biological process	transmembrane transport	TAS
ATXN1	ATXN1 ataxin 1	Component	cytoplasm	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	colocalizes_with nuclear RNA export factor complex	IDA
		Component	nuclear inclusion body	IDA
		Component	nuclear matrix	IDA
		Component	NOT nucleolus	IDA
		Component	nucleoplasm	IDA
		Component	nucleus	IDA
		Function	poly(G) RNA binding	IDA
		Function	poly(U) RNA binding	IDA
		Function	protein self-association	IDA
		Function	identical protein binding	IPI
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	nuclear export	IDA
AXL	AXL AXL receptor tyrosine kinase	Component	integral to plasma membrane	TAS
		Biological process	signal transduction	TAS
B3GALT1	B3GALT1 UDPGal:betaGlcNAc beta 1,3galactosyltransferase, polypeptide 1	Function	UDP-galactose:beta-N-acetylglucosamine beta-1,3-galactosyltransferase activity	IDA
		Biological process	protein glycosylation	IDA
B3GNT5	B3GNT5 UDPGlcNAc:betaGal beta1,3Nacetylglucosaminyltransferase 5	Component	intracellular	IDA
		Function	beta-galactosyl-N-acetylglucosaminylgalactosylglucosyl-ceramide beta-1,3-acetylglucosaminyltransferase activity	IDA
		Biological process	central nervous system development	IDA

		Biological process	glycolipid biosynthetic process	TAS
		Biological process	protein glycosylation	TAS
B4GALNT1	B4GALNT1 beta1,4Nacetylglactosaminyl transferase 1	Component	membrane fraction	TAS
		Biological process	carbohydrate metabolic process	TAS
B4GALT3	B4GALT3 UDPGal:betaGlcNAc beta 1,4 galactosyltransferase, polypeptide 3	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	Golgi membrane	TAS
		Function	galactosyltransferase activity	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
BACE1	BACE1 betasite APPcleaving enzyme 1	Component	Golgi apparatus	IDA
		Component	endosome	IDA
		Component	trans-Golgi network	IDA
		Component	integral to plasma membrane	TAS
		Function	aspartic-type endopeptidase activity	IDA
		Function	protein binding	IPI
		Function	beta-aspartyl-peptidase activity	TAS
		Biological process	beta-amyloid metabolic process	IDA
		Biological process	proteolysis	IDA
		Biological process	membrane protein ectodomain proteolysis	TAS
BACH1	BACH1 BTB and CNC homology 1, basic leucine zipper transcription factor 1	Component	colocalizes_with cytosol	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	colocalizes_with nucleus	IDA
		Biological process	transcription, DNA-dependent	TAS
BAG1	BAG1 BCL2associated athanogene	Component	intermediate filament cytoskeleton	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Function	receptor signaling protein activity	TAS
		Biological process	chaperone cofactor-dependent protein refolding	IDA
		Biological process	anti-apoptosis	TAS

		Biological process	cell surface receptor linked signaling pathway	TAS
BAIAP2	BAIAP2 BAI1 associated protein 2	Component	colocalizes_with actin cytoskeleton	IDA
		Component	cell junction	IDA
		Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	proline-rich region binding	IDA
		Function	protein binding	IPI
		Function	protein C-terminus binding	TAS
		Biological process	regulation of actin cytoskeleton organization	IMP
		Biological process	response to bacterium	IMP
		Biological process	axonogenesis	TAS
		Biological process	insulin receptor signaling pathway	TAS
BASP1	BASP1 brain abundant, membrane attached signal protein 1	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	cytoskeleton	TAS
		Function	transcription corepressor activity	IMP
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IMP
BAZ2A	BAZ2A bromodomain adjacent to zinc finger domain, 2A	Function	protein binding	IPI
BCAT1	BCAT1 branched chain aminoacid transaminase 1, cytosolic	Biological process	branched chain family amino acid catabolic process	TAS
		Biological process	cell proliferation	TAS
		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
BCL11B	BCL11B Bcell CLL/lymphoma 11B (zinc finger protein)	Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP

BCL2	BCL2 Bcell CLL/lymphoma 2	Component	cytoplasm	IDA
		Component	endoplasmic reticulum	IDA
		Component	membrane	IDA
		Component	mitochondrial outer membrane	IDA
		Component	mitochondrion	IDA
		Component	nuclear membrane	IDA
		Component	nucleus	IDA
		Component	pore complex	IDA
		Component	mitochondrial outer membrane	TAS
		Function	channel activity	IDA
		Function	protease binding	IDA
		Function	sequence-specific DNA binding	IDA
		Function	BH3 domain binding	IPI
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	protein heterodimerization activity	IPI
		Function	protein homodimerization activity	IPI
		Biological process	anti-apoptosis	IDA
		Biological process	apoptosis in response to endoplasmic reticulum stress	IDA
		Biological process	B cell proliferation	IDA
		Biological process	cell death	IDA
		Biological process	defense response to virus	IDA
		Biological process	negative regulation of apoptosis	IDA
		Biological process	negative regulation of cellular pH reduction	IDA
		Biological process	negative regulation of neuron apoptosis	IDA
		Biological process	positive regulation of cell growth	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	regulation of calcium ion transport	IDA
		Biological process	regulation of protein heterodimerization activity	IDA
		Biological process	regulation of protein homodimerization activity	IDA
		Biological process	regulation of transmembrane transporter activity	IDA
		Biological process	response to cytokine stimulus	IDA
		Biological process	response to drug	IDA
		Biological process	response to iron ion	IDA

		Biological process	response to nicotine	IDA
		Biological process	response to toxin	IDA
		Biological process	B cell receptor signaling pathway	IMP
		Biological process	positive regulation of B cell proliferation	IMP
		Biological process	response to DNA damage stimulus	IMP
		Biological process	response to drug	IMP
		Biological process	activation of pro-apoptotic gene products	TAS
		Biological process	apoptosis	TAS
		Biological process	humoral immune response	TAS
		Biological process	induction of apoptosis by intracellular signals	TAS
		Biological process	negative regulation of mitochondrial depolarization	TAS
		Biological process	neuron apoptosis	TAS
BCL2L11	BCL2L11 BCL2like 11 (apoptosis facilitator)	Component	cytosol	TAS
		Component	membrane fraction	TAS
		Component	mitochondrial outer membrane	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	positive regulation of protein homooligomerization	IDA
		Biological process	positive regulation of release of cytochrome c from mitochondria	IGI
		Biological process	activation of pro-apoptotic gene products	TAS
		Biological process	apoptosis	TAS
		Biological process	induction of apoptosis	TAS
		Biological process	induction of apoptosis by intracellular signals	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
BCL6	BCL6 Bcell CLL/lymphoma 6	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	colocalizes_with replication fork	IDA
		Function	chromatin binding	IDA
		Function	sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IMP
		Function	protein binding	IPI
		Biological process	negative regulation of cell growth	IDA
		Biological process	negative regulation of transcription from RNA	IDA

			polymerase II promoter	
		Biological process	positive regulation of apoptosis	IDA
		Biological process	response to DNA damage stimulus	IDA
		Biological process	protein import into nucleus, translocation	IGI
		Biological process	transcription, DNA-dependent	IMP
BCORL1	BCORL1 BCL6 corepressorlike 1	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
BDNF	BDNF brainderived neurotrophic factor	Function	protein binding	IPI
		Biological process	nervous system development	TAS
BECN1	BECN1 beclin 1, autophagy related	Function	protein binding	IPI
		Biological process	cytokinesis	IMP
		Biological process	anti-apoptosis	TAS
		Biological process	cellular defense response	TAS
BICD2	BICD2 bicaudal D homolog 2 (Drosophila)	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
BMI1	BMI1 BMI1 polycomb ring finger oncogene	Component	nucleolus	IDA
		Component	nucleus	IDA
		Component	ubiquitin ligase complex	IDA
		Function	zinc ion binding	IDA
		Function	RING-like zinc finger domain binding	IPI
		Biological process	positive regulation of ubiquitin-protein ligase activity	IDA
		Biological process	hemopoiesis	IEP
		Biological process	positive regulation of fibroblast proliferation	IMP
		Biological process	regulation of gene expression	IMP
		Biological process	segment specification	TAS
BMPR1B	BMPR1B bone morphogenetic protein receptor, type IB	Component	plasma membrane	TAS
		Component	receptor complex	TAS
		Function	ATP binding	IDA
		Function	SMAD binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	transmembrane receptor protein serine/threonine	IMP

			kinase activity	
		Function	protein binding	IPI
		Biological process	BMP signaling pathway	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	limb morphogenesis	IMP
		Biological process	positive regulation of bone mineralization	IMP
		Biological process	positive regulation of cell differentiation	IMP
		Biological process	positive regulation of osteoblast differentiation	IMP
		Biological process	skeletal system development	IMP
BMPR2	BMPR2 bone morphogenetic protein receptor, type II (serine/threonine kinase)	Component	integral to plasma membrane	IDA
		Component	plasma membrane	IDA
		Component	colocalizes_with caveola	IMP
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	BMP signaling pathway	IDA
		Biological process	negative regulation of cell growth	IDA
		Biological process	positive regulation of epithelial cell migration	IDA
		Biological process	transmembrane receptor protein serine/threonine kinase signaling pathway	IDA
		Biological process	cellular response to starvation	IEP
		Biological process	BMP signaling pathway	IMP
		Biological process	negative regulation of systemic arterial blood pressure	IMP
		Biological process	positive regulation of BMP signaling pathway	IMP
		Biological process	positive regulation of bone mineralization	IMP
		Biological process	positive regulation of endothelial cell migration	IMP
		Biological process	positive regulation of endothelial cell proliferation	IMP
		Biological process	positive regulation of osteoblast differentiation	IMP
		Biological process	positive regulation of pathway-restricted SMAD protein phosphorylation	IMP
		Biological process	regulation of cell proliferation	IMP
		Biological process	regulation of lung blood pressure	IMP
		Biological process	transcription from RNA polymerase II promoter	IMP
		Function	sequence-specific DNA binding transcription	TAS

			factor activity	
		Biological process	epidermis development	TAS
		Biological process	positive regulation of cell proliferation	TAS
		Biological process	transcription, DNA-dependent	TAS
BNC2	BNC2 basonuclein 2	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
BPTF	BPTF bromodomain PHD finger transcription factor	Component	NURF complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	contributes_to DNA-dependent ATPase activity	IDA
		Function	sequence-specific DNA binding	IDA
		Function	transcription factor binding	IDA
		Function	sequence-specific DNA binding	IMP
		Function	protein binding	IPI
		Biological process	chromatin remodeling	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	brain development	IMP
		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	regulation of transcription, DNA-dependent	IMP
BRD1	BRD1 bromodomain containing 1	Component	MOZ/MORF histone acetyltransferase complex	IDA
		Component	nucleus	IDA
		Component	nucleus	TAS
		Biological process	histone H3 acetylation	IDA
BRD4	BRD4 bromodomain containing 4	Component	condensed nuclear chromosome	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of G2/M transition of mitotic cell cycle	IMP
		Biological process	regulation of transcription involved in G1 phase of mitotic cell cycle	IMP

BRWD1	BRWD1 bromodomain and WD repeat domain containing 1	Component	nucleus	IDA
BSDC1	BSDC1 BSD domain containing 1	Function	protein binding	IPI
BTG1	BTG1 Bcell translocation gene 1, antiproliferative	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	cytoplasm	IMP
		Component	nucleus	IMP
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	positive regulation of myoblast differentiation	IDA
		Biological process	positive regulation of angiogenesis	IMP
		Biological process	positive regulation of endothelial cell differentiation	IMP
		Biological process	regulation of apoptosis	IMP
BTG2	BTG2 BTG family, member 2	Function	protein binding	IPI
		Biological process	positive regulation of nuclear-transcribed mRNA poly(A) tail shortening	IDA
		Biological process	response to DNA damage stimulus	IDA
		Biological process	neuron projection development	IMP
		Biological process	DNA repair	TAS
		Biological process	negative regulation of cell proliferation	TAS
BTRC	BTRC betatransducin repeat containing	Component	SCF ubiquitin ligase complex	IDA
		Component	cytosol	TAS
		Function	contributes_to ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	protein ubiquitination	IDA
		Biological process	ubiquitin-dependent protein catabolic process	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IMP
		Biological process	positive regulation of proteolysis	IMP
		Biological process	protein destabilization	IMP
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS

		Biological process	mitotic cell cycle	TAS
		Biological process	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	TAS
		Biological process	signal transduction	TAS
		Biological process	viral reproduction	TAS
BVES	BVES blood vessel epicardial substance	Component	integral to membrane	IDA
		Component	lateral plasma membrane	IDA
		Component	tight junction	IDA
		Function	structural molecule activity	IDA
		Biological process	epithelial cell-cell adhesion	IDA
BZRAP1	BZRAP1 benzodiazapine receptor (peripheral) associated protein 1	Component	cytoplasm	IDA
		Component	mitochondrion	IDA
		Function	benzodiazepine receptor binding	IPI
BZW1	BZW1 basic leucine zipper and W2 domains 1	Component	cytoplasm	IDA
		Function	protein binding	IPI
C12orf5	C12orf5 chromosome 12 open reading frame 5	Component	intracellular	IDA
C14orf1	C14orf1 chromosome 14 open reading frame 1	Component	transport vesicle	IDA
C14orf147	C14orf147 chromosome 14 open reading frame 147	Component	serine C-palmitoyltransferase complex	IDA
		Function	contributes_to serine C-palmitoyltransferase activity	IDA
		Function	protein binding	IPI
		Biological process	sphingolipid biosynthetic process	TAS
C15orf41	C15orf41 chromosome 15 open reading frame 41	Function	protein binding	IPI
C20orf11	C20orf11 chromosome 20 open reading frame 11	Function	protein binding	IPI
C2orf18	C2orf18 chromosome 2 open reading frame 18	Component	lysosomal membrane	IDA
C3orf58	C3orf58 chromosome 3 open reading frame 58	Component	COPI vesicle coat	IDA
		Component	Golgi membrane	IDA
C4orf34	C4orf34 chromosome 4 open reading frame 34	Function	protein binding	IPI
C5orf13	C5orf13 chromosome 5 open reading frame 13	Component	cytoplasm	IDA
C5orf41	C5orf41 chromosome 5 open reading frame 41	Function	protein binding	IPI
C7orf58	C7orf58 chromosome 7 open reading frame 58	Component	endoplasmic reticulum	IDA
CAB39	CAB39 calcium binding protein 39	Component	cytosol	TAS
		Function	contributes_to protein serine/threonine kinase activity	IDA

		Function	kinase binding	IPI
		Function	protein binding	IPI
		Biological process	cell cycle arrest	TAS
		Biological process	insulin receptor signaling pathway	TAS
CACNA1D	CACNA1D calcium channel, voltage-dependent, L type, alpha 1D subunit	Component	voltage-gated calcium channel complex	IDA
		Component	plasma membrane	TAS
		Function	voltage-gated calcium channel activity	IDA
		Biological process	calcium ion transport	IDA
		Biological process	regulation of calcium ion transport via voltage-gated calcium channel activity	IDA
		Biological process	axon guidance	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	regulation of insulin secretion	TAS
CACNA1I	CACNA1I calcium channel, voltage-dependent, T type, alpha 1I subunit	Function	protein binding	IPI
		Function	voltage-gated calcium channel activity	TAS
		Biological process	axon guidance	TAS
		Biological process	regulation of calcium ion transport via voltage-gated calcium channel activity	TAS
		Biological process	signal transduction	TAS
		Biological process	transport	TAS
CACNA2D2	CACNA2D2 calcium channel, voltage-dependent, alpha 2/delta subunit 2	Component	plasma membrane	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	regulation of insulin secretion	TAS
CACNB3	CACNB3 calcium channel, voltage-dependent, beta 3 subunit	Component	membrane	IDA
		Component	voltage-gated calcium channel complex	IDA
		Function	contributes_to voltage-gated calcium channel activity	IDA
		Function	protein binding	IPI
		Biological process	calcium ion transport	IDA
		Biological process	regulation of calcium ion transport via voltage-gated calcium channel activity	IDA

		Biological process	axon guidance	TAS
		Biological process	membrane depolarization	TAS
		Biological process	regulation of calcium ion transport via voltage-gated calcium channel activity	TAS
		Biological process	synaptic transmission	TAS
		Biological process	transport	TAS
CACYBP	CACYBP calyculin binding protein	Component	beta-catenin destruction complex	IDA
		Component	cytoplasm	IDA
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
CADM2	CADM2 cell adhesion molecule 2	Component	plasma membrane	TAS
		Biological process	adherens junction organization	TAS
		Biological process	cell junction assembly	TAS
		Biological process	cell-cell junction organization	TAS
CADM3	CADM3 cell adhesion molecule 3	Component	plasma membrane	TAS
		Biological process	adherens junction organization	TAS
		Biological process	cell junction assembly	TAS
		Biological process	cell-cell junction organization	TAS
CADPS	CADPS Ca ⁺⁺ dependent secretion activator	Component	cytosol	TAS
CALCOCO2	CALCOCO2 calcium binding and coiledcoil domain 2	Component	cytoplasm	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	perinuclear region of cytoplasm	IDA
		Component	soluble fraction	IDA
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	response to interferon-gamma	IDA
		Biological process	viral reproduction	TAS
CAMK2A	CAMK2A calcium/calmodulindependent protein kinase II alpha	Component	cytosol	TAS
		Function	kinase activity	IDA
		Function	protein binding	IPI
		Biological process	protein phosphorylation	IDA
		Biological process	positive regulation of NF-kappaB transcription	IMP

			factor activity	
		Biological process	cytokine-mediated signaling pathway	TAS
		Biological process	interferon-gamma-mediated signaling pathway	TAS
		Biological process	synaptic transmission	TAS
CAMK2D	CAMK2D calcium/calmodulin-dependent protein kinase II delta	Component	calcium- and calmodulin-dependent protein kinase complex	TAS
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	cytokine-mediated signaling pathway	TAS
		Biological process	interferon-gamma-mediated signaling pathway	TAS
		Biological process	synaptic transmission	TAS
CAMK2G	CAMK2G calcium/calmodulin-dependent protein kinase II gamma	Component	calcium- and calmodulin-dependent protein kinase complex	TAS
		Component	cytosol	TAS
		Biological process	cytokine-mediated signaling pathway	TAS
		Biological process	interferon-gamma-mediated signaling pathway	TAS
		Biological process	synaptic transmission	TAS
CAMKK1	CAMKK1 calcium/calmodulin-dependent protein kinase kinase 1, alpha	Biological process	synaptic transmission	TAS
CAP2	CAP2 CAP, adenylate cyclase-associated protein, 2 (yeast)	Biological process	activation of adenylate cyclase activity	TAS
		Biological process	axon guidance	TAS
		Biological process	establishment or maintenance of cell polarity	TAS
		Biological process	signal transduction	TAS
CAPN6	CAPN6 calpain 6	Component	perinuclear region of cytoplasm	IDA
		Component	spindle microtubule	IDA
CASC3	CASC3 cancer susceptibility candidate 3	Component	cytoplasm	IDA
		Component	exon-exon junction complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	identical protein binding	IDA
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI

CBFA2T2	CBFA2T2 corebinding factor, runt domain, alpha subunit 2; translocated to, 2	Function	protein binding	IPI
CBFA2T3	CBFA2T3 corebinding factor, runt domain, alpha subunit 2; translocated to, 3	Function	protein binding	IPI
		Biological process	granulocyte differentiation	IDA
		Biological process	cell proliferation	TAS
CBL	CBL CasBrM (murine) ecotropic retroviral transforming sequence	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Component	plasma membrane	TAS
		Function	SH3 domain binding	IPI
		Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Function	ubiquitin-protein ligase activity	TAS
		Biological process	negative regulation of apoptosis	IMP
		Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	TAS
		Biological process	positive regulation of receptor-mediated endocytosis	TAS
		Biological process	protein ubiquitination	TAS
		Biological process	transcription, DNA-dependent	TAS
CBX3	CBX3 chromobox homolog 3	Component	chromatin	IDA
		Component	nuclear euchromatin	IDA
		Component	nuclear heterochromatin	IDA
		Component	nucleus	IDA
		Component	spindle	IDA
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Biological process	negative regulation of transcription, DNA-	IDA

			dependent	
CBX8	CBX8 chromobox homolog 8	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	methylated histone residue binding	IDA
CCBL2	CCBL2 cysteine conjugate beta lyase 2	Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	tryptophan catabolic process	TAS
CCDC141	CCDC141 coiledcoil domain containing 141	Function	protein binding	IPI
CCDC6	CCDC6 coiledcoil domain containing 6	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Function	structural constituent of cytoskeleton	TAS
CCL22	CCL22 chemokine (CC motif) ligand 22	Biological process	cell-cell signaling	TAS
		Biological process	inflammatory response	TAS
		Biological process	response to virus	TAS
		Biological process	signal transduction	TAS
CCNB1	CCNB1 cyclin B1	Component	condensed nuclear chromosome outer kinetochore	IDA
		Component	nucleus	IDA
		Component	spindle pole	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	mitotic prometaphase	IDA
		Biological process	mitotic cell cycle spindle checkpoint	IMP
		Biological process	mitotic metaphase plate congression	IMP
		Biological process	mitotic spindle stabilization	IMP
		Biological process	positive regulation of attachment of spindle microtubules to kinetochore	IMP
		Biological process	positive regulation of mitotic cell cycle	IMP
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS
		Biological process	cell cycle checkpoint	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
		Biological process	G2/M transition of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	regulation of ubiquitin-protein ligase activity	TAS

			involved in mitotic cell cycle	
CCND2	CCND2 cyclin D2	Component	cyclin-dependent protein kinase holoenzyme complex	IDA
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	positive regulation of cyclin-dependent protein kinase activity	IDA
		Biological process	positive regulation of protein phosphorylation	IDA
CCNT2	CCNT2 cyclin T2	Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Biological process	gene expression	TAS
		Biological process	transcription elongation from RNA polymerase II promoter	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
		Biological process	viral reproduction	TAS
CCNY	CCNY cyclin Y	Component	cytoplasmic cyclin-dependent protein kinase holoenzyme complex	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	cyclin-dependent protein kinase regulator activity	IDA
		Function	protein binding	IPI
		Biological process	G2/M transition of mitotic cell cycle	IDA
		Biological process	positive regulation of cyclin-dependent protein kinase activity	IDA
		Biological process	regulation of canonical Wnt receptor signaling pathway	IDA
CD1C	CD1C CD1c molecule	Component	integral to plasma membrane	TAS
		Function	endogenous lipid antigen binding	IDA
		Function	exogenous lipid antigen binding	IDA
		Function	glycolipid binding	IDA
		Function	lipopeptide binding	IDA
		Biological process	T cell activation involved in immune response	IDA
CD28	CD28 CD28 molecule	Component	external side of plasma membrane	IDA
		Component	plasma membrane	IDA
		Component	integral to plasma membrane	TAS

		Component	plasma membrane	TAS
		Function	SH3/SH2 adaptor activity	IDA
		Function	protease binding	IPI
		Function	protein binding	IPI
		Function	coreceptor activity	TAS
		Biological process	positive regulation of interleukin-2 biosynthetic process	IDA
		Biological process	positive regulation of mitosis	IDA
		Biological process	positive regulation of T cell proliferation	IDA
		Biological process	regulatory T cell differentiation	IDA
		Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	cytokine biosynthetic process	TAS
		Biological process	humoral immune response	TAS
		Biological process	positive regulation of anti-apoptosis	TAS
		Biological process	positive regulation of T cell proliferation	TAS
		Biological process	regulation of defense response to virus by virus	TAS
		Biological process	T cell costimulation	TAS
		Biological process	viral reproduction	TAS
CD2AP	CD2AP CD2associated protein	Component	cytoplasm	IDA
		Component	filamentous actin	IDA
		Component	nucleolus	IDA
		Component	plasma membrane	IDA
		Component	ruffle	IDA
		Component	actin cytoskeleton	TAS
		Function	SH3 domain binding	IPI
		Function	protein binding	IPI
		Function	structural constituent of cytoskeleton	TAS
		Biological process	protein complex assembly	TAS
		Biological process	substrate-dependent cell migration, cell extension	TAS
CD40	CD40 CD40 molecule, TNF receptor superfamily member 5	Component	integral to plasma membrane	TAS
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	signal transducer activity	TAS
		Biological process	positive regulation of endothelial cell apoptosis	IDA

		Biological process	cellular response to mechanical stimulus	IEP
		Biological process	positive regulation of I-kappaB kinase/NF-kappaB cascade	IEP
		Biological process	protein complex assembly	TAS
		Biological process	regulation of immune response	TAS
		Biological process	signal transduction	TAS
CD44	CD44 CD44 molecule (Indian blood group)	Component	Golgi apparatus	IDA
		Component	cell surface	IDA
		Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Function	contributes_to transmembrane receptor activity	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of apoptosis	IDA
		Biological process	negative regulation of DNA damage response, signal transduction by p53 class mediator	IDA
		Biological process	positive regulation of ERK1 and ERK2 cascade	IDA
		Biological process	positive regulation of peptidyl-serine phosphorylation	IDA
		Biological process	positive regulation of peptidyl-tyrosine phosphorylation	IDA
		Biological process	cytokine-mediated signaling pathway	TAS
		Biological process	interferon-gamma-mediated signaling pathway	TAS
CD5	CD5 CD5 molecule	Component	plasma membrane	IDA
		Function	protein binding	IPI
CD59	CD59 CD59 molecule, complement regulatory protein	Component	anchored to external side of plasma membrane	IDA
		Component	membrane fraction	TAS
		Biological process	blood coagulation	TAS
		Biological process	cell surface receptor linked signaling pathway	TAS
CD69	CD69 CD69 molecule	Component	integral to plasma membrane	TAS
		Function	transmembrane receptor activity	TAS
CD8A	CD8A CD8a molecule	Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	regulation of immune response	TAS
CD8B	CD8B CD8b molecule	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS

		Function	protein binding	IPI
		Biological process	regulation of defense response to virus by virus	TAS
		Biological process	regulation of immune response	TAS
		Biological process	viral reproduction	TAS
CDC27	CDC27 cell division cycle 27 homolog (<i>S. cerevisiae</i>)	Component	anaphase-promoting complex	IDA
		Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	spindle microtubule	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Component	spindle	TAS
		Function	protein binding	IPI
		Function	protein phosphatase binding	IPI
		Biological process	protein K11-linked ubiquitination	IDA
		Biological process	mitotic metaphase/anaphase transition	IMP
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS
		Biological process	cell cycle checkpoint	TAS
		Biological process	cell proliferation	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic cell cycle spindle assembly checkpoint	TAS
		Biological process	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	TAS
CDC42BPA	CDC42BPA CDC42 binding protein kinase alpha (DMPKlike)	Function	ATP binding	IDA
		Function	magnesium ion binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	actin cytoskeleton reorganization	IDA
		Biological process	protein phosphorylation	IDA
CDC42SE1	CDC42SE1 CDC42 small effector 1	Function	GTPase inhibitor activity	TAS

		Biological process	signal transduction	TAS
CDCA7	CDCA7 cell division cycle associated 7	Component	nucleus	IDA
		Biological process	regulation of cell proliferation	IDA
CDH2	CDH2 cadherin 2, type 1, Ncadherin (neuronal)	Component	catenin complex	IDA
		Component	cell-cell adherens junction	IDA
		Component	cell-cell junction	IDA
		Component	plasma membrane	TAS
		Function	alpha-catenin binding	IPI
		Function	gamma-catenin binding	IPI
		Function	protein binding	IPI
		Function	beta-catenin binding	TAS
		Biological process	adherens junction organization	TAS
		Biological process	cell adhesion	TAS
		Biological process	cell junction assembly	TAS
		Biological process	cell-cell junction organization	TAS
		Biological process	muscle cell differentiation	TAS
CDK6	CDK6 cyclindependent kinase 6	Component	cyclin-dependent protein kinase holoenzyme complex	IDA
		Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	ruffle	IDA
		Component	cytosol	TAS
		Function	ATP binding	IDA
		Function	cyclin-dependent protein kinase activity	IDA
		Function	cyclin binding	IPI
		Function	protein binding	IPI
		Biological process	cell cycle	IDA
		Biological process	negative regulation of cell cycle	IDA
		Biological process	negative regulation of osteoblast differentiation	IDA
		Biological process	positive regulation of cell-matrix adhesion	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	regulation of gene expression	IDA
		Biological process	G1 phase of mitotic cell cycle	IEP
		Biological process	response to virus	IEP
		Biological process	cell dedifferentiation	IMP

		Biological process	gliogenesis	IMP
		Biological process	negative regulation of epithelial cell proliferation	IMP
		Biological process	positive regulation of fibroblast proliferation	IMP
		Biological process	regulation of erythrocyte differentiation	IMP
		Biological process	regulation of gene expression	IMP
		Biological process	G1 phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
CDKN1B	CDKN1B cyclindependent kinase inhibitor 1B (p27, Kip1)	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Function	protein phosphatase binding	IPI
		Function	cyclin-dependent protein kinase inhibitor activity	TAS
		Function	transforming growth factor beta receptor, cytoplasmic mediator activity	TAS
		Biological process	autophagic cell death	IDA
		Biological process	cellular response to lithium ion	IDA
		Biological process	G1/S transition of mitotic cell cycle	IDA
		Biological process	induction of apoptosis	IDA
		Biological process	negative regulation of cell growth	IDA
		Biological process	negative regulation of kinase activity	IDA
		Biological process	negative regulation of phosphorylation	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	positive regulation of protein catabolic process	IDA
		Biological process	cell cycle arrest	IMP
		Biological process	negative regulation of cell proliferation	IMP
		Biological process	cell cycle checkpoint	TAS
		Biological process	DNA damage response, signal transduction by p53 class mediator resulting in cell cycle arrest	TAS
		Biological process	G1 phase of mitotic cell cycle	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS

		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	phosphatidylinositol-mediated signaling	TAS
		Biological process	regulation of cyclin-dependent protein kinase activity	TAS
		Biological process	S phase of mitotic cell cycle	TAS
CDKN2B	CDKN2B cyclindependent kinase inhibitor 2B (p15, inhibits CDK4)	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Function	cyclin-dependent protein kinase inhibitor activity	IDA
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	negative regulation of phosphorylation	IDA
		Biological process	regulation of cyclin-dependent protein kinase activity	IDA
		Biological process	megakaryocyte differentiation	IEP
		Biological process	cell cycle arrest	IMP
		Biological process	cellular response to extracellular stimulus	IMP
		Biological process	cellular response to nutrient	IMP
		Biological process	G2/M transition of mitotic cell cycle	IMP
		Biological process	mitotic cell cycle G1/S transition checkpoint	IMP
		Biological process	negative regulation of cell proliferation	IMP
		Biological process	negative regulation of epithelial cell proliferation	IMP
		Biological process	positive regulation of transforming growth factor beta receptor signaling pathway	IMP
		Biological process	G1 phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
CELSR3	CELSR3 cadherin, EGF LAG sevenpass Gtype receptor 3 (flamingo homolog, Drosophila)	Function	protein binding	IPI
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
CEP350	CEP350 centrosomal protein 350kDa	Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA

CGGBP1	CGGBP1 CGG triplet repeat binding protein 1	Component	nucleus	IDA
		Function	double-stranded DNA binding	TAS
CHD2	CHD2 chromodomain helicase DNA binding protein 2	Function	ATP-dependent DNA helicase activity	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
CHD9	CHD9 chromodomain helicase DNA binding protein 9	Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	cellular lipid metabolic process	TAS
CHL1	CHL1 cell adhesion molecule with homology to L1CAM (close homolog of L1)	Biological process	axon guidance	TAS
		Biological process	signal transduction	TAS
CHODL	CHODL chondrolectin	Component	perinuclear region of cytoplasm	IDA
		Function	NOT hyaluronic acid binding	IDA
CHRD	CHRD chordin	Function	protein binding	IPI
		Biological process	negative regulation of cell migration	IDA
		Biological process	positive regulation of cell adhesion	IDA
		Biological process	BMP signaling pathway involved in spinal cord dorsal/ventral patterning	IMP
		Biological process	negative regulation of BMP signaling pathway	IMP
		Biological process	floor plate development	TAS
		Biological process	skeletal system development	TAS
CHRM1	CHRM1 cholinergic receptor, muscarinic 1	Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	phosphatidylinositol phospholipase C activity	TAS
		Biological process	activation of phospholipase C activity by muscarinic acetylcholine receptor signaling pathway	TAS
		Biological process	activation of protein kinase C activity by G-protein coupled receptor protein signaling pathway	TAS
		Biological process	cell proliferation	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	muscarinic acetylcholine receptor signaling	TAS

			pathway	
		Biological process	nervous system development	TAS
		Biological process	positive regulation of cell proliferation	TAS
		Biological process	protein modification process	TAS
		Biological process	signal transduction	TAS
CHSY1	CHSY1 chondroitin sulfate synthase 1	Function	glucuronosyl-N-acetylgalactosaminyl-proteoglycan 4-beta-N-acetylgalactosaminyltransferase activity	IDA
		Biological process	chondroitin sulfate biosynthetic process	IDA
CIITA	CIITA class II, major histocompatibility complex, transactivator	Function	protein complex binding	IDA
		Function	activating transcription factor binding	IPI
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Function	NOT DNA binding	TAS
		Function	transcription coactivator activity	TAS
		Biological process	positive regulation of MHC class I biosynthetic process	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	response to antibiotic	IDA
		Biological process	response to interferon-gamma	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	cytokine-mediated signaling pathway	TAS
		Biological process	immune response	TAS
		Biological process	interferon-gamma-mediated signaling pathway	TAS
CLCN4	CLCN4 chloride channel 4	Function	chloride channel activity	IDA
		Biological process	chloride transport	IDA
		Biological process	transport	TAS
CLCN5	CLCN5 chloride channel 5	Component	apical part of cell	IDA
		Component	membrane	IDA
		Component	integral to plasma membrane	TAS
		Function	chloride channel activity	TAS

		Biological process	chloride transport	TAS
		Biological process	excretion	TAS
		Biological process	transport	TAS
CLEC1A	CLEC1A Ctype lectin domain family 1, member A	Component	integral to plasma membrane	TAS
		Component	intracellular	TAS
		Function	transmembrane receptor activity	TAS
		Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	defense response	TAS
CLTA	CLTA clathrin, light chain A	Component	cytosol	TAS
		Component	plasma membrane	TAS
		Biological process	axon guidance	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
CLTC	CLTC clathrin, heavy chain (Hc)	Component	clathrin-coated vesicle	IDA
		Component	spindle	IDA
		Component	cytosol	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	mitosis	IMP
		Biological process	receptor internalization	IMP
		Biological process	receptor-mediated endocytosis	IMP
		Biological process	transferrin transport	IMP
		Biological process	axon guidance	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
CMPK1	CMPK1 cytidine monophosphate (UMPCMP) kinase 1, cytosolic	Component	cytosol	TAS
		Function	nucleoside phosphate kinase activity	TAS
		Function	uridine kinase activity	TAS

		Biological process	nucleobase, nucleoside and nucleotide interconversion	TAS
		Biological process	nucleobase, nucleoside and nucleotide metabolic process	TAS
		Biological process	nucleoside monophosphate phosphorylation	TAS
		Biological process	pyrimidine ribonucleotide biosynthetic process	TAS
		Biological process	UMP biosynthetic process	TAS
CNBP	CNBP CCHCtype zinc finger, nucleic acid binding protein	Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	cholesterol biosynthetic process	TAS
		Biological process	transcription, DNA-dependent	TAS
CNIH2	CNIH2 cornichon homolog 2 (Drosophila)	Function	protein binding	IPI
		Biological process	regulation of alpha-amino-3-hydroxy-5-methyl-4-isoxazole propionate selective glutamate receptor activity	IDA
CNN1	CNN1 calponin 1, basic, smooth muscle	Component	cytoskeleton	IDA
		Biological process	regulation of smooth muscle contraction	TAS
CNN2	CNN2 calponin 2	Component	stress fiber	IDA
		Component	cell-cell junction	TAS
		Component	cytoskeleton	TAS
		Biological process	cellular response to mechanical stimulus	IDA
		Biological process	regulation of actin filament-based process	IDA
		Biological process	cytoskeleton organization	TAS
CNNM3	CNNM3 cyclin M3	Function	protein binding	IPI
CNOT2	CNOT2 CCR4NOT transcription complex, subunit 2	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	RNA polymerase II transcription cofactor activity	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	nuclear-transcribed mRNA catabolic process, deadenylation-dependent decay	TAS
		Biological process	nuclear-transcribed mRNA poly(A) tail shortening	TAS
		Biological process	RNA metabolic process	TAS
CNP	CNP 2',3'cyclic nucleotide 3' phosphodiesterase	Component	cytoplasm	IDA

		Component	extracellular space	IDA
		Function	protein binding	IPI
		Biological process	synaptic transmission	TAS
		Function	protein binding	IPI
CNTNAP2	CNTNAP2 contactin associated proteinlike 2	Component	axolemma	TAS
		Component	cell body fiber	TAS
		Component	dendrite	TAS
		Component	juxtaparanode region of axon	TAS
		Component	plasma membrane	TAS
		Component	voltage-gated potassium channel complex	TAS
		Biological process	cerebral cortex development	IEP
		Biological process	limbic system development	IEP
		Biological process	striatum development	IEP
		Biological process	superior temporal gyrus development	IEP
		Biological process	thalamus development	IEP
		Biological process	behavior	IMP
		Biological process	brain development	TAS
COG3	COG3 component of oligomeric golgi complex 3	Component	Golgi apparatus	IDA
		Component	Golgi transport complex	IDA
		Function	protein transporter activity	IDA
		Function	protein binding	IPI
		Biological process	ER to Golgi vesicle-mediated transport	IDA
		Biological process	intra-Golgi vesicle-mediated transport	IDA
		Biological process	protein transport	IDA
		Biological process	protein glycosylation	IMP
		Biological process	protein localization to organelle	IMP
		Biological process	protein stabilization	IMP
		Biological process	retrograde vesicle-mediated transport, Golgi to ER	IMP
COL12A1	COL12A1 collagen, type XII, alpha 1	Component	colocalizes_ with extracellular matrix	IDA
		Component	extracellular space	IDA
		Biological process	skeletal system development	TAS
COL19A1	COL19A1 collagen, type XIX, alpha 1	Biological process	skeletal system development	TAS
COL23A1	COL23A1 collagen, type XXIII, alpha 1	Function	protein binding	IPI
COL2A1	COL2A1 collagen, type II, alpha 1	Component	collagen type II	IDA
		Component	extracellular region	TAS

		Function	platelet-derived growth factor binding	IDA
		Biological process	collagen fibril organization	IMP
		Biological process	embryonic skeletal joint morphogenesis	IMP
		Biological process	sensory perception of sound	IMP
		Biological process	skeletal system development	IMP
		Biological process	visual perception	IMP
		Biological process	axon guidance	TAS
		Biological process	cartilage development	TAS
COL4A3	COL4A3 collagen, type IV, alpha 3 (Goodpasture antigen)	Component	basement membrane	IDA
		Component	collagen type IV	IDA
		Component	extracellular region	TAS
		Function	integrin binding	IDA
		Function	protein binding	IPI
		Function	integrin binding	TAS
		Biological process	activation of caspase activity	IDA
		Biological process	cell proliferation	IDA
		Biological process	induction of apoptosis	IDA
		Biological process	negative regulation of angiogenesis	IDA
		Biological process	axon guidance	TAS
		Biological process	blood circulation	TAS
		Biological process	negative regulation of cell proliferation	TAS
		Biological process	sensory perception of sound	TAS
COL5A1	COL5A1 collagen, type V, alpha 1	Component	colocalizes_with extracellular matrix	IDA
		Component	collagen type V	IMP
		Component	extracellular matrix	IMP
		Component	extracellular region	TAS
		Function	heparin binding	IDA
		Function	platelet-derived growth factor binding	IDA
		Function	proteoglycan binding	IPI
		Biological process	cell adhesion	IMP
		Biological process	cell migration	IMP
		Biological process	collagen biosynthetic process	IMP
		Biological process	collagen fibril organization	IMP
		Biological process	eye morphogenesis	IMP

		Biological process	fibril organization	IMP
		Biological process	integrin biosynthetic process	IMP
		Biological process	skin development	IMP
		Biological process	wound healing, spreading of epidermal cells	IMP
		Biological process	axon guidance	TAS
COL6A3	COL6A3 collagen, type VI, alpha 3	Component	extracellular matrix	IDA
		Component	colocalizes_with extracellular matrix	IDA
		Component	extracellular space	IDA
		Component	collagen type VI	TAS
		Component	extracellular region	TAS
		Biological process	axon guidance	TAS
		Biological process	muscle organ development	TAS
COL8A2	COL8A2 collagen, type VIII, alpha 2	Component	colocalizes_with extracellular matrix	IDA
COPS2	COPS2 COP9 constitutive photomorphogenic homolog subunit 2 (Arabidopsis)	Component	cytoplasm	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	signalosome	IDA
		Function	protein binding	IPI
		Biological process	transcription from RNA polymerase II promoter	TAS
CORO1C	CORO1C coronin, actin binding protein, 1C	Biological process	phagocytosis	TAS
		Biological process	signal transduction	TAS
CORO2A	CORO2A coronin, actin binding protein, 2A	Component	transcriptional repressor complex	IDA
		Biological process	intracellular signal transduction	TAS
COX4NB	COX4NB COX4 neighbor	Component	cytoplasm	TAS
		Component	nucleus	TAS
CPD	CPD carboxypeptidase D	Component	membrane fraction	TAS
CPLX1	CPLX1 complexin 1	Component	cytosol	TAS
		Biological process	exocytosis	TAS
		Biological process	glutamate secretion	TAS
		Biological process	neurotransmitter secretion	TAS
		Biological process	synaptic transmission	TAS
CPLX2	CPLX2 complexin 2	Biological process	vesicle docking involved in exocytosis	TAS
CPNE3	CPNE3 copine III	Component	cytosol	IDA

		Function	protein serine/threonine kinase activity	IDA
		Function	calcium-dependent phospholipid binding	TAS
		Function	transporter activity	TAS
		Biological process	lipid metabolic process	TAS
		Biological process	vesicle-mediated transport	TAS
CPS1	CPS1 carbamoylphosphate synthase 1, mitochondrial	Component	mitochondrial nucleoid	IDA
		Function	carbamoyl-phosphate synthase (ammonia) activity	IMP
		Function	protein binding	IPI
		Biological process	response to lipopolysaccharide	IDA
		Biological process	carbamoyl phosphate biosynthetic process	IMP
		Biological process	glycogen catabolic process	IMP
		Biological process	nitric oxide metabolic process	IMP
		Biological process	positive regulation of vasodilation	IMP
		Biological process	triglyceride catabolic process	IMP
		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	urea cycle	TAS
CPSF6	CPSF6 cleavage and polyadenylation specific factor 6, 68kDa	Component	mRNA cleavage factor complex	IDA
		Component	nucleus	IDA
		Component	paraspeckles	IDA
		Component	ribonucleoprotein complex	IDA
		Function	contributes_to RNA binding	IDA
		Function	mRNA binding	IDA
		Function	protein binding	IPI
		Biological process	mRNA processing	IDA
		Biological process	protein tetramerization	IDA
		Biological process	mRNA polyadenylation	IMP
CREB1	CREB1 cAMP responsive element binding protein 1	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Function	transcription cofactor activity	TAS
		Biological process	positive regulation of transcription from RNA	IDA

			polymerase II promoter	
		Biological process	protein phosphorylation	IDA
		Biological process	response to organic substance	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	activation of phospholipase C activity	TAS
		Biological process	axon guidance	TAS
		Biological process	innate immune response	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	phosphatidylinositol-mediated signaling	TAS
		Biological process	signal transduction	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	synaptic transmission	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
CREB5	CREB5 cAMP responsive element binding protein 5	Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	transcription from RNA polymerase II promoter	TAS
CREBBP	CREBBP CREB binding protein	Component	cytoplasm	IDA
		Component	nuclear body	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	MyoD binding	IDA
		Function	acetyltransferase activity	IDA

		Function	histone acetyltransferase activity	IDA
		Function	transcription coactivator activity	IDA
		Function	contributes_to transcription coactivator activity	IDA
		Function	p53 binding	IPI
		Function	protein binding	IPI
		Function	transcription coactivator activity	IPI
		Function	transcription factor binding	IPI
		Function	signal transducer activity	TAS
		Biological process	histone acetylation	IDA
		Biological process	N-terminal peptidyl-lysine acetylation	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	cellular lipid metabolic process	TAS
		Biological process	gene expression	TAS
		Biological process	protein complex assembly	TAS
		Biological process	regulation of transcription, DNA-dependent	TAS
		Biological process	response to hypoxia	TAS
		Biological process	transcription, DNA-dependent	TAS
CREBZF	CREBZF CREB/ATF bZIP transcription factor	Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	regulation of sequence-specific DNA binding transcription factor activity	IDA
		Biological process	response to virus	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	negative regulation of gene expression, epigenetic	IEP
		Biological process	negative regulation of transcription, DNA-dependent	IMP
CRNN	CRNN cornulin	Component	membrane	IDA
		Component	cytoplasm	TAS
		Biological process	cell-cell adhesion	IDA
		Biological process	response to heat	IDA
CROT	CROT carnitine Octanoyltransferase	Biological process	fatty acid beta-oxidation using acyl-CoA oxidase	TAS
		Biological process	generation of precursor metabolites and energy	TAS
CSDC2	CSDC2 cold shock domain containing C2, RNA	Function	protein binding	IPI

	binding			
CSNK1D	CSNK1D casein kinase 1, delta	Function	protein kinase activity	IDA
		Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	protein phosphorylation	IDA
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	positive regulation of protein phosphorylation	IMP
		Biological process	DNA repair	TAS
		Biological process	G2/M transition of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	signal transduction	TAS
CSNK1G1	CSNK1G1 casein kinase 1, gamma 1	Component	cytoplasm	IDA
CSNK2B	CSNK2B casein kinase 2, beta polypeptide	Component	cytoplasm	IDA
		Component	colocalizes_with plasma membrane	IDA
		Component	cytosol	TAS
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Function	receptor binding	IPI
		Function	transcription factor binding	IPI
		Function	contributes_to protein serine/threonine kinase activity	TAS
		Biological process	adiponectin-mediated signaling pathway	IDA
		Biological process	axon guidance	TAS
		Biological process	negative regulation of cell proliferation	TAS
		Biological process	signal transduction	TAS
CTNNB1	CTNNB1 catenin (cadherinassociated protein), beta 1, 88kDa	Component	APC-Axin-1-beta-catenin complex	IDA
		Component	Axin-APC-beta-catenin-GSK3B complex	IDA
		Component	adherens junction	IDA
		Component	beta-catenin-TCF7L2 complex	IDA
		Component	catenin complex	IDA
		Component	cell cortex	IDA
		Component	cell junction	IDA

	Component	cell periphery	IDA
	Component	cell-cell adherens junction	IDA
	Component	cell-cell junction	IDA
	Component	cell-substrate adherens junction	IDA
	Component	centrosome	IDA
	Component	cytoplasm	IDA
	Component	cytosol	IDA
	Component	lateral plasma membrane	IDA
	Component	nucleus	IDA
	Component	perinuclear region of cytoplasm	IDA
	Component	plasma membrane	IDA
	Component	protein-DNA complex	IDA
	Component	transcription factor complex	IDA
	Component	cell junction	TAS
	Component	cytosol	TAS
	Function	transcription coactivator activity	IDA
	Function	transcription coactivator activity	IMP
	Function	I-SMAD binding	IPI
	Function	R-SMAD binding	IPI
	Function	SMAD binding	IPI
	Function	alpha-catenin binding	IPI
	Function	cadherin binding	IPI
	Function	enzyme binding	IPI
	Function	estrogen receptor binding	IPI
	Function	ion channel binding	IPI
	Function	kinase binding	IPI
	Function	nuclear hormone receptor binding	IPI
	Function	protein C-terminus binding	IPI
	Function	protein binding	IPI
	Function	protein phosphatase binding	IPI
	Function	transcription factor binding	IPI
	Function	nuclear hormone receptor binding	TAS
	Function	transcription factor binding	TAS
	Biological process	canonical Wnt receptor signaling pathway	IDA
	Biological process	cellular response to indole-3-methanol	IDA

		Biological process	negative regulation of cell proliferation	IDA
		Biological process	positive regulation of apoptosis	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	regulation of calcium ion import	IDA
		Biological process	regulation of centriole-centriole cohesion	IDA
		Biological process	regulation of protein localization at cell surface	IDA
		Biological process	response to estradiol stimulus	IDA
		Biological process	Wnt receptor signaling pathway	IDA
		Biological process	response to drug	IEP
		Biological process	adherens junction assembly	IMP
		Biological process	canonical Wnt receptor signaling pathway involved in negative regulation of apoptosis	IMP
		Biological process	canonical Wnt receptor signaling pathway involved in positive regulation of epithelial to mesenchymal transition	IMP
		Biological process	cell adhesion	IMP
		Biological process	cell-cell adhesion	IMP
		Biological process	cellular response to growth factor stimulus	IMP
		Biological process	endothelial tube morphogenesis	IMP
		Biological process	negative regulation of transcription, DNA-dependent	IMP
		Biological process	positive regulation of anti-apoptosis	IMP
		Biological process	positive regulation of heparan sulfate proteoglycan biosynthetic process	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	protein localization at cell surface	IMP
		Biological process	regulation of centromeric sister chromatid cohesion	IMP
		Biological process	regulation of smooth muscle cell proliferation	IMP

		Biological process	apoptosis	TAS
		Biological process	cellular component disassembly involved in apoptosis	TAS
		Biological process	epithelial to mesenchymal transition	TAS
		Biological process	muscle cell differentiation	TAS
		Biological process	regulation of angiogenesis	TAS
		Biological process	regulation of fibroblast proliferation	TAS
		Component	cytoplasm	TAS
		Function	protein binding	IPI
		Biological process	signal transduction	TAS
CUL2	CUL2 cullin 2	Function	protein binding	IPI
		Biological process	cell cycle arrest	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
		Biological process	induction of apoptosis by intracellular signals	TAS
		Biological process	negative regulation of cell proliferation	TAS
CXCL12	CXCL12 chemokine (CXC motif) ligand 12	Component	extracellular region	TAS
		Function	receptor binding	TAS
		Function	signal transducer activity	TAS
		Biological process	negative regulation of leukocyte apoptosis	IDA
		Biological process	positive regulation of monocyte chemotaxis	IDA
		Biological process	blood circulation	TAS
		Biological process	cell adhesion	TAS
		Biological process	cellular calcium ion homeostasis	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	regulation of actin polymerization or depolymerization	TAS
		Biological process	response to virus	TAS
		Biological process	signal transduction	TAS
CXCL5	CXCL5 chemokine (CXC motif) ligand 5	Component	extracellular region	TAS
		Biological process	cell-cell signaling	TAS
		Biological process	chemotaxis	TAS
		Biological process	positive regulation of cell proliferation	TAS
		Biological process	signal transduction	TAS
CYB5R4	CYB5R4 cytochrome b5 reductase 4	Component	endoplasmic reticulum	IDA

		Component	perinuclear region of cytoplasm	IDA
		Function	NAD(P)H oxidase activity	IDA
		Function	NOT NAD(P)H oxidase activity	IDA
		Function	cytochrome-b5 reductase activity	IDA
		Function	oxidoreductase activity, acting on NADH or NADPH, heme protein as acceptor	IDA
		Biological process	generation of precursor metabolites and energy	IDA
		Biological process	oxidation-reduction process	IDA
		Biological process	superoxide metabolic process	IDA
CYBRD1	CYBRD1 cytochrome b reductase 1	Component	plasma membrane	TAS
		Function	ferric-chelate reductase activity	IDA
		Function	oxidoreductase activity, oxidizing metal ions	TAS
		Biological process	cellular iron ion homeostasis	TAS
		Biological process	transmembrane transport	TAS
CYLC2	CYLC2 cylicin, basic protein of sperm head cytoskeleton 2	Function	structural constituent of cytoskeleton	TAS
CYP26B1	CYP26B1 cytochrome P450, family 26, subfamily B, polypeptide 1	Component	microsome	IDA
		Function	retinoic acid 4-hydroxylase activity	IDA
		Function	retinoic acid binding	IDA
		Biological process	oxidation-reduction process	IDA
		Biological process	retinoic acid catabolic process	IDA
		Biological process	negative regulation of retinoic acid receptor signaling pathway	TAS
		Biological process	xenobiotic metabolic process	TAS
CYP27B1	CYP27B1 cytochrome P450, family 27, subfamily B, polypeptide 1	Component	cytoplasm	IDA
		Component	mitochondrial outer membrane	TAS
		Component	mitochondrion	TAS
		Function	calcidiol 1-monooxygenase activity	IDA
		Function	calcidiol 1-monooxygenase activity	TAS
		Biological process	negative regulation of calcidiol 1-monooxygenase activity	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	positive regulation of vitamin D 24-hydroxylase	IDA

			activity	
		Biological process	positive regulation of vitamin D receptor signaling pathway	IDA
		Biological process	response to interferon-gamma	IDA
		Biological process	vitamin D biosynthetic process	IDA
		Biological process	vitamin D metabolic process	IDA
		Biological process	bone mineralization	IEP
		Biological process	decidualization	IEP
		Biological process	response to estrogen stimulus	IEP
		Biological process	response to lipopolysaccharide	IEP
		Biological process	response to tumor necrosis factor	IEP
		Biological process	response to vitamin D	IEP
		Biological process	calcium ion homeostasis	IMP
		Biological process	G1 to G0 transition	IMP
		Biological process	negative regulation of cell growth	IMP
		Biological process	positive regulation of keratinocyte differentiation	IMP
		Biological process	regulation of bone mineralization	IMP
		Biological process	hormone biosynthetic process	TAS
		Biological process	vitamin metabolic process	TAS
		Biological process	xenobiotic metabolic process	TAS
D4S234E	D4S234E DNA segment on chromosome 4 (unique) 234 expressed sequence	Component	cytoplasm	TAS
		Component	nucleus	TAS
DAB2	DAB2 disabled homolog 2, mitogenresponsive phosphoprotein (Drosophila)	Component	coated pit	IDA
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	negative regulation of protein binding	IMP
		Biological process	negative regulation of transcription, DNA- dependent	IMP
		Biological process	positive regulation of proteasomal ubiquitin- dependent protein catabolic process	IMP
		Biological process	positive regulation of protein phosphorylation	IMP

		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	positive regulation of Wnt receptor signaling pathway, planar cell polarity pathway	IMP
		Biological process	cell proliferation	TAS
DACH1	DACH1 dachshund homolog 1 (Drosophila)	Component	nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
DAG1	DAG1 dystroglycan 1 (dystrophin-associated glycoprotein 1)	Component	basement membrane	IDA
		Component	contractile ring	IDA
		Component	cytoplasm	IDA
		Component	dystrophin-associated glycoprotein complex	IDA
		Component	extracellular space	IDA
		Component	filopodium	IDA
		Component	colocalizes_with focal adhesion	IDA
		Component	lamellipodium	IDA
		Component	nucleoplasm	IDA
		Component	plasma membrane	IDA
		Function	actin binding	IDA
		Function	alpha-actinin binding	IDA
		Function	tubulin binding	IDA
		Function	structural constituent of muscle	IMP
		Function	protein binding	IPI
		Function	vinculin binding	IPI
		Biological process	cytoskeletal anchoring at plasma membrane	IMP
		Biological process	microtubule anchoring	IMP
		Biological process	negative regulation of cell migration	IMP
		Biological process	negative regulation of MAPKKK cascade	IMP
		Biological process	negative regulation of protein kinase B signaling cascade	IMP
DAGLA	DAGLA diacylglycerol lipase, alpha	Component	plasma membrane	TAS
		Function	acylglycerol lipase activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS

DAZAP2	DAZAP2 DAZ associated protein 2	Function	WW domain binding	IPI
		Function	protein binding	IPI
DBT	DBT dihydrolipoamide branched chain transacylase E2	Component	cytoplasm	IDA
		Component	microtubule cytoskeleton	IDA
		Component	mitochondrial nucleoid	IDA
		Component	mitochondrion	IDA
		Component	mitochondrial alpha-ketoglutarate dehydrogenase complex	TAS
		Component	mitochondrial matrix	TAS
		Function	protein binding	IPI
		Biological process	branched chain family amino acid catabolic process	TAS
		Biological process	cellular nitrogen compound metabolic process	TAS
DCLK1	DCLK1 doublecortinlike kinase 1	Component	integral to plasma membrane	TAS
		Function	protein kinase activity	TAS
		Function	receptor signaling protein activity	TAS
		Biological process	response to virus	IEP
		Biological process	central nervous system development	TAS
		Biological process	nervous system development	TAS
		Component	intracellular membrane-bounded organelle	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	exonucleolytic nuclear-transcribed mRNA catabolic process involved in deadenylation-dependent decay	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	nuclear-transcribed mRNA catabolic process, deadenylation-dependent decay	TAS
		Biological process	RNA metabolic process	TAS
DCUN1D3	DCUN1D3 DCN1, defective in cullin neddylation 1, domain containing 3 (<i>S. cerevisiae</i>)	Component	perinuclear region of cytoplasm	IDA
		Biological process	response to gamma radiation	IDA
		Biological process	response to UV-C	IDA
		Biological process	negative regulation of cell growth	IMP
		Biological process	negative regulation of S phase of mitotic cell cycle	IMP

		Biological process	positive regulation of apoptosis	IMP
DCX	DCX doublecortin	Component	cytoskeleton	TAS
		Component	microtubule associated complex	TAS
		Function	microtubule binding	TAS
		Biological process	axon guidance	TAS
		Biological process	central nervous system development	TAS
		Biological process	nervous system development	TAS
DDR1	DDR1 discoidin domain receptor tyrosine kinase 1	Component	integral to plasma membrane	TAS
		Function	protein binding	IPI
DDX17	DDX17 DEAD (AspGluAlaAsp) box polypeptide 17	Function	RNA helicase activity	TAS
		Function	RNA-dependent ATPase activity	TAS
		Biological process	RNA processing	TAS
DDX3X	DDX3X DEAD (AspGluAlaAsp) box polypeptide 3, Xlinked	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Function	ATP-dependent RNA helicase activity	TAS
DDX6	DDX6 DEAD (AspGluAlaAsp) box polypeptide 6	Component	RNA-induced silencing complex	IDA
		Component	cytoplasmic mRNA processing body	IDA
		Component	stress granule	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Function	RNA helicase activity	TAS
		Function	helicase activity	TAS
			exonucleolytic nuclear-transcribed mRNA catabolic process involved in deadenylation-dependent decay	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	nuclear-transcribed mRNA catabolic process, deadenylation-dependent decay	TAS
		Biological process	RNA metabolic process	TAS
DEPDC1	DEPDC1 DEP domain containing 1	Component	nucleus	IDA
		Component	transcriptional repressor complex	IDA
		Function	protein binding	IPI
DES	DES desmin	Component	Z disc	IDA

		Component	cytosol	TAS
		Component	intermediate filament	TAS
		Function	protein binding	IPI
		Function	structural constituent of cytoskeleton	TAS
		Biological process	cytoskeleton organization	TAS
		Biological process	muscle contraction	TAS
		Biological process	muscle filament sliding	TAS
		Biological process	regulation of heart contraction	TAS
DGCR2	DGCR2 DiGeorge syndrome critical region gene 2	Biological process	organ morphogenesis	TAS
DGCR8	DGCR8 DiGeorge syndrome critical region gene 8	Component	cytoplasm	IDA
		Component	microtubule cytoskeleton	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	double-stranded RNA binding	IDA
		Function	protein binding	IPI
		Biological process	primary microRNA processing	IDA
DGKG	DGKG diacylglycerol kinase, gamma 90kDa	Component	plasma membrane	TAS
		Function	diacylglycerol kinase activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
		Biological process	signal transduction	TAS
DHDDS	DHDDS dehydrololichyl diphosphate synthase	Function	protein binding	IPI
DHX15	DHX15 DEAH (AspGluAlaHis) box polypeptide 15	Component	U12-type spliceosomal complex	IDA
		Function	RNA helicase activity	TAS
DHX8	DHX8 DEAH (AspGluAlaHis) box polypeptide 8	Component	catalytic step 2 spliceosome	IDA
		Component	spliceosomal complex	TAS
		Function	protein binding	IPI
		Function	ATP-dependent RNA helicase activity	TAS
		Biological process	RNA processing	TAS
DIXDC1	DIXDC1 DIX domain containing 1	Component	cytosol	IDA
		Function	gamma-tubulin binding	IDA
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IDA
DLG2	DLG2 discs, large homolog 2 (Drosophila)	Function	protein binding	IPI

		Function	guanylate kinase activity	TAS
DLG3	DLG3 discs, large homolog 3 (Drosophila)	Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	axon guidance	TAS
		Biological process	synaptic transmission	TAS
DLG4	DLG4 discs, large homolog 4 (Drosophila)	Component	cortical cytoskeleton	IDA
		Component	postsynaptic membrane	IDA
		Component	plasma membrane	TAS
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	axon guidance	TAS
		Biological process	learning	TAS
		Biological process	nervous system development	TAS
		Biological process	protein complex assembly	TAS
		Biological process	signal transduction	TAS
		Biological process	synaptic transmission	TAS
DLGAP2	DLGAP2 discs, large (Drosophila) homolog associated protein 2	Function	protein binding	IPI
DLL4	DLL4 deltalike 4 (Drosophila)	Component	plasma membrane	TAS
		Biological process	blood circulation	TAS
		Biological process	Notch receptor processing	TAS
		Biological process	Notch signaling pathway	TAS
		Biological process	signal transduction	TAS
DLX6	DLX6 distalless homeobox 6	Biological process	nervous system development	TAS
		Biological process	skeletal system development	TAS
		Biological process	transcription, DNA-dependent	TAS
DNAJB5	DNAJB5 DnaJ (Hsp40) homolog, subfamily B, member 5	Biological process	response to unfolded protein	IEP
DNM1L	DNM1L dynamin 1 like	Component	cis-Golgi network	TAS
		Component	endoplasmic reticulum	TAS
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Biological process	mitochondrial fragmentation involved in apoptosis	IMP
		Biological process	apoptosis	TAS
		Biological process	cellular component disassembly involved in	TAS

			apoptosis	
		Biological process	GTP catabolic process	TAS
		Biological process	mitochondrial membrane organization	TAS
		Biological process	positive regulation of mitochondrial fission	TAS
DNM3	DNM3 dynamin 3	Function	protein binding	IPI
DOCK9	DOCK9 dedicator of cytokinesis 9	Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	blood coagulation	TAS
DPP6	DPP6 dipeptidylpeptidase 6	Function	dipeptidyl-peptidase activity	TAS
DPP8	DPP8 dipeptidylpeptidase 8	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Biological process	immune response	TAS
DPYSL2	DPYSL2 dihydropyrimidinase like 2	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	dihydropyrimidinase activity	TAS
		Biological process	axon guidance	TAS
		Biological process	nucleobase, nucleoside, nucleotide and nucleic acid metabolic process	TAS
		Biological process	signal transduction	TAS
DR1	DR1 downregulator of transcription 1, TBPbinding (negative cofactor 2)	Component	Ada2/Gcn5/Ada3 transcription activator complex	IDA
		Function	TBP-class protein binding	IDA
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Function	transcription corepressor activity	TAS
		Function	transcription factor binding	TAS
		Biological process	histone H3 acetylation	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	TAS
DRP2	DRP2 dystrophin related protein 2	Biological process	central nervous system development	TAS
DSTN	DSTN destrin (actin depolymerizing factor)	Component	actin cytoskeleton	TAS
		Biological process	actin filament severing	TAS
		Biological process	actin polymerization or depolymerization	TAS
DTL	DTL denticleless homolog (Drosophila)	Component	Cul4A-RING ubiquitin ligase complex	IDA

		Component	Cul4B-RING ubiquitin ligase complex	IDA
		Component	centrosome	IDA
		Component	nucleus	IDA
		Function	contributes_to ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	protein monoubiquitination	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	response to DNA damage stimulus	IDA
		Biological process	response to UV	IDA
		Biological process	translesion synthesis	IDA
		Biological process	ubiquitin-dependent protein catabolic process	IDA
		Biological process	G2/M transition DNA damage checkpoint	IMP
		Biological process	regulation of cell cycle	IMP
		Biological process	protein polyubiquitination	TAS
		Biological process	ubiquitin-dependent protein catabolic process	TAS
DTX1	DTX1 deltex homolog 1 (Drosophila)	Function	Notch binding	IDA
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Function	transcription coactivator activity	TAS
		Biological process	negative regulation of neuron differentiation	IGI
		Biological process	regulation of Notch signaling pathway	IGI
		Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
DUSP3	DUSP3 dual specificity phosphatase 3	Component	cytosol	IDA
		Component	immunological synapse	IDA
		Component	nucleus	IDA
		Function	protein tyrosine phosphatase activity	IDA
		Function	protein tyrosine/serine/threonine phosphatase activity	IDA
		Function	MAP kinase phosphatase activity	IMP
		Function	protein tyrosine/serine/threonine phosphatase activity	IMP
		Biological process	negative regulation of ERK1 and ERK2 cascade	IDA
		Biological process	negative regulation of JNK cascade	IDA
		Biological process	negative regulation of T cell activation	IDA

		Biological process	negative regulation of T cell receptor signaling pathway	IDA
		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	inactivation of MAPK activity	IMP
		Biological process	negative regulation of JNK cascade	IMP
		Biological process	negative regulation of MAPKKK cascade	IMP
		Biological process	positive regulation of mitotic cell cycle	IMP
		Biological process	innate immune response	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
DYRK1A	DYRK1A dualspecificity tyrosine(Y)phosphorylation regulated kinase 1A	Function	non-membrane spanning protein tyrosine kinase activity	IDA
		Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	peptidyl-tyrosine phosphorylation	IDA
		Biological process	nervous system development	TAS
DYRK2	DYRK2 dualspecificity tyrosine(Y)phosphorylation regulated kinase 2	Component	cytoplasm	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	ATP binding	IDA
		Function	magnesium ion binding	IDA
		Function	manganese ion binding	IDA
		Function	protein serine/threonine kinase activity	IDA

		Function	protein tyrosine kinase activity	IDA
		Function	protein kinase activity	TAS
		Biological process	DNA damage response, signal transduction by p53 class mediator resulting in induction of apoptosis	IDA
		Biological process	positive regulation of glycogen biosynthetic process	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	smoothened signaling pathway	IMP
DYRK4	DYRK4 dualspecificity tyrosine(Y)phosphorylation regulated kinase 4	Component	Golgi apparatus	IDA
E2F2	E2F2 E2F transcription factor 2	Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	G1 phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	transcription initiation from RNA polymerase II promoter	TAS
E2F3	E2F3 E2F transcription factor 3	Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	G1 phase of mitotic cell cycle	TAS
		Biological process	G2 phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	transcription initiation from RNA polymerase II promoter	TAS
E2F7	E2F7 E2F transcription factor 7	Function	identical protein binding	IPI
		Function	protein binding	IPI
EAF1	EAF1 ELL associated factor 1	Function	protein binding	IPI
EBF3	EBF3 early Bcell factor 3	Function	protein binding	IPI
EDC3	EDC3 enhancer of mRNA decapping 3 homolog (S. cerevisiae)	Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	exonucleolytic nuclear-transcribed mRNA catabolic process involved in deadenylation-dependent decay	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	nuclear-transcribed mRNA catabolic process,	TAS

			deadenylation-dependent decay	
		Biological process	RNA metabolic process	TAS
EDEM1	EDEM1 ER degradation enhancer, mannosidase alpha-like 1	Function	NOT mannosyl-oligosaccharide 1,2-alpha- mannosidase activity	IDA
		Function	misfolded protein binding	IDA
		Function	protein binding	IPI
		Biological process	cellular protein metabolic process	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
EDN1	EDN1 endothelin 1	Component	cytoplasm	IDA
		Component	extracellular space	IDA
		Component	extracellular region	TAS
		Function	cytokine activity	IDA
		Function	endothelin A receptor binding	IDA
		Function	endothelin B receptor binding	IDA
		Function	hormone activity	IDA
		Function	endothelin B receptor binding	IPI
		Biological process	artery smooth muscle contraction	IDA
		Biological process	calcium-mediated signaling	IDA
		Biological process	cell surface receptor linked signaling pathway	IDA
		Biological process	cell-cell signaling	IDA
		Biological process	elevation of cytosolic calcium ion concentration	IDA
		Biological process	G-protein coupled receptor protein signaling pathway	IDA
		Biological process	inositol phosphate-mediated signaling	IDA
		Biological process	negative regulation of cellular protein metabolic process	IDA
		Biological process	negative regulation of nitric-oxide synthase biosynthetic process	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	nitric oxide transport	IDA
		Biological process	NOT neutrophil chemotaxis	IDA
		Biological process	peptide hormone secretion	IDA
		Biological process	phosphatidylinositol 3-kinase cascade	IDA

		Biological process	positive regulation of cardiac muscle hypertrophy	IDA
		Biological process	positive regulation of cell migration	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	positive regulation of cell size	IDA
		Biological process	positive regulation of heart rate	IDA
		Biological process	positive regulation of hormone secretion	IDA
		Biological process	positive regulation of JUN kinase activity	IDA
		Biological process	positive regulation of MAP kinase activity	IDA
		Biological process	positive regulation of mitosis	IDA
		Biological process	positive regulation of smooth muscle cell proliferation	IDA
		Biological process	prostaglandin biosynthetic process	IDA
		Biological process	protein kinase C deactivation	IDA
		Biological process	regulation of systemic arterial blood pressure by endothelin	IDA
		Biological process	vasoconstriction	IDA
		Biological process	vein smooth muscle contraction	IDA
		Biological process	positive regulation of prostaglandin-endoperoxide synthase activity	IMP
		Biological process	positive regulation of sarcomere organization	IMP
		Biological process	artery smooth muscle contraction	TAS
		Biological process	leukocyte activation	TAS
		Biological process	negative regulation of blood coagulation	TAS
		Biological process	positive regulation of endothelial cell migration	TAS
		Biological process	positive regulation of nitric oxide biosynthetic process	TAS
EDNRB	EDNRB endothelin receptor type B	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	endothelin-B receptor activity	IDA
		Function	peptide hormone binding	IDA
		Function	endothelin-B receptor activity	IMP
		Function	endothelin-B receptor activity	IPI
		Biological process	macrophage chemotaxis	IMP
		Biological process	negative regulation of cellular protein metabolic process	IMP

		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	vasoconstriction	IMP
		Biological process	vein smooth muscle contraction	IMP
		Biological process	activation of phospholipase C activity by G-protein coupled receptor protein signaling pathway coupled to IP3 second messenger	TAS
		Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	negative regulation of adenylate cyclase activity	TAS
		Biological process	nervous system development	TAS
EEA1	EEA1 early endosome antigen 1	Component	cytosol	IDA
		Component	early endosome	IDA
		Component	extrinsic to plasma membrane	IDA
		Component	membrane fraction	TAS
		Function	1-phosphatidylinositol binding	IDA
		Function	GTP-dependent protein binding	IDA
		Function	protein homodimerization activity	IDA
		Function	protein binding	IPI
		Function	zinc ion binding	TAS
		Biological process	vesicle fusion	IMP
		Biological process	synaptic vesicle to endosome fusion	TAS
EFNA5	EFNA5 ephrinA5	Component	anchored to plasma membrane	TAS
		Component	extracellular space	TAS
		Function	ephrin receptor binding	IPI
		Function	protein binding	IPI
		Biological process	cell-cell signaling	TAS
EFNB1	EFNB1 ephrinB1	Component	integral to plasma membrane	TAS
		Component	soluble fraction	TAS
		Function	protein binding	IPI
		Biological process	cell adhesion	TAS
		Biological process	cell-cell signaling	TAS
EFNB2	EFNB2 ephrinB2	Component	integral to plasma membrane	TAS
		Function	ephrin receptor binding	TAS
		Biological process	anatomical structure morphogenesis	TAS
		Biological process	cell-cell signaling	TAS

EFNB3	EFNB3 ephrinB3	Component	integral to plasma membrane	TAS
		Function	ephrin receptor binding	IDA
		Function	transmembrane-ephrin receptor activity	TAS
		Biological process	ephrin receptor signaling pathway	IDA
		Biological process	cell-cell signaling	TAS
EFS	EFS embryonal Fynassociated substrate	Component	cytoplasm	TAS
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Biological process	intracellular signal transduction	TAS
EGR3	EGR3 early growth response 3	Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	circadian rhythm	TAS
		Biological process	muscle organ development	TAS
		Biological process	transcription, DNA-dependent	TAS
EHMT1	EHMT1 euchromatic histonelysine Nmethyltransferase 1	Function	histone-lysine N-methyltransferase activity	IDA
		Function	methyltransferase activity	IDA
		Function	protein-lysine N-methyltransferase activity	IDA
		Function	p53 binding	IPI
		Biological process	chromatin modification	IDA
		Biological process	histone lysine methylation	IDA
		Biological process	histone methylation	IDA
		Biological process	peptidyl-lysine dimethylation	IDA
EID1	EID1 EP300 interacting inhibitor of differentiation 1	Component	nucleus	IPI
		Function	histone acetyltransferase binding	IDA
		Function	histone acetyltransferase regulator activity	IDA
		Function	protein binding	IPI
		Biological process	cell differentiation	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	regulation of histone acetylation	IDA
EIF1AX	EIF1AX eukaryotic translation initiation factor 1A, Xlinked	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Function	translation factor activity, nucleic acid binding	TAS

		Biological process	cellular protein metabolic process	TAS
		Biological process	gene expression	TAS
		Biological process	translation	TAS
		Biological process	translational initiation	TAS
EIF2C1	EIF2C1 eukaryotic translation initiation factor 2C, 1	Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	negative regulation of translation involved in gene silencing by miRNA	IDA
		Biological process	nuclear-transcribed mRNA catabolic process	IDA
EIF2S2	EIF2S2 eukaryotic translation initiation factor 2, subunit 2 beta, 38kDa	Component	cytosol	TAS
		Component	eukaryotic translation initiation factor 2 complex	TAS
		Function	translation initiation factor activity	IDA
		Function	protein binding	IPI
		Function	RNA binding	TAS
		Function	translation factor activity, nucleic acid binding	TAS
		Biological process	translational initiation	IDA
		Biological process	cellular protein metabolic process	TAS
		Biological process	gene expression	TAS
		Biological process	translation	TAS
EIF4EBP1	EIF4EBP1 eukaryotic translation initiation factor 4E binding protein 1	Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	TOR signaling cascade	IDA
		Biological process	G1/S transition of mitotic cell cycle	IMP
		Biological process	positive regulation of mitotic cell cycle	IMP
		Biological process	cellular protein metabolic process	TAS
		Biological process	gene expression	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	translation	TAS
EIF4G2	EIF4G2 eukaryotic translation initiation factor 4 gamma, 2	Component	eukaryotic translation initiation factor 4F complex	IDA
		Function	translation factor activity, nucleic acid binding	IDA
		Function	translation initiation factor activity	IDA
		Function	protein binding	IPI

		Biological process	regulation of translational initiation	IDA
		Biological process	translation	IDA
		Biological process	translational initiation	IDA
		Biological process	cell cycle arrest	TAS
		Biological process	cell death	TAS
		Biological process	translation	TAS
EIF5	EIF5 eukaryotic translation initiation factor 5	Component	cytoplasm	TAS
		Component	cytosol	TAS
		Function	GTPase activity	TAS
		Function	translation factor activity, nucleic acid binding	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	gene expression	TAS
		Biological process	GTP catabolic process	TAS
		Biological process	regulation of translational initiation	TAS
		Biological process	translation	TAS
ELAVL1	ELAVL1 ELAV (embryonic lethal, abnormal vision, Drosophila)like 1 (Hu antigen R)	Component	cytoplasm	IDA
		Component	nucleoplasm	TAS
		Function	identical protein binding	IPI
		Function	mRNA binding	TAS
		Biological process	3'-UTR-mediated mRNA stabilization	IMP
		Biological process	mRNA stabilization	IMP
		Biological process	mRNA metabolic process	TAS
		Biological process	multicellular organismal development	TAS
		Biological process	RNA metabolic process	TAS
ELAVL2	ELAVL2 ELAV (embryonic lethal, abnormal vision, Drosophila)like 2 (Hu antigen B)	Function	protein binding	IPI
		Function	mRNA 3'-UTR binding	TAS
		Biological process	regulation of transcription, DNA-dependent	TAS
ELAVL4	ELAVL4 ELAV (embryonic lethal, abnormal vision, Drosophila)like 4 (Hu antigen D)	Function	AU-rich element binding	IDA
		Function	RNA binding	TAS
		Function	mRNA 3'-UTR binding	TAS
		Biological process	mRNA processing	TAS
		Biological process	RNA processing	TAS

ELK1	ELK1 ELK1, member of ETS oncogene family	Component	nucleus	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	innate immune response	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
ELK3	ELK3 ELK3, ETSdomain protein (SRF accessory protein 2)	Component	intracellular membrane-bounded organelle	IDA
		Component	mitochondrion	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	purine-rich negative regulatory element binding	IDA
		Function	transcription corepressor activity	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	signal transduction	TAS
ELK4	ELK4 ELK4, ETSdomain protein (SRF accessory protein 1)	Component	cytoplasm	IDA

		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	DNA binding	TAS
		Function	transcription cofactor activity	TAS
ELOVL2	ELOVL2 elongation of very long chain fatty acids (FEN1/Elo2, SUR4/Elo3, yeast)like 2	Component	endoplasmic reticulum	IDA
		Function	fatty acid elongase activity	IDA
		Function	protein binding	IPI
		Biological process	fatty acid elongation, polyunsaturated fatty acid	IDA
		Biological process	very long-chain fatty acid biosynthetic process	IDA
		Biological process	cellular lipid metabolic process	TAS
		Biological process	long-chain fatty-acyl-CoA biosynthetic process	TAS
ELOVL6	ELOVL6 ELOVL family member 6, elongation of long chain fatty acids (FEN1/Elo2, SUR4/Elo3like, yeast)	Component	endoplasmic reticulum	IDA
		Component	endoplasmic reticulum membrane	TAS
		Function	protein binding	IPI
		Function	fatty acid elongase activity	TAS
		Biological process	fatty acid elongation, saturated fatty acid	IDA
		Biological process	long-chain fatty acid biosynthetic process	IDA
		Biological process	cellular lipid metabolic process	TAS
		Biological process	long-chain fatty-acyl-CoA biosynthetic process	TAS
EML4	EML4 echinoderm microtubule associated protein like 4	Function	protein binding	IPI
ENAH	ENAH enabled homolog (Drosophila)	Function	WW domain binding	IPI
		Biological process	axon guidance	TAS
		Biological process	T cell receptor signaling pathway	TAS
ENOX2	ENOX2 ectoNOX disulfidethiol exchanger 2	Component	external side of plasma membrane	IDA
		Component	cytosol	TAS
		Function	protein disulfide oxidoreductase activity	IDA
		Biological process	oxidation-reduction process	IDA
		Biological process	ultradian rhythm	IDA
ENPEP	ENPEP glutamyl aminopeptidase (aminopeptidase A)	Component	integral to plasma membrane	TAS
		Function	aminopeptidase activity	TAS
		Function	metalloexopeptidase activity	TAS
		Biological process	cell migration	IDA
		Biological process	cell proliferation	IDA

		Biological process	cell-cell signaling	TAS
ENSA	ENSA endosulfine alpha	Function	protein binding	IPI
		Function	ion channel inhibitor activity	TAS
		Function	receptor binding	TAS
		Biological process	response to nutrient	TAS
		Biological process	transport	TAS
ENTPD1	ENTPD1 ectonucleoside triphosphate diphosphohydrolase 1	Component	integral to plasma membrane	TAS
		Biological process	blood coagulation	TAS
EPB41L1	EPB41L1 erythrocyte membrane protein band 4.1like 1	Biological process	synaptic transmission	TAS
EPB49	EPB49 erythrocyte membrane protein band 4.9 (dematin)	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	actin cytoskeleton	TAS
		Biological process	actin filament bundle assembly	TAS
		Biological process	cytoskeleton organization	TAS
EPHA3	EPHA3 EPH receptor A3	Function	transmembrane receptor protein tyrosine kinase activity	TAS
		Biological process	signal transduction	TAS
EPHA4	EPHA4 EPH receptor A4	Function	transmembrane receptor protein tyrosine kinase activity	TAS
		Biological process	signal transduction	TAS
EPHA7	EPHA7 EPH receptor A7	Function	transmembrane receptor protein tyrosine kinase activity	TAS
EPHB2	EPHB2 EPH receptor B2	Component	integral to membrane	TAS
		Function	transmembrane-ephrin receptor activity	TAS
		Biological process	axon guidance	TAS
		Biological process	nervous system development	TAS
		Biological process	protein phosphorylation	TAS
EPM2A	EPM2A epilepsy, progressive myoclonus type 2A, Lafora disease (laforin)	Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	polysome	IDA
		Function	protein serine/threonine phosphatase activity	IDA
		Function	protein tyrosine phosphatase activity	IDA

		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	protein serine/threonine phosphatase activity	TAS
		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	protein dephosphorylation	IDA
EPS15	EPS15 epidermal growth factor receptor pathway substrate 15	Component	cytoplasm	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	plasma membrane	IDA
		Component	coated pit	TAS
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	clathrin coat assembly	IDA
		Biological process	cell proliferation	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	TAS
		Biological process	vesicle organization	TAS
EPS8	EPS8 epidermal growth factor receptor pathway substrate 8	Function	protein binding	IPI
		Function	SH3/SH2 adaptor activity	TAS
		Biological process	cell proliferation	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	signal transduction	TAS
ERAP1	ERAP1 endoplasmic reticulum aminopeptidase 1	Component	extracellular region	IDA
		Component	endoplasmic reticulum lumen	TAS
		Function	aminopeptidase activity	IDA
		Function	metalloexopeptidase activity	IDA
		Function	interleukin-6 receptor binding	IPI
		Function	protein binding	IPI
		Function	interleukin-1, Type II receptor binding	TAS
		Biological process	membrane protein ectodomain proteolysis	IDA
		Biological process	response to bacterium	IEP

		Biological process	angiogenesis	TAS
		Biological process	antigen processing and presentation of endogenous peptide antigen via MHC class I	TAS
		Biological process	regulation of blood pressure	TAS
ERBB4	ERBB4 verba erythroblastic leukemia viral oncogene homolog 4 (avian)	Component	basolateral plasma membrane	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	signal transduction	IDA
		Biological process	cell proliferation	TAS
ERC2	ERC2 ELKS/RAB6interacting/CAST family member 2	Function	protein binding	IPI
ERF	ERF Ets2 repressor factor	Function	ligand-regulated transcription factor activity	TAS
		Function	transcription corepressor activity	TAS
		Biological process	cell proliferation	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
ERLIN2	ERLIN2 ER lipid raft associated 2	Component	cytoplasm	IDA
		Component	endoplasmic reticulum	IDA
		Component	endoplasmic reticulum membrane	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
		Biological process	ER-associated protein catabolic process	IDA
ERRFI1	ERRFI1 ERBB receptor feedback inhibitor 1	Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Function	Rho GTPase activator activity	TAS
		Biological process	negative regulation of epidermal growth factor receptor activity	IDA
		Biological process	negative regulation of protein autophosphorylation	IDA
		Biological process	positive regulation of Rho GTPase activity	TAS
		Biological process	response to stress	TAS
ESRRG	ESRRG estrogenrelated receptor gamma	Component	nucleoplasm	TAS
		Biological process	gene expression	TAS
		Biological process	regulation of transcription from RNA polymerase	TAS

			II promoter by nuclear hormone receptor	
ETNK1	ETNK1 ethanolamine kinase 1	Function	ethanolamine kinase activity	IDA
		Biological process	phosphatidylethanolamine biosynthetic process	IDA
ETS1	ETS1 vets erythroblastosis virus E26 oncogene homolog 1 (avian)	Component	nucleus	IDA
		Component	nucleus	IMP
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Biological process	induction of apoptosis	IDA
		Biological process	negative regulation of cell cycle	IDA
		Biological process	PML body organization	IDA
		Biological process	positive regulation of erythrocyte differentiation	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	response to antibiotic	IDA
		Biological process	transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	cell motility	IMP
		Biological process	negative regulation of cell cycle	IMP
		Biological process	positive regulation of cellular component movement	IMP
		Biological process	immune response	TAS
		Biological process	negative regulation of cell proliferation	TAS
ETS2	ETS2 vets erythroblastosis virus E26 oncogene homolog 2 (avian)	Component	nucleus	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA

		Biological process	skeletal system development	TAS
ETV6	ETV6 ets variant 6	Component	cytoplasm	IDA
		Component	nucleolus	IDA
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Biological process	transcription, DNA-dependent	TAS
EXOC5	EXOC5 exocyst complex component 5	Biological process	post-Golgi vesicle-mediated transport	TAS
EXT2	EXT2 exostosin 2	Component	endoplasmic reticulum membrane	TAS
		Function	contributes_to acetylglucosaminyltransferase activity	IDA
		Function	glucuronosyltransferase activity	IDA
		Function	NOT protein homodimerization activity	IDA
		Function	transferase activity, transferring glycosyl groups	IDA
		Function	protein binding	IPI
		Function	protein heterodimerization activity	IPI
		Biological process	cellular polysaccharide biosynthetic process	IDA
		Biological process	glycosaminoglycan biosynthetic process	IDA
		Biological process	heparan sulfate proteoglycan biosynthetic process	IMP
		Biological process	heparan sulfate proteoglycan biosynthetic process, polysaccharide chain biosynthetic process	IMP
		Biological process	ossification	IMP
		Biological process	signal transduction	TAS
EZR	EZR ezrin	Component	actin cytoskeleton	IDA
		Component	actin filament	IDA
		Component	apical part of cell	IDA
		Component	cytosol	IDA
		Component	extrinsic to membrane	IDA
		Component	filopodium	IDA
		Component	colocalizes_with focal adhesion	IDA
		Component	microvillus	IDA
		Component	nucleolus	IDA
		Component	plasma membrane	IDA
		Component	ruffle	IDA
		Component	cortical cytoskeleton	TAS
		Component	cytosol	TAS

		Function	actin filament binding	IDA
		Function	cell adhesion molecule binding	IPI
		Function	protein binding	IPI
		Biological process	actin filament bundle assembly	IDA
		Biological process	leukocyte cell-cell adhesion	IEP
		Biological process	membrane to membrane docking	IEP
		Biological process	axon guidance	TAS
F3	F3 coagulation factor III (thromboplastin, tissue factor)	Component	extracellular matrix	IDA
		Component	extracellular space	IDA
		Component	plasma membrane	TAS
		Function	cell surface binding	IDA
		Function	phospholipid binding	IDA
		Function	protease binding	IPI
		Biological process	activation of caspase activity	IDA
		Biological process	activation of plasma proteins involved in acute inflammatory response	IDA
		Biological process	positive regulation of angiogenesis	IDA
		Biological process	positive regulation of endothelial cell proliferation	IDA
		Biological process	positive regulation of platelet-derived growth factor receptor signaling pathway	IDA
		Biological process	positive regulation of protein kinase B signaling cascade	IMP
		Biological process	anti-apoptosis	TAS
		Biological process	blood coagulation	TAS
		Biological process	positive regulation of cell migration	TAS
FAM120A	FAM120A family with sequence similarity 120A	Component	cytoplasm	IDA
FAM160A2	FAM160A2 family with sequence similarity 160, member A2	Component	FHF complex	IDA
		Function	protein binding	IPI
		Biological process	early endosome to late endosome transport	IMP
		Biological process	endosome organization	IMP
		Biological process	endosome to lysosome transport	IMP
		Biological process	lysosome organization	IMP
FAM176A	FAM176A family with sequence similarity 176, member A	Component	intracellular membrane-bounded organelle	IDA

		Component	plasma membrane	IDA
FAM58A	FAM58A family with sequence similarity 58, member A	Function	protein binding	IPI
FAM82A2	FAM82A2 family with sequence similarity 82, member A2	Component	mitochondrion	IDA
		Function	protein binding	IPI
FAM84B	FAM84B family with sequence similarity 84, member B	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
FAT2	FAT2 FAT tumor suppressor homolog 2 (Drosophila)	Component	cell-cell adherens junction	IDA
		Biological process	epithelial cell migration	IMP
FBN1	FBN1 fibrillin 1	Component	basement membrane	IDA
		Component	colocalizes_with extracellular matrix	IDA
		Component	extracellular space	IDA
		Component	microfibril	IDA
		Component	proteinaceous extracellular matrix	IDA
		Function	calcium ion binding	IDA
		Function	extracellular matrix structural constituent	IDA
		Function	protein binding	IPI
		Biological process	heart development	IMP
		Biological process	skeletal system development	IMP
FBN2	FBN2 fibrillin 2	Component	microfibril	TAS
		Biological process	anatomical structure morphogenesis	TAS
FBXL7	FBXL7 Fbox and leucinerich repeat protein 7	Function	protein binding	IPI
FBXO40	FBXO40 Fbox protein 40	Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
FBXO6	FBXO6 Fbox protein 6	Component	SCF ubiquitin ligase complex	IDA
		Component	cytoplasm	IDA
		Function	protein binding	IPI
		Biological process	SCF-dependent proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	DNA damage checkpoint	TAS

		Biological process	DNA repair	TAS
		Biological process	proteolysis	TAS
FBXW11	FBXW11 Fbox and WD repeat domain containing 11	Component	SCF ubiquitin ligase complex	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	protein ubiquitination	IDA
		Biological process	SCF-dependent proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IMP
		Biological process	positive regulation of proteolysis	IMP
		Biological process	protein destabilization	IMP
FBXW2	FBXW2 Fbox and WD repeat domain containing 2	Function	protein binding	IPI
		Function	ubiquitin-protein ligase activity	TAS
		Biological process	protein modification process	TAS
		Biological process	protein ubiquitination	TAS
		Biological process	proteolysis	TAS
FBXW7	FBXW7 Fbox and WD repeat domain containing 7	Component	SCF ubiquitin ligase complex	IDA
		Component	nucleolus	IDA
		Component	nucleoplasm	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of epidermal growth factor receptor activity	IDA
		Biological process	positive regulation of protein ubiquitination involved in ubiquitin-dependent protein catabolic process	IDA
		Biological process	protein stabilization	IDA
		Biological process	protein ubiquitination	IDA
		Biological process	SCF-dependent proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	negative regulation of DNA endoreduplication	IMP
		Biological process	positive regulation of ERK1 and ERK2 cascade	IMP

		Biological process	sister chromatid cohesion	IMP
		Biological process	vasculature development	TAS
FCHSD2	FCHSD2 FCH and double SH3 domains 2	Function	protein binding	IPI
		Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Function	guanyl-nucleotide exchange factor activity	IDA
		Function	small GTPase binding	IDA
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	actin cytoskeleton organization	IDA
		Biological process	filopodium assembly	IDA
		Biological process	regulation of Cdc42 GTPase activity	IDA
		Biological process	multicellular organismal development	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	organ morphogenesis	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
FGF13	FGF13 fibroblast growth factor 13	Component	nucleus	IDA
		Component	cytoplasm	IPI
		Function	protein kinase activator activity	IGI
		Function	protein binding	IPI
		Biological process	MAPKKK cascade	IDA
		Biological process	positive regulation of protein phosphorylation	IGI
		Biological process	cell-cell signaling	TAS
		Biological process	nervous system development	TAS
		Biological process	signal transduction	TAS
FGF7	FGF7 fibroblast growth factor 7	Component	extracellular region	TAS
		Function	chemoattractant activity	IDA
		Biological process	actin cytoskeleton reorganization	IDA
		Biological process	mesenchymal cell proliferation	IDA
		Biological process	positive chemotaxis	IDA
		Biological process	positive regulation of epithelial cell proliferation	IDA

		Biological process	positive regulation of epithelial cell proliferation involved in lung morphogenesis	IDA
		Biological process	positive regulation of keratinocyte migration	IDA
		Biological process	positive regulation of keratinocyte proliferation	IDA
		Biological process	positive regulation of peptidyl-tyrosine phosphorylation	IDA
		Biological process	protein localization at cell surface	IDA
		Biological process	secretion by lung epithelial cell involved in lung growth	IDA
		Biological process	fibroblast growth factor receptor signaling pathway	IGI
		Biological process	positive regulation of cell proliferation	IGI
		Biological process	epidermis development	TAS
		Biological process	fibroblast growth factor receptor signaling pathway	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	response to wounding	TAS
FKBP4	FKBP4 FK506 binding protein 4, 59kDa	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	heat shock protein binding	IPI
		Function	protein binding	IPI
		Function	FK506 binding	TAS
		Function	protein binding, bridging	TAS
FKBP5	FKBP5 FK506 binding protein 5	Function	heat shock protein binding	IPI
		Function	protein binding	IPI
FMR1	FMR1 fragile X mental retardation 1	Component	cytoplasm	TAS
		Component	nucleolus	TAS
		Component	nucleoplasm	TAS
		Component	colocalizes_with polysomal ribosome	TAS
		Component	soluble fraction	TAS
		Function	protein binding	IPI
		Function	RNA binding	TAS
		Function	mRNA binding	TAS
FN1	FN1 fibronectin 1	Component	ER-Golgi intermediate compartment	IDA
		Component	extracellular matrix	IDA
		Component	colocalizes_with extracellular matrix	IDA

		Component	extracellular space	IDA
		Component	fibrinogen complex	IDA
		Component	extracellular region	TAS
		Component	platelet alpha granule lumen	TAS
		Function	protein binding	IPI
		Biological process	peptide cross-linking	IDA
		Biological process	substrate adhesion-dependent cell spreading	IDA
		Biological process	blood coagulation	TAS
		Biological process	leukocyte migration	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
FNDC3A	FNDC3A fibronectin type III domain containing 3A	Component	Golgi apparatus	IDA
FNDC3B	FNDC3B fibronectin type III domain containing 3B	Component	endoplasmic reticulum	IDA
FNIP1	FNIP1 folliculin interacting protein 1	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Biological process	regulation of protein phosphorylation	IDA
FOXC1	FOXC1 forkhead box C1	Component	nuclear heterochromatin	IDA
		Component	nucleus	IDA
		Function	DNA bending activity	IDA
		Function	DNA binding	IDA
		Function	sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	eye development	IDA
		Biological process	heart development	IDA
		Biological process	negative regulation of mitotic cell cycle	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	odontogenesis of dentine-containing tooth	IMP
FOXF1	FOXF1 forkhead box F1	Function	DNA binding	IDA
		Biological process	positive regulation of transcription, DNA-	IDA

			dependent	
		Biological process	blood vessel development	IMP
		Biological process	branching involved in open tracheal system development	IMP
		Biological process	cardiac left ventricle morphogenesis	IMP
		Biological process	digestive tract development	IMP
		Biological process	embryonic digestive tract morphogenesis	IMP
		Biological process	embryonic ectodermal digestive tract morphogenesis	IMP
		Biological process	endocardial cushion development	IMP
		Biological process	heart development	IMP
		Biological process	in utero embryonic development	IMP
		Biological process	lung development	IMP
		Biological process	lung vasculature development	IMP
		Biological process	midgut development	IMP
		Biological process	pancreas development	IMP
		Biological process	renal system development	IMP
		Biological process	ureter development	IMP
		Biological process	venous blood vessel development	IMP
FO XK2	FO XK2 forkhead box K2	Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	magnesium ion binding	IDA
		Function	sequence-specific DNA binding	IDA
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
FO XL2	FO XL2 forkhead box L2	Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	caspase regulator activity	IMP
		Function	protein binding	IPI
		Function	ubiquitin conjugating enzyme binding	IPI
		Function	DNA binding	TAS
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	DNA fragmentation involved in apoptotic nuclear	IMP

			change	
		Biological process	extraocular skeletal muscle development	IMP
		Biological process	menstruation	IMP
		Biological process	ovarian follicle development	IMP
		Biological process	positive regulation of apoptosis	IMP
		Biological process	positive regulation of caspase activity	IMP
FOXM1	FOXM1 forkhead box M1	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	negative regulation of cell aging	IMP
		Biological process	negative regulation of stress-activated MAPK cascade	IMP
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	positive regulation of cell proliferation	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	regulation of cell cycle arrest	IMP
		Biological process	regulation of Ras protein signal transduction	IMP
		Biological process	regulation of reactive oxygen species metabolic process	IMP
		Biological process	cell cycle	TAS
		Biological process	regulation of cell growth	TAS
		Biological process	transcription, DNA-dependent	TAS
FOXN2	FOXN2 forkhead box N2	Component	intracellular membrane-bounded organelle	IDA
		Component	nucleus	IDA

		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription, DNA-dependent	TAS
FOXN3	FOXN3 forkhead box N3	Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	DNA damage checkpoint	TAS
		Biological process	G2 phase of mitotic cell cycle	TAS
FOXO1	FOXO1 forkhead box O1	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	sequence-specific DNA binding	IDA
		Function	protein binding	IPI
		Biological process	anti-apoptosis	IDA
		Biological process	negative regulation of stress-activated MAPK cascade	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	endocrine pancreas development	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	phosphatidylinositol-mediated signaling	TAS
FOXO3	FOXO3 forkhead box O3	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	apoptosis	IDA
		Biological process	positive regulation of erythrocyte differentiation	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA

		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	phosphatidylinositol-mediated signaling	TAS
FOXO4	FOXO4 forkhead box O4	Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	cell cycle arrest	IDA
		Biological process	G1 phase of mitotic cell cycle	IDA
		Biological process	insulin receptor signaling pathway	IDA
		Biological process	negative regulation of angiogenesis	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of smooth muscle cell differentiation	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	phosphatidylinositol-mediated signaling	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
FOXP1	FOXP1 forkhead box P1	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
FOXP2	FOXP2 forkhead box P2	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	protein homodimerization activity	IDA
		Function	sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA

		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	cerebral cortex development	IEP
		Biological process	caudate nucleus development	IMP
		Biological process	putamen development	IMP
FRMD6	FRMD6 FERM domain containing 6	Component	mitochondrion	IDA
FRMPD4	FRMPD4 FERM and PDZ domain containing 4	Component	dendritic spine	IDA
		Function	phosphatidylinositol-4,5-bisphosphate binding	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of synapse structural plasticity	IMP
FRS2	FRS2 fibroblast growth factor receptor substrate 2	Component	endosome	TAS
		Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS
		Component	plasma membrane	TAS
		Function	fibroblast growth factor receptor binding	IPI
		Function	protein binding	IPI
		Function	phosphatase activator activity	TAS
		Function	transmembrane receptor protein tyrosine kinase adaptor activity	TAS
		Biological process	fibroblast growth factor receptor signaling pathway	IGI
		Biological process	activation of MAPKK activity	TAS
		Biological process	activation of phospholipase C activity	TAS
		Biological process	fibroblast growth factor receptor signaling pathway	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	transmembrane receptor protein tyrosine phosphatase signaling pathway	TAS
FTL	FTL ferritin, light polypeptide	Component	intracellular ferritin complex	IDA
		Function	iron ion binding	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	iron ion homeostasis	TAS

FUBP1	FUBP1 far upstream element (FUSE) binding protein 1	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Function	single-stranded DNA binding	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
FURIN	FURIN furin (paired basic amino acid cleaving enzyme)	Component	cell surface	IDA
		Component	NOT extracellular space	IDA
		Component	membrane raft	IDA
		Component	trans-Golgi network	IDA
		Component	trans-Golgi network transport vesicle	IDA
		Component	Golgi membrane	TAS
		Function	endopeptidase activity	IDA
		Function	nerve growth factor binding	IDA
		Function	peptidase activity	IDA
		Function	peptide binding	IDA
		Function	serine-type endopeptidase activity	IDA
		Function	serine-type endopeptidase inhibitor activity	IDA
		Function	protease binding	IPI
		Function	protein binding	IPI
		Function	serine-type endopeptidase activity	TAS
		Biological process	negative regulation of low-density lipoprotein particle receptor catabolic process	IDA
		Biological process	nerve growth factor production	IDA
		Biological process	NOT negative regulation of nerve growth factor production	IDA
		Biological process	peptide biosynthetic process	IDA
		Biological process	peptide hormone processing	IDA
		Biological process	protein maturation by peptide bond cleavage	IDA
		Biological process	regulation of endopeptidase activity	IDA
		Biological process	secretion by cell	IDA
		Biological process	signal peptide processing	IDA
		Biological process	viral assembly, maturation, egress, and release	IEP
		Biological process	cell proliferation	IMP

		Biological process	negative regulation of transforming growth factor-beta1 production	IMP
		Biological process	protein maturation by peptide bond cleavage	IMP
		Biological process	regulation of protein catabolic process	IMP
		Biological process	cellular protein metabolic process	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	Notch signaling pathway	TAS
		Biological process	peptidyl-glutamic acid carboxylation	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	proteolysis	TAS
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
FXN	FXN frataxin	Component	cytosol	IDA
		Component	mitochondrion	IDA
		Function	2 iron, 2 sulfur cluster binding	IDA
		Function	ferric iron binding	IDA
		Function	ferrous iron binding	IDA
		Function	ferroxidase activity	IDA
		Function	iron chaperone activity	IDA
		Function	iron-sulfur cluster binding	IDA
		Function	protein binding	IPI
		Biological process	cellular response to hydrogen peroxide	IDA
		Biological process	iron incorporation into metallo-sulfur cluster	IDA
		Biological process	positive regulation of lyase activity	IDA
		Biological process	protein autoprocessing	IDA
		Biological process	regulation of ferroxidase activity	IDA
		Biological process	cellular iron ion homeostasis	IMP
		Biological process	negative regulation of apoptosis	IMP
		Biological process	negative regulation of release of cytochrome c from mitochondria	IMP
		Biological process	positive regulation of cell growth	IMP
		Biological process	positive regulation of cell proliferation	IMP
		Biological process	positive regulation of lyase activity	IMP
		Biological process	positive regulation of metalloenzyme activity	IMP
		Biological process	positive regulation of oxidoreductase activity	IMP

		Biological process	positive regulation of transferase activity	IMP
		Biological process	response to iron ion	IMP
FXR1	FXR1 fragile X mental retardation, autosomal homolog 1	Component	cytoplasm	IDA
		Component	nucleolus	TAS
		Function	RNA binding	TAS
		Biological process	apoptosis	TAS
FXR2	FXR2 fragile X mental retardation, autosomal homolog 2	Component	cytoplasm	IDA
		Component	cytosolic large ribosomal subunit	TAS
		Function	protein binding	IPI
FYB	FYB FYN binding protein	Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	cell junction assembly	TAS
		Biological process	immune response	TAS
		Biological process	intracellular protein kinase cascade	TAS
		Biological process	NLS-bearing substrate import into nucleus	TAS
		Biological process	protein phosphorylation	TAS
		Biological process	signal transduction	TAS
		Biological process	T cell receptor signaling pathway	TAS
FYCO1	FYCO1 FYVE and coiledcoil domain containing 1	Function	protein binding	IPI
FZD5	FZD5 frizzled family receptor 5	Component	cell surface	IDA
		Component	plasma membrane	TAS
		Function	Wnt-protein binding	IPI
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	anterior/posterior axis specification, embryo	IDA
		Biological process	canonical Wnt receptor signaling pathway	IDA
		Biological process	cellular response to molecule of bacterial origin	IDA
		Biological process	embryonic axis specification	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	Spemann organizer formation	IDA
		Biological process	Wnt receptor signaling pathway involved in	IDA

			dorsal/ventral axis specification	
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IGI
		Biological process	canonical Wnt receptor signaling pathway	IMP
		Biological process	positive regulation of interferon-gamma production	IMP
FZD6	FZD6 frizzled family receptor 6	Component	plasma membrane	IDA
		Function	Wnt receptor activity	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of sequence-specific DNA binding transcription factor activity	IDA
		Biological process	non-canonical Wnt receptor signaling pathway	IDA
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IMP
FZD7	FZD7 frizzled family receptor 7	Component	plasma membrane	IDA
		Component	integral to membrane	TAS
		Function	PDZ domain binding	IPI
		Function	Wnt-protein binding	IPI
		Function	protein binding	IPI
		Biological process	canonical Wnt receptor signaling pathway	IDA
		Biological process	positive regulation of phosphorylation	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	canonical Wnt receptor signaling pathway	IMP
		Biological process	mesenchymal to epithelial transition	IMP
		Biological process	negative regulation of cell-substrate adhesion	IMP
		Biological process	negative regulation of ectodermal cell fate specification	IMP
		Biological process	non-canonical Wnt receptor signaling pathway	IMP
		Biological process	positive regulation of epithelial cell proliferation involved in wound healing	IMP
		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	regulation of catenin import into nucleus	IMP
		Biological process	regulation of transcription, DNA-dependent	IMP
		Biological process	stem cell maintenance	IMP

FZD8	FZD8 frizzled family receptor 8	Component	integral to membrane	TAS
		Function	PDZ domain binding	IPI
		Function	Wnt receptor activity	TAS
G3BP2	G3BP2 GTPase activating protein (SH3 domain) binding protein 2	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Function	GTPase activator activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
GAB2	GAB2 GRB2associated binding protein 2	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Function	transmembrane receptor protein tyrosine kinase adaptor activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	transmembrane receptor protein tyrosine kinase signaling pathway	IDA
		Biological process	osteoclast differentiation	IMP
GABBR2	GABBR2 gammaaminobutyric acid (GABA) B receptor, 2	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	negative regulation of adenylate cyclase activity	TAS
		Biological process	synaptic transmission	TAS
GABPA	GABPA GA binding protein transcription factor, alpha subunit 60kDa	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein heterodimerization activity	IDA
		Function	transcription regulatory region DNA binding	IDA
		Function	protein binding	IPI

		Function	DNA binding	TAS
		Function	transcription coactivator activity	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
GABRA3	GABRA3 gammaaminobutyric acid (GABA) A receptor, alpha 3	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	benzodiazepine receptor activity	TAS
		Biological process	ion transmembrane transport	TAS
		Biological process	synaptic transmission	TAS
		Biological process	transmembrane transport	TAS
		Biological process	transport	TAS
GABRA4	GABRA4 gammaaminobutyric acid (GABA) A receptor, alpha 4	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	benzodiazepine receptor activity	TAS
		Biological process	ion transmembrane transport	TAS
		Biological process	synaptic transmission	TAS
		Biological process	transmembrane transport	TAS
		Biological process	transport	TAS
GABRB2	GABRB2 gammaaminobutyric acid (GABA) A receptor, beta 2	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Biological process	gamma-aminobutyric acid signaling pathway	TAS
		Biological process	ion transmembrane transport	TAS
		Biological process	synaptic transmission	TAS
		Biological process	transmembrane transport	TAS
		Biological process	transport	TAS
GALNT2	GALNT2 UDPNacetylalphaDgalactosamine:polypeptide Nacetylgalactosaminyltransferase 2 (GalNAcT2)	Component	Golgi apparatus	IDA
		Component	colocalizes_with Golgi apparatus	IDA
		Component	Golgi stack	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	manganese ion binding	IDA

		Function	polypeptide N-acetylgalactosaminyltransferase activity	IDA
		Biological process	immunoglobulin biosynthetic process	IDA
		Biological process	protein O-linked glycosylation via serine	IDA
		Biological process	protein O-linked glycosylation via threonine	IDA
GAN	GAN gigaxonin	Function	protein binding	IPI
GATA4	GATA4 GATA binding protein 4	Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	contributes_to sequence-specific DNA binding transcription factor activity	IDA
		Function	transcription regulatory region DNA binding	IDA
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	intestinal epithelial cell differentiation	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	male gonad development	IEP
		Biological process	atrial septum morphogenesis	IMP
		Biological process	atrial septum secundum morphogenesis	IMP
		Biological process	response to drug	IMP
		Biological process	blood coagulation	TAS
		Biological process	cardiac ventricle morphogenesis	TAS
		Biological process	endoderm development	TAS
GATA6	GATA6 GATA binding protein 6	Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	transcription regulatory region DNA binding	IDA
		Function	sequence-specific DNA binding RNA polymerase II transcription factor activity	IMP
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Function	transcription factor binding	IPI
		Biological process	cellular response to hypoxia	IDA
		Biological process	intestinal epithelial cell differentiation	IDA
		Biological process	negative regulation of transcription from RNA	IDA

			polymerase II promoter	
		Biological process	positive regulation of angiogenesis	IDA
		Biological process	positive regulation of cell cycle arrest	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	response to growth factor stimulus	IDA
		Biological process	transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	male gonad development	IEP
		Biological process	cardiac vascular smooth muscle cell differentiation	IMP
		Biological process	negative regulation of apoptosis	IMP
		Biological process	negative regulation of transforming growth factor-beta1 production	IMP
		Biological process	negative regulation of transforming growth factor-beta2 production	IMP
		Biological process	outflow tract septum morphogenesis	IMP
		Biological process	response to drug	IMP
		Biological process	smooth muscle cell differentiation	IMP
		Biological process	transcription from RNA polymerase II promoter	IMP
		Biological process	blood coagulation	TAS
GATAD2B	GATAD2B GATA zinc finger domain containing 2B	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
GBF1	GBF1 golgi brefeldin A resistant guanine nucleotide exchange factor 1	Component	Golgi membrane	TAS
		Function	protein binding	IPI
		Function	ARF guanyl-nucleotide exchange factor activity	TAS
GCC2	GCC2 GRIP and coiledcoil domain containing 2	Component	Golgi apparatus	IDA
		Component	trans-Golgi network	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	Golgi ribbon formation	IMP
		Biological process	late endosome to Golgi transport	IMP
		Biological process	microtubule anchoring	IMP
		Biological process	microtubule organizing center organization	IMP

		Biological process	NOT Golgi to plasma membrane protein transport	IMP
		Biological process	protein localization in Golgi apparatus	IMP
		Biological process	protein targeting to lysosome	IMP
		Biological process	recycling endosome to Golgi transport	IMP
		Biological process	regulation of protein exit from endoplasmic reticulum	IMP
		Biological process	retrograde transport, endosome to Golgi	IMP
GCH1	GCH1 GTP cyclohydrolase 1	Component	cytoplasm	IDA
		Component	cytoplasmic vesicle	IDA
		Component	cytosol	IDA
		Component	nuclear membrane	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	protein complex	IDA
		Function	GTP binding	IDA
		Function	GTP cyclohydrolase I activity	IDA
		Function	NOT GTP cyclohydrolase I activity	IDA
		Function	zinc ion binding	IDA
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	dopamine biosynthetic process	IDA
		Biological process	GTP catabolic process	IDA
		Biological process	positive regulation of nitric-oxide synthase activity	IDA
		Biological process	protein homooligomerization	IDA
		Biological process	pteridine-containing compound biosynthetic process	IDA
		Biological process	response to interferon-gamma	IDA
		Biological process	response to lipopolysaccharide	IDA
		Biological process	response to tumor necrosis factor	IDA
		Biological process	tetrahydrobiopterin biosynthetic process	IDA
		Biological process	NOT response to lipopolysaccharide	IEP
		Biological process	neuromuscular process controlling posture	IMP
		Biological process	positive regulation of nitric-oxide synthase activity	IMP
		Biological process	regulation of blood pressure	IMP
		Biological process	tetrahydrobiopterin biosynthetic process	IMP

GCLC	GCLC glutamatecysteine ligase, catalytic subunit	Component	cytosol	TAS
		Function	ADP binding	IDA
		Function	glutamate binding	IDA
		Function	glutamate-cysteine ligase activity	IDA
		Function	magnesium ion binding	IDA
		Function	glutamate-cysteine ligase activity	IMP
		Function	coenzyme binding	IPI
		Biological process	anti-apoptosis	IDA
		Biological process	cell redox homeostasis	IDA
		Biological process	cysteine metabolic process	IDA
		Biological process	glutamate metabolic process	IDA
		Biological process	glutathione biosynthetic process	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	response to heat	IDA
		Biological process	response to hormone stimulus	IDA
		Biological process	response to oxidative stress	IDA
		Biological process	glutathione biosynthetic process	IMP
		Biological process	regulation of blood vessel size	IMP
		Biological process	glutathione biosynthetic process	TAS
		Biological process	xenobiotic metabolic process	TAS
GCLM	GCLM glutamatecysteine ligase, modifier subunit	Component	soluble fraction	IDA
		Component	cytosol	TAS
		Function	contributes_to glutamate-cysteine ligase activity	IDA
		Function	contributes_to glutamate-cysteine ligase activity	IMP
		Function	glutamate-cysteine ligase catalytic subunit binding	IPI
		Function	protein binding	IPI
		Biological process	glutamate metabolic process	IDA
		Biological process	glutathione biosynthetic process	IDA
		Biological process	response to drug	IDA
		Biological process	response to oxidative stress	IDA
		Biological process	glutathione biosynthetic process	IMP
		Biological process	regulation of blood vessel size	IMP
		Biological process	glutathione biosynthetic process	TAS
		Biological process	xenobiotic metabolic process	TAS

GCNT2	GCNT2 glucosaminyl (Nacetyl) transferase 2, Ibranching enzyme (I blood group)	Component	membrane fraction	TAS
		Biological process	glycosaminoglycan biosynthetic process	TAS
		Biological process	multicellular organismal development	TAS
GDF6	GDF6 growth differentiation factor 6	Biological process	activin receptor signaling pathway	IDA
		Biological process	BMP signaling pathway	IDA
		Biological process	pathway-restricted SMAD protein phosphorylation	IDA
		Biological process	positive regulation of pathway-restricted SMAD protein phosphorylation	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
GDI1	GDI1 GDP dissociation inhibitor 1	Component	cytoplasm	IDA
		Component	midbody	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Function	GDP-dissociation inhibitor activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
GEM	GEM GTP binding protein overexpressed in skeletal muscle	Component	internal side of plasma membrane	IDA
		Function	GDP binding	IDA
		Function	GTP binding	IDA
		Function	GTPase activity	IDA
		Function	magnesium ion binding	IDA
		Function	protein binding	IPI
		Biological process	GTP catabolic process	IDA
		Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	immune response	TAS
		Biological process	signal transduction	TAS
GEMIN8	GEMIN8 gem (nuclear organelle) associated protein 8	Component	SMN complex	IDA
		Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI

		Biological process	spliceosomal snRNP assembly	IDA
GGA2	GGA2 golgiassociated, gamma adaptin ear containing, ARF binding protein 2	Component	clathrin-coated vesicle	IDA
		Component	trans-Golgi network	IDA
		Function	ADP-ribosylation factor binding	IDA
		Function	protein binding	IPI
GGCX	GGCX gammaglutamyl carboxylase	Component	endoplasmic reticulum membrane	TAS
		Component	membrane fraction	TAS
		Function	gamma-glutamyl carboxylase activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	peptidyl-glutamic acid carboxylation	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein modification process	TAS
GIT1	GIT1 G proteincoupled receptor kinase interacting ArfGAP 1	Component	cytoplasm	IDA
		Component	focal adhesion	IDA
		Function	protein binding	IPI
		Biological process	regulation of G-protein coupled receptor protein signaling pathway	TAS
GJA1	GJA1 gap junction protein, alpha 1, 43kDa	Component	integral to plasma membrane	TAS
		Function	signal transducer activity	IMP
		Function	protein binding	IPI
		Function	ion transmembrane transporter activity	TAS
		Biological process	positive regulation of I-kappaB kinase/NF-kappaB cascade	IMP
		Biological process	signal transduction	IMP
		Biological process	gap junction assembly	TAS
		Biological process	ion transmembrane transport	TAS
		Biological process	muscle contraction	TAS
		Biological process	transport	TAS
GJC1	GJC1 gap junction protein, gamma 1, 45kDa	Component	gap junction	TAS
		Component	plasma membrane	TAS
		Biological process	cell-cell junction assembly	TAS
		Biological process	gap junction assembly	TAS

		Biological process	muscle contraction	TAS
		Biological process	synaptic transmission	TAS
GK	GK glycerol kinase	Biological process	cellular lipid metabolic process	TAS
GLCE	GLCE glucuronic acid epimerase	Function	UDP-glucuronate 5'-epimerase activity	IDA
GLI3	GLI3 GLI family zinc finger 3	Component	cilium	IDA
		Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	colocalizes_with mediator complex	IDA
		Component	nucleolus	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	histone deacetylase binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	beta-catenin binding	IPI
		Function	histone acetyltransferase binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	limb morphogenesis	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
GLP1R	GLP1R glucagonlike peptide 1 receptor	Component	plasma membrane	TAS
		Function	transmembrane receptor activity	TAS
		Biological process	cAMP-mediated signaling	IDA
		Biological process	elevation of cytosolic calcium ion concentration	IDA
		Biological process	activation of adenylate cyclase activity	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	regulation of insulin secretion	TAS

GLTSCR1	GLTSCR1 glioma tumor suppressor candidate region gene 1	Function	protein binding	IPI
GNAI2	GNAI2 guanine nucleotide binding protein (G protein), alpha inhibiting activity polypeptide 2	Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	midbody	IDA
		Component	plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	GTPase activity	TAS
		Biological process	cell division	IMP
		Biological process	blood coagulation	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	GTP catabolic process	TAS
		Biological process	negative regulation of adenylate cyclase activity	TAS
		Biological process	platelet activation	TAS
		Biological process	response to nutrient	TAS
		Biological process	signal transduction	TAS
		Biological process	synaptic transmission	TAS
GNAI3	GNAI3 guanine nucleotide binding protein (G protein), alpha inhibiting activity polypeptide 3	Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	midbody	IDA
		Component	plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	GTPase activity	TAS
		Biological process	cell division	IDA
		Biological process	blood coagulation	TAS
		Biological process	GTP catabolic process	TAS
		Biological process	negative regulation of adenylate cyclase activity	TAS
		Biological process	platelet activation	TAS
		Biological process	synaptic transmission	TAS
GNE	GNE glucosamine (UDP-N-acetyl)2epimerase/N-acetylmannosamine kinase	Biological process	cell adhesion	TAS

		Biological process	N-acetylneuraminatate metabolic process	TAS
GNG4	GNG4 guanine nucleotide binding protein (G protein), gamma 4	Component	plasma membrane	TAS
		Biological process	negative regulation of cell growth	IMP
		Biological process	energy reserve metabolic process	TAS
		Biological process	regulation of G-protein coupled receptor protein signaling pathway	TAS
		Biological process	synaptic transmission	TAS
GNPNAT1	GNPNAT1 glucosaminephosphate Nacetyltransferase 1	Biological process	cellular protein metabolic process	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
		Biological process	UDP-N-acetylglucosamine biosynthetic process	TAS
GNS	GNS glucosamine (Nacetyl)6sulfatase	Function	sulfuric ester hydrolase activity	IDA
		Function	protein binding	IPI
		Biological process	glycosaminoglycan catabolic process	TAS
GOLGA3	GOLGA3 golgin A3	Component	Golgi transport complex	IDA
		Component	Golgi membrane	TAS
		Function	protein binding	IPI
GOSR2	GOSR2 golgi SNAP receptor complex member 2	Function	transporter activity	TAS
		Biological process	cellular membrane fusion	TAS
		Biological process	ER to Golgi vesicle-mediated transport	TAS
GPAM	GPAM glycerol3phosphate acyltransferase, mitochondrial	Component	mitochondrial outer membrane	TAS
		Function	glycerol-3-phosphate O-acyltransferase activity	IMP
		Function	glycerol-3-phosphate O-acyltransferase activity	TAS
		Biological process	triglyceride biosynthetic process	IDA
		Biological process	cellular lipid metabolic process	TAS
GPD2	GPD2 glycerol3phosphate dehydrogenase 2 (mitochondrial)	Component	mitochondrial inner membrane	TAS
		Function	glycerol-3-phosphate dehydrogenase activity	TAS
		Biological process	cellular lipid metabolic process	TAS
GPM6A	GPM6A glycoprotein M6A	Component	cell surface	IDA
GPR173	GPR173 G proteinincoupled receptor 173	Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	signal transduction	TAS

GPR37L1	GPR37L1 G proteincoupled receptor 37 like 1	Function	protein binding	IPI
GPR85	GPR85 G proteincoupled receptor 85	Component	plasma membrane	IDA
		Function	G-protein coupled receptor activity	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	signal transduction	TAS
GPX3	GPX3 glutathione peroxidase 3 (plasma)	Component	extracellular space	IDA
		Function	glutathione peroxidase activity	IDA
		Function	selenium binding	IDA
		Function	transcription factor binding	TAS
		Biological process	protein homotetramerization	IDA
		Biological process	hydrogen peroxide catabolic process	TAS
		Biological process	response to lipid hydroperoxide	TAS
GRHL1	GRHL1 grainyheadlike 1 (Drosophila)	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	nucleus	IDA
		Biological process	cellular lipid metabolic process	TAS
GRHL2	GRHL2 grainyheadlike 2 (Drosophila)	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
GRIA2	GRIA2 glutamate receptor, ionotropic, AMPA 2	Component	plasma membrane	TAS
		Function	glutamate receptor activity	TAS
		Function	kainate selective glutamate receptor activity	TAS
		Biological process	signal transduction	TAS
		Biological process	synaptic transmission	TAS
GRIK2	GRIK2 glutamate receptor, ionotropic, kainate 2	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	kainate selective glutamate receptor activity	IDA
		Biological process	neuron apoptosis	IDA
		Biological process	regulation of synaptic transmission	IDA
		Biological process	positive regulation of synaptic transmission	IMP
		Biological process	regulation of short-term neuronal synaptic plasticity	IMP
		Biological process	glutamate signaling pathway	TAS
		Biological process	synaptic transmission	TAS

GRIK3	GRIK3 glutamate receptor, ionotropic, kainate 3	Component	integral to plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	adenylate cyclase inhibiting metabotropic glutamate receptor activity	IDA
		Function	ionotropic glutamate receptor activity	IDA
		Function	kainate selective glutamate receptor activity	IDA
		Function	glutamate receptor activity	TAS
		Biological process	glutamate signaling pathway	IDA
		Biological process	inhibition of adenylate cyclase activity by metabotropic glutamate receptor signaling pathway	IDA
		Biological process	metabotropic glutamate receptor signaling pathway	IDA
		Biological process	regulation of membrane potential	IDA
		Biological process	synaptic transmission	TAS
GRIN2A	GRIN2A glutamate receptor, ionotropic, Nmethyl Daspartate 2A	Component	N-methyl-D-aspartate selective glutamate receptor complex	IDA
		Component	integral to plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	response to ethanol	IDA
		Biological process	glutamate signaling pathway	TAS
		Biological process	learning or memory	TAS
		Biological process	synaptic transmission	TAS
		Biological process	transport	TAS
GRIN3A	GRIN3A glutamate receptor, ionotropic, NmethylDaspartate 3A	Component	N-methyl-D-aspartate selective glutamate receptor complex	IDA
		Component	membrane	IDA
		Component	neuron projection	IDA
		Component	neuronal cell body	IDA
		Component	synapse	IDA
		Function	N-methyl-D-aspartate selective glutamate receptor activity	IDA
		Function	glycine binding	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	response to ethanol	IDA
GRINL1A	GRINL1A glutamate receptor, ionotropic, Nmethyl	Component	nuclear envelope	IDA

	Daspartatelike 1A			
GRLF1	GRLF1 glucocorticoid receptor DNA binding factor 1	Component	cytosol	TAS
		Function	GTPase activator activity	TAS
		Function	transcription corepressor activity	TAS
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	axon guidance	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
		Biological process	transcription, DNA-dependent	TAS
GRM3	GRM3 glutamate receptor, metabotropic 3	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	G-protein coupled receptor activity	TAS
		Function	glutamate receptor activity	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	negative regulation of adenylate cyclase activity	TAS
		Biological process	synaptic transmission	TAS
GRM5	GRM5 glutamate receptor, metabotropic 5	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	G-protein coupled receptor activity	TAS
		Function	glutamate receptor activity	TAS
		Biological process	activation of phospholipase C activity by metabotropic glutamate receptor signaling pathway	TAS
GTF2I	GTF2I general transcription factor Ii	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	signal transduction	TAS
		Biological process	transcription initiation from RNA polymerase II promoter	TAS
GUCY1A3	GUCY1A3 guanylate cyclase 1, soluble, alpha 3	Component	guanylate cyclase complex, soluble	TAS
		Function	receptor activity	TAS
		Biological process	blood circulation	TAS

		Biological process	blood coagulation	TAS
		Biological process	cGMP biosynthetic process	TAS
		Biological process	nitric oxide mediated signal transduction	TAS
		Biological process	platelet activation	TAS
GULP1	GULP1 GULP, engulfment adaptor PTB domain containing 1	Component	intracellular membrane-bounded organelle	IDA
		Function	signal transducer activity	TAS
		Biological process	phagocytosis, engulfment	IDA
		Biological process	signal transduction	TAS
H3F3B	H3F3B H3 histone, family 3B (H3.3B)	Component	nucleoplasm	TAS
		Biological process	blood coagulation	TAS
HCLS1	HCLS1 hematopoietic cellspecific Lyn substrate 1	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Function	DNA binding	TAS
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	intracellular signal transduction	TAS
		Biological process	regulation of transcription, DNA-dependent	TAS
		Biological process	transcription, DNA-dependent	TAS
HDAC4	HDAC4 histone deacetylase 4	Component	cytoplasm	IDA
		Component	histone deacetylase complex	IDA
		Component	nucleus	IDA
		Component	transcriptional repressor complex	IDA
		Function	histone deacetylase activity	IDA
		Function	potassium ion binding	IDA
		Function	protein deacetylase activity	IDA
		Function	contributes_to sequence-specific DNA binding	IDA
		Function	zinc ion binding	IDA
		Function	activating transcription factor binding	IPI
		Function	histone deacetylase binding	IPI
		Function	protein binding	IPI
		Function	repressing transcription factor binding	IPI
		Function	transcription factor binding	IPI
		Biological process	chromatin remodeling	IDA
		Biological process	histone deacetylation	IDA

		Biological process	histone H3 deacetylation	IDA
		Biological process	histone H4 deacetylation	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	peptidyl-lysine deacetylation	IDA
		Biological process	positive regulation of protein sumoylation	IDA
		Biological process	histone deacetylation	IMP
		Biological process	negative regulation of myotube differentiation	IMP
		Biological process	negative regulation of sequence-specific DNA binding transcription factor activity	IMP
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	positive regulation of cell proliferation	IMP
		Biological process	positive regulation of sequence-specific DNA binding transcription factor activity	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	regulation of protein binding	IMP
		Biological process	response to interleukin-1	IMP
		Biological process	B cell activation	TAS
		Biological process	B cell differentiation	TAS
		Biological process	cardiac muscle hypertrophy in response to stress	TAS
		Biological process	inflammatory response	TAS
		Biological process	nervous system development	TAS
HDAC5	HDAC5 histone deacetylase 5	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	histone deacetylase complex	TAS
		Function	histone deacetylase activity	IDA
		Function	protein binding	IPI
		Function	protein kinase C binding	IPI
		Function	repressing transcription factor binding	IPI
		Function	transcription factor binding	IPI
		Biological process	histone deacetylation	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA

		Biological process	negative regulation of cell migration involved in sprouting angiogenesis	IMP
		Biological process	negative regulation of myotube differentiation	IMP
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	positive regulation of sequence-specific DNA binding transcription factor activity	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	regulation of protein binding	IMP
		Biological process	B cell activation	TAS
		Biological process	B cell differentiation	TAS
		Biological process	chromatin modification	TAS
		Biological process	chromatin organization	TAS
		Biological process	chromatin remodeling	TAS
		Biological process	chromatin silencing	TAS
		Biological process	histone deacetylation	TAS
		Biological process	inflammatory response	TAS
HDGFRP3	HDGFRP3 hepatomaderived growth factor, related protein 3	Component	nucleus	IDA
HGSNAT	HGSNAT heparanalphaglucoaminide Nacetyltransferase	Component	lysosomal membrane	IDA
		Function	acyltransferase activity	IDA
		Biological process	lysosomal transport	IDA
		Biological process	protein oligomerization	IDA
HIF1AN	HIF1AN hypoxia inducible factor 1, alpha subunit inhibitor	Function	protein binding	IPI
HIGD1A	HIGD1A HIG1 hypoxia inducible domain family, member 1A	Component	protein complex	IDA
		Function	protein binding	IPI
HIPK2	HIPK2 homeodomain interacting protein kinase 2	Component	colocalizes_with PML body	IDA
		Component	centrosome	IDA
		Component	nuclear body	IDA
		Component	nuclear membrane	IDA
		Component	nucleus	IDA

		Component	nuclear body	TAS
		Function	transcription corepressor activity	IDA
		Function	SMAD binding	IPI
		Function	protein binding	IPI
		Function	virion binding	IPI
		Function	protein kinase activity	TAS
		Biological process	DNA damage response, signal transduction by p53 class mediator resulting in transcription of p21 class mediator	IDA
		Biological process	SMAD protein signal transduction	IDA
		Biological process	negative regulation of BMP signaling pathway	IMP
		Biological process	positive regulation of JNK cascade	IMP
		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	positive regulation of transforming growth factor beta receptor signaling pathway	IMP
HIVEP2	HIVEP2 human immunodeficiency virus type I enhancer binding protein 2	Function	DNA binding	TAS
HLCS	HLCS holocarboxylase synthetase (biotin(propionylCoAcarboxylase (ATPhydrolysing)) ligase)	Component	chromatin	IDA
		Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	nuclear lamina	IDA
		Component	nuclear matrix	IDA
		Function	biotin binding	IDA
		Function	biotin-[propionyl-CoA-carboxylase (ATP-hydrolyzing)] ligase activity	IDA
		Function	biotin-protein ligase activity	IDA
		Function	biotin-protein ligase activity	IMP
		Function	enzyme binding	IPI
		Biological process	histone biotinylation	IDA
		Biological process	histone modification	IDA
		Biological process	protein biotinylation	IDA
		Biological process	response to biotin	IDA

		Biological process	cell proliferation	IMP
HLF	HLF hepatic leukemia factor	Function	DNA binding	TAS
		Function	double-stranded DNA binding	TAS
		Biological process	multicellular organismal development	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
HMGB1	HMGB1 high mobility group box 1	Component	cell surface	IDA
		Component	condensed chromosome	IDA
		Component	extracellular space	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Component	colocalizes_with transcriptional repressor complex	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	DNA bending activity	IMP
		Function	protein binding	IPI
		Function	repressing transcription factor binding	IPI
		Function	transcription factor binding	IPI
		Biological process	base-excision repair, DNA ligation	IDA
		Biological process	negative regulation of RNA polymerase II transcriptional preinitiation complex assembly	IDA
		Biological process	positive regulation of apoptosis	IDA
		Biological process	positive regulation of caspase activity	IDA
		Biological process	positive regulation of DNA binding	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	V(D)J recombination	IDA
		Biological process	inflammatory response to antigenic stimulus	IEP
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	apoptosis	TAS
		Biological process	cellular component disassembly involved in apoptosis	TAS

		Biological process	DNA fragmentation involved in apoptotic nuclear change	TAS
		Biological process	innate immune response	TAS
		Biological process	multicellular organismal development	TAS
HNF1B	HNF1B HNF1 homeobox B	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	kidney development	IDA
		Biological process	positive regulation of transcription initiation from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	pronephric nephron tubule development	IGI
		Biological process	endocrine pancreas development	IMP
		Biological process	genitalia development	IMP
		Biological process	kidney development	IMP
		Biological process	pronephros development	IMP
		Biological process	regulation of pronephros size	IMP
HNRNPA2B1	HNRNPA2B1 heterogeneous nuclear ribonucleoprotein A2/B1	Component	catalytic step 2 spliceosome	IDA
		Component	heterogeneous nuclear ribonucleoprotein complex	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Component	ribonucleoprotein complex	IDA
		Component	spliceosomal complex	IDA
		Component	nucleoplasm	TAS
		Function	RNA binding	IDA
		Function	single-stranded telomeric DNA binding	IDA
		Function	protein binding	IPI
		Biological process	mRNA processing	IDA

		Biological process	RNA transport	IDA
		Biological process	gene expression	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
HNRNPA3	HNRNPA3 heterogeneous nuclear ribonucleoprotein A3	Component	catalytic step 2 spliceosome	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Component	ribonucleoprotein complex	TAS
		Function	protein binding	IPI
		Biological process	gene expression	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
HNRNPU	HNRNPU heterogeneous nuclear ribonucleoprotein U (scaffold attachment factor A)	Component	CRD-mediated mRNA stability complex	IDA
		Component	catalytic step 2 spliceosome	IDA
		Component	ribonucleoprotein complex	IDA
		Component	heterogeneous nuclear ribonucleoprotein complex	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	CRD-mediated mRNA stabilization	IMP
		Biological process	gene expression	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
		Biological process	RNA processing	TAS
HOOK3	HOOK3 hook homolog 3 (Drosophila)	Component	FHF complex	IDA
		Component	Golgi apparatus	IDA
		Component	colocalizes_with HOPS complex	IDA
		Component	centrosome	IDA
		Component	cis-Golgi network	IDA
		Component	cytoplasm	IDA
		Function	microtubule binding	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	cytoplasmic microtubule organization	IMP
		Biological process	early endosome to late endosome transport	IMP
		Biological process	endosome organization	IMP

		Biological process	endosome to lysosome transport	IMP
		Biological process	Golgi localization	IMP
		Biological process	lysosome organization	IMP
HOXA10	HOXA10 homeobox A10	Function	protein binding	IPI
		Biological process	spermatogenesis	TAS
HOXA13	HOXA13 homeobox A13	Function	DNA binding	TAS
		Biological process	skeletal system development	TAS
HOXA3	HOXA3 homeobox A3	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Biological process	angiogenesis	IEP
HOXB13	HOXB13 homeobox B13	Biological process	angiogenesis	IEP
		Biological process	epidermis development	TAS
		Biological process	response to wounding	TAS
HOXB3	HOXB3 homeobox B3	Biological process	angiogenesis	IEP
HOXB5	HOXB5 homeobox B5	Biological process	anatomical structure morphogenesis	TAS
HOXD13	HOXD13 homeobox D13	Function	DNA binding	TAS
		Biological process	multicellular organismal development	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
HPCA	HPCA hippocalcin	Function	actin binding	IDA
		Function	binding	TAS
HS3ST1	HS3ST1 heparan sulfate (glucosamine) 3O-sulfotransferase 1	Component	cytoplasm	IDA
		Component	integral to membrane	TAS
HS3ST3B1	HS3ST3B1 heparan sulfate (glucosamine) 3O-sulfotransferase 3B1	Component	integral to plasma membrane	TAS
		Function	[heparan sulfate]-glucosamine 3-sulfotransferase 1 activity	TAS
		Biological process	heparan sulfate proteoglycan biosynthetic process	TAS
		Biological process	heparan sulfate proteoglycan biosynthetic process, enzymatic modification	TAS
HSD11B2	HSD11B2 hydroxysteroid (11beta) dehydrogenase 2	Biological process	glucocorticoid biosynthetic process	TAS
HSPA5	HSPA5 heat shock 70kDa protein 5 (glucoseregulated protein, 78kDa)	Component	ER-Golgi intermediate compartment	IDA
		Component	colocalizes_with caspase complex	IDA
		Component	cell surface	IDA

		Component	endoplasmic reticulum	IDA
		Component	endoplasmic reticulum chaperone complex	IDA
		Component	integral to endoplasmic reticulum membrane	IDA
		Component	midbody	IDA
		Component	nucleus	IDA
		Component	perinuclear region of cytoplasm	IDA
		Component	endoplasmic reticulum	TAS
		Component	endoplasmic reticulum lumen	TAS
		Component	endoplasmic reticulum membrane	TAS
		Function	caspase inhibitor activity	IDA
		Function	misfolded protein binding	IDA
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Function	calcium ion binding	TAS
		Function	chaperone binding	TAS
		Function	unfolded protein binding	TAS
		Biological process	cellular response to glucose starvation	IDA
		Biological process	negative regulation of caspase activity	IDA
		Biological process	anti-apoptosis	IMP
		Biological process	negative regulation of apoptosis	IMP
		Biological process	anti-apoptosis	TAS
		Biological process	blood coagulation	TAS
		Biological process	endoplasmic reticulum unfolded protein response	TAS
		Biological process	ER-associated protein catabolic process	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
		Biological process	regulation of protein folding in endoplasmic reticulum	TAS
HSPA8	HSPA8 heat shock 70kDa protein 8	Component	cell surface	IDA
		Component	ribonucleoprotein complex	IDA
		Component	clathrin sculpted gamma-aminobutyric acid transport vesicle membrane	TAS
		Component	cytosol	TAS
		Component	plasma membrane	TAS

		Function	protein binding	IPI
		Biological process	mRNA metabolic process	TAS
		Biological process	neurotransmitter secretion	TAS
		Biological process	RNA metabolic process	TAS
		Biological process	synaptic transmission	TAS
HSPC159	HSPC159 galectinrelated protein	Component	intracellular	IDA
HTT	HTT huntingtin	Component	Golgi apparatus	IDA
		Component	autophagic vacuole	IDA
		Component	axon	IDA
		Component	cytoplasm	IDA
		Component	cytoplasmic vesicle membrane	IDA
		Component	cytosol	IDA
		Component	dendrite	IDA
		Component	endoplasmic reticulum	IDA
		Component	late endosome	IDA
		Component	membrane fraction	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	protein complex	IDA
		Function	beta-tubulin binding	IDA
		Function	dynein intermediate chain binding	IDA
		Function	dynactin binding	IPI
		Function	p53 binding	IPI
		Function	protein binding	IPI
		Biological process	establishment of mitotic spindle orientation	IMP
		Biological process	Golgi organization	IMP
		Biological process	retrograde vesicle-mediated transport, Golgi to ER	IMP
		Biological process	vesicle transport along microtubule	IMP
IAPP	IAPP islet amyloid polypeptide	Component	extracellular region	TAS
		Component	soluble fraction	TAS
		Function	receptor binding	TAS
		Biological process	apoptosis	TAS
		Biological process	cell-cell signaling	TAS
		Biological process	endocrine pancreas development	TAS
		Biological process	signal transduction	TAS

IER3	IER3 immediate early response 3	Function	protein binding	IPI
		Biological process	anatomical structure morphogenesis	TAS
		Biological process	anti-apoptosis	TAS
		Biological process	apoptosis	TAS
IFT20	IFT20 intraflagellar transport 20 homolog (Chlamydomonas)	Function	protein binding	IPI
IGF1	IGF1 insulinlike growth factor 1 (somatomedin C)	Component	extracellular space	IDA
		Component	extracellular region	TAS
		Component	platelet alpha granule lumen	TAS
		Function	hormone activity	IDA
		Function	integrin binding	IDA
		Function	insulin receptor binding	IPI
		Function	insulin-like growth factor receptor binding	IPI
		Function	protein binding	IPI
		Biological process	anti-apoptosis	IDA
		Biological process	bone mineralization involved in bone maturation	IDA
		Biological process	myoblast differentiation	IDA
		Biological process	myoblast proliferation	IDA
		Biological process	myotube cell development	IDA
		Biological process	negative regulation of smooth muscle cell apoptosis	IDA
		Biological process	phosphatidylinositol-mediated signaling	IDA
		Biological process	positive regulation of activated T cell proliferation	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	positive regulation of DNA replication	IDA
		Biological process	positive regulation of epithelial cell proliferation	IDA
		Biological process	positive regulation of fibroblast proliferation	IDA
		Biological process	positive regulation of glucose import	IDA
		Biological process	positive regulation of glycogen biosynthetic process	IDA
		Biological process	positive regulation of glycolysis	IDA
		Biological process	positive regulation of insulin-like growth factor receptor signaling pathway	IDA
		Biological process	positive regulation of mitosis	IDA
		Biological process	positive regulation of osteoblast differentiation	IDA

		Biological process	positive regulation of peptidyl-tyrosine phosphorylation	IDA
		Biological process	positive regulation of phosphatidylinositol 3-kinase cascade	IDA
		Biological process	positive regulation of Ras protein signal transduction	IDA
		Biological process	positive regulation of smooth muscle cell migration	IDA
		Biological process	positive regulation of smooth muscle cell proliferation	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	positive regulation of tyrosine phosphorylation of Stat5 protein	IDA
		Biological process	proteoglycan biosynthetic process	IDA
		Biological process	satellite cell maintenance involved in skeletal muscle regeneration	IDA
		Biological process	regulation of multicellular organism growth	IEP
		Biological process	muscle hypertrophy	IMP
		Biological process	blood coagulation	TAS
		Biological process	cellular component movement	TAS
		Biological process	DNA replication	TAS
		Biological process	glycolate metabolic process	TAS
		Biological process	muscle organ development	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
		Biological process	Ras protein signal transduction	TAS
		Biological process	signal transduction	TAS
		Biological process	skeletal system development	TAS
IGF1R	IGF1R insulinlike growth factor 1 receptor	Component	membrane	IDA
		Component	microsome	IDA
		Function	insulin receptor binding	IDA
		Function	insulin-like growth factor binding	IDA

		Function	insulin-like growth factor receptor activity	IDA
		Function	protein tyrosine kinase activity	IDA
		Function	identical protein binding	IPI
		Function	insulin binding	IPI
		Function	insulin receptor substrate binding	IPI
		Function	insulin-like growth factor I binding	IPI
		Function	phosphatidylinositol 3-kinase binding	IPI
		Function	protein binding	IPI
		Biological process	insulin-like growth factor receptor signaling pathway	IDA
		Biological process	phosphatidylinositol-mediated signaling	IDA
		Biological process	protein autophosphorylation	IDA
		Biological process	protein tetramerization	IDA
		Biological process	immune response	IMP
		Biological process	positive regulation of cell migration	IMP
		Biological process	positive regulation of DNA replication	IMP
		Biological process	anti-apoptosis	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	insulin-like growth factor receptor signaling pathway	TAS
		Biological process	positive regulation of cell proliferation	TAS
		Biological process	signal transduction	TAS
IGF2BP1	IGF2BP1 insulinlike growth factor 2 mRNA binding protein 1	Component	CRD-mediated mRNA stability complex	IDA
		Component	cytoplasm	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Component	ribonucleoprotein complex	IDA
		Component	stress granule	IDA
		Component	cytosol	TAS
		Function	mRNA 3'-UTR binding	IDA
		Function	mRNA 5'-UTR binding	IDA
		Function	mRNA binding	IDA

		Function	translation regulator activity	IDA
		Function	protein binding	IPI
		Biological process	CRD-mediated mRNA stabilization	IDA
		Biological process	negative regulation of translation	IDA
		Biological process	regulation of mRNA stability involved in response to stress	IMP
IGF2BP2	IGF2BP2 insulinlike growth factor 2 mRNA binding protein 2	Component	cytoplasm	IDA
		Component	cytoskeletal part	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Function	mRNA 3'-UTR binding	IDA
		Function	mRNA 5'-UTR binding	IDA
		Function	protein binding	IPI
		Biological process	anatomical structure morphogenesis	TAS
IGF2BP3	IGF2BP3 insulinlike growth factor 2 mRNA binding protein 3	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Function	mRNA 3'-UTR binding	IDA
		Function	mRNA 5'-UTR binding	IDA
		Function	protein binding	IPI
		Biological process	anatomical structure morphogenesis	TAS
		Biological process	translation	TAS
IGFBP5	IGFBP5 insulinlike growth factor binding protein 5	Component	extracellular region	TAS
		Function	insulin-like growth factor I binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of cell migration	IDA
		Biological process	negative regulation of insulin-like growth factor receptor signaling pathway	IDA
		Biological process	negative regulation of smooth muscle cell migration	IDA
		Biological process	negative regulation of smooth muscle cell proliferation	IDA
		Biological process	negative regulation of translation	IDA
IGSF1	IGSF1 immunoglobulin superfamily, member 1	Component	membrane	IDA

		Function	inhibin beta-A binding	IDA
		Function	inhibin beta-B binding	IDA
		Function	receptor activity	IDA
		Function	protein binding	IPI
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	signal transduction	IDA
IKZF4	IKZF4 IKAROS family zinc finger 4 (Eos)	Component	nucleus	TAS
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription, DNA-dependent	TAS
IL1F5	IL1F5 interleukin 1 family, member 5 (delta)	Biological process	negative regulation of cytokine-mediated signaling pathway	TAS
IL28RA	IL28RA interleukin 28 receptor, alpha (interferon, lambda receptor)	Component	interleukin-28 receptor complex	IDA
		Function	protein binding	IPI
		Biological process	regulation of defense response to virus by host	IDA
IMMP2L	IMMP2L IMP2 inner mitochondrial membrane peptidase-like (S. cerevisiae)	Component	mitochondrion	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
ING4	ING4 inhibitor of growth family, member 4	Component	histone acetyltransferase complex	IDA
		Component	nucleus	IDA
		Function	transcription coactivator activity	IDA
		Function	protein binding	IPI
		Biological process	apoptosis	IDA
		Biological process	cell cycle arrest	IDA
		Biological process	DNA damage response, signal transduction by p53 class mediator resulting in transcription of p21 class mediator	IDA
		Biological process	DNA replication	IDA
		Biological process	histone H3 acetylation	IDA
		Biological process	histone H4-K12 acetylation	IDA
		Biological process	histone H4-K5 acetylation	IDA
		Biological process	histone H4-K8 acetylation	IDA
		Biological process	negative regulation of cell proliferation	IDA

		Biological process	negative regulation of growth	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	NOT histone H4-K16 acetylation	IDA
		Biological process	positive regulation of apoptosis	IDA
		Biological process	protein acetylation	IDA
ING5	ING5 inhibitor of growth family, member 5	Component	MOZ/MORF histone acetyltransferase complex	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	DNA replication	IDA
		Biological process	histone H3 acetylation	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of growth	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	protein acetylation	IDA
INPP5B	INPP5B inositol polyphosphate5phosphatase, 75kDa	Component	cytoplasm	IDA
		Component	microtubule cytoskeleton	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Function	GTPase activator activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
INSIG2	INSIG2 insulin induced gene 2	Component	SREBP-SCAP-Insig complex	IDA
		Function	protein binding	IPI
		Biological process	ER-nuclear sterol response pathway	IDA
INSR	INSR insulin receptor	Component	caveola	IDA
		Component	integral to plasma membrane	IDA
		Component	membrane	IDA
		Component	microsome	IDA
		Component	insulin receptor complex	IMP
		Component	endosome membrane	TAS
		Component	plasma membrane	TAS

		Function	ATP binding	IDA
		Function	GTP binding	IDA
		Function	insulin binding	IDA
		Function	insulin receptor activity	IDA
		Function	insulin-like growth factor receptor binding	IDA
		Function	protein tyrosine kinase activity	IDA
		Function	receptor signaling protein tyrosine kinase activity	IDA
		Function	protein tyrosine kinase activity	IMP
		Function	PTB domain binding	IPI
		Function	SH2 domain binding	IPI
		Function	insulin binding	IPI
		Function	insulin receptor substrate binding	IPI
		Function	insulin-like growth factor I binding	IPI
		Function	insulin-like growth factor II binding	IPI
		Function	phosphatidylinositol 3-kinase binding	IPI
		Function	protein binding	IPI
		Biological process	activation of protein kinase B activity	IDA
		Biological process	cellular response to insulin stimulus	IDA
		Biological process	G-protein coupled receptor protein signaling pathway	IDA
		Biological process	insulin receptor signaling pathway	IDA
		Biological process	peptidyl-tyrosine phosphorylation	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	positive regulation of glucose import	IDA
		Biological process	positive regulation of glycogen biosynthetic process	IDA
		Biological process	positive regulation of protein phosphorylation	IDA
		Biological process	positive regulation of respiratory burst	IDA
		Biological process	protein autophosphorylation	IDA
		Biological process	protein heterotetramerization	IDA
		Biological process	activation of MAPK activity	IMP
		Biological process	activation of protein kinase activity	IMP
		Biological process	glucose homeostasis	IMP
		Biological process	heart morphogenesis	IMP
		Biological process	positive regulation of cell migration	IMP

		Biological process	positive regulation of developmental growth	IMP
		Biological process	positive regulation of DNA replication	IMP
		Biological process	positive regulation of glycolysis	IMP
		Biological process	positive regulation of MAPKKK cascade	IMP
		Biological process	positive regulation of mitosis	IMP
		Biological process	positive regulation of nitric oxide biosynthetic process	IMP
		Biological process	positive regulation of protein kinase B signaling cascade	IMP
		Biological process	protein autophosphorylation	IMP
		Biological process	regulation of embryonic development	IMP
		Biological process	regulation of transcription, DNA-dependent	IMP
		Biological process	transformation of host cell by virus	IMP
		Biological process	fibroblast growth factor receptor signaling pathway	TAS
		Biological process	insulin receptor signaling pathway	TAS
INTS6	INTS6 integrator complex subunit 6	Component	actin cytoskeleton	IDA
		Component	integrator complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Function	transmembrane receptor activity	TAS
		Biological process	snRNA processing	IDA
INTS8	INTS8 integrator complex subunit 8	Component	integrator complex	IDA
		Function	protein binding	IPI
		Biological process	snRNA processing	IDA
IPO8	IPO8 importin 8	Function	protein binding	IPI
		Function	Ran GTPase binding	TAS
		Biological process	signal transduction	TAS
IPO9	IPO9 importin 9	Component	cytoplasm	IDA
		Function	protein transporter activity	IDA
		Function	protein binding	IPI
		Biological process	protein transport	IDA
IPPK	IPPK inositol 1,3,4,5,6pentakisphosphate 2kinase	Function	inositol pentakisphosphate 2-kinase activity	IDA
		Biological process	inositol or phosphatidylinositol phosphorylation	IDA
IRAK1	IRAK1 interleukin1 receptorassociated kinase 1	Component	cytosol	TAS

		Component	endosome membrane	TAS
		Component	plasma membrane	TAS
		Function	kinase activity	IDA
		Function	protein kinase activity	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	protein heterodimerization activity	IPI
		Function	protein homodimerization activity	IPI
		Function	NF-kappaB-inducing kinase activity	TAS
		Function	protein kinase activity	TAS
		Function	protein serine/threonine kinase activity	TAS
		Biological process	activation of NF-kappaB-inducing kinase activity	IDA
		Biological process	positive regulation of NF-kappaB transcription factor activity	IDA
		Biological process	protein autophosphorylation	IDA
		Biological process	interleukin-1-mediated signaling pathway	IMP
		Biological process	lipopolysaccharide-mediated signaling pathway	IMP
		Biological process	negative regulation of NF-kappaB transcription factor activity	IMP
		Biological process	protein oligomerization	IMP
		Biological process	regulation of cytokine-mediated signaling pathway	IMP
		Biological process	response to interleukin-1	IMP
		Biological process	response to lipopolysaccharide	IMP
		Biological process	toll-like receptor 2 signaling pathway	IMP
		Biological process	activation of MAPK activity	TAS
		Biological process	innate immune response	TAS
		Biological process	JNK cascade	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	positive regulation of I-kappaB kinase/NF-kappaB cascade	TAS
		Biological process	positive regulation of NF-kappaB transcription	TAS

			factor activity	
		Biological process	protein phosphorylation	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
IRAK2	IRAK2 interleukin1 receptorassociated kinase 2	Component	cell surface	IDA
		Component	cytosol	TAS
		Component	endosome membrane	TAS
		Component	plasma membrane	TAS
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	protein heterodimerization activity	IPI
		Function	protein homodimerization activity	IPI
		Function	NF-kappaB-inducing kinase activity	TAS
		Biological process	interleukin-1-mediated signaling pathway	IMP
		Biological process	negative regulation of NF-kappaB transcription factor activity	IMP
		Biological process	positive regulation of NF-kappaB transcription factor activity	IMP
		Biological process	regulation of cytokine-mediated signaling pathway	IMP
		Biological process	response to interleukin-1	IMP
		Biological process	activation of MAPK activity	TAS
		Biological process	I-kappaB kinase/NF-kappaB cascade	TAS
		Biological process	inflammatory response	TAS
		Biological process	innate immune response	TAS
		Biological process	JNK cascade	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	positive regulation of NF-kappaB transcription	TAS

			factor activity	
		Biological process	protein phosphorylation	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
IREB2	IREB2 ironresponsive element binding protein 2	Function	RNA binding	IDA
		Function	protein binding	IPI
IRS2	IRS2 insulin receptor substrate 2	Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	cellular response to insulin stimulus	IMP
		Biological process	negative regulation of plasma membrane long-chain fatty acid transport	IMP
		Biological process	positive regulation of fatty acid beta-oxidation	IMP
		Biological process	positive regulation of glucose import	IMP
		Biological process	positive regulation of glucose metabolic process	IMP
		Biological process	positive regulation of glycogen biosynthetic process	IMP
		Biological process	fibroblast growth factor receptor signaling pathway	TAS
		Biological process	glucose metabolic process	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	lipid homeostasis	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	phosphatidylinositol-mediated signaling	TAS
		Biological process	regulation of lipid metabolic process	TAS
		Biological process	signal transduction	TAS
ISL1	ISL1 ISL LIM homeobox 1	Biological process	generation of precursor metabolites and energy	TAS
ITGA2	ITGA2 integrin, alpha 2 (CD49B, alpha 2 subunit of VLA2 receptor)	Component	cell surface	IDA
		Component	plasma membrane	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI

		Function	collagen binding	TAS
		Biological process	axon guidance	TAS
		Biological process	blood coagulation	TAS
		Biological process	cell-matrix adhesion	TAS
		Biological process	organ morphogenesis	TAS
ITGA9	ITGA9 integrin, alpha 9	Component	plasma membrane	TAS
		Biological process	axon guidance	TAS
ITGAV	ITGAV integrin, alpha V (vitronectin receptor, alpha polypeptide, antigen CD51)	Component	cell surface	IDA
		Component	integrin complex	IDA
		Component	plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	contributes_to insulin-like growth factor I binding	IDA
		Function	protein binding	IPI
		Biological process	cell adhesion	IDA
		Biological process	entry of bacterium into host cell	IDA
		Biological process	negative regulation of apoptosis	IDA
		Biological process	positive regulation of cell adhesion	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	regulation of phagocytosis	IDA
		Biological process	angiogenesis	IEP
		Biological process	negative regulation of lipid storage	IMP
		Biological process	negative regulation of lipid transport	IMP
		Biological process	negative regulation of lipoprotein metabolic process	IMP
		Biological process	negative regulation of low-density lipoprotein particle receptor biosynthetic process	IMP
		Biological process	negative regulation of macrophage derived foam cell differentiation	IMP
		Biological process	axon guidance	TAS
		Biological process	blood coagulation	TAS
		Biological process	entry of virus into host cell	TAS
		Biological process	leukocyte migration	TAS
ITGB1BP1	ITGB1BP1 integrin beta 1 binding protein 1	Component	cytosol	IDA
		Component	lamellipodium	IDA

		Component	ruffle	IDA
		Function	protein binding	IPI
		Biological process	cell-matrix adhesion	IDA
		Biological process	cell migration	TAS
		Biological process	intracellular protein kinase cascade	TAS
ITGB8	ITGB8 integrin, beta 8	Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	placenta blood vessel development	TAS
ITM2C	ITM2C integral membrane protein 2C	Component	Golgi apparatus	IDA
		Component	lysosome	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	beta-amyloid binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of neuron projection development	IDA
		Biological process	neuron differentiation	IDA
ITPKB	ITPKB inositoltrisphosphate 3kinase B	Biological process	signal transduction	TAS
ITPR1	ITPR1 inositol 1,4,5trisphosphate receptor, type 1	Component	platelet dense granule membrane	IDA
		Component	platelet dense tubular network	IDA
		Function	protein binding	IPI
		Function	calcium ion transmembrane transporter activity	TAS
		Function	inositol-1,4,5-trisphosphate receptor activity	TAS
		Biological process	response to hypoxia	IDA
		Biological process	activation of phospholipase C activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	calcium ion transmembrane transport	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	platelet activation	TAS
		Biological process	regulation of insulin secretion	TAS
ITSN1	ITSN1 intersectin 1 (SH3 domain protein)	Component	coated pit	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Function	protein complex scaffold	IDA

		Function	proline-rich region binding	IPI
		Function	protein binding	IPI
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
		Biological process	synaptic vesicle endocytosis	TAS
IVNS1ABP	IVNS1ABP influenza virus NS1A binding protein	Component	spliceosomal complex	TAS
		Component	transcription factor complex	TAS
		Biological process	response to virus	TAS
		Biological process	RNA splicing	TAS
		Biological process	transcription from RNA polymerase III promoter	TAS
JDP2	JDP2 Jun dimerization protein 2	Function	protein binding	IPI
JHDM1D	JHDM1D jumonji C domain containing histone demethylase 1 homolog D (<i>S. cerevisiae</i>)	Component	nucleolus	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	histone demethylase activity (H3-K27 specific)	IDA
		Function	histone demethylase activity (H3-K36 specific)	IDA
		Function	histone demethylase activity (H3-K9 specific)	IDA
		Function	histone demethylase activity (H4-K20 specific)	IDA
		Function	iron ion binding	IDA
		Function	methylated histone residue binding	IDA
		Function	oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen, 2-oxoglutarate as one donor, and incorporation of one atom each of oxygen into both donors	IDA
		Function	zinc ion binding	IDA
		Function	iron ion binding	TAS
		Biological process	histone H3-K27 demethylation	IDA
		Biological process	histone H3-K36 demethylation	IDA
		Biological process	histone H3-K9 demethylation	IDA
		Biological process	histone H4-K20 demethylation	IDA

JRKL	JRKL jerky homologlike (mouse)	Biological process	central nervous system development	TAS
KAL1	KAL1 Kallmann syndrome 1 sequence	Component	extracellular space	TAS
		Component	proteinaceous extracellular matrix	TAS
		Function	extracellular matrix structural constituent	TAS
		Biological process	axon guidance	TAS
		Biological process	cellular component movement	TAS
		Biological process	chemotaxis	TAS
KAT2B	KAT2B K(lysine) acetyltransferase 2B	Component	Ada2/Gcn5/Ada3 transcription activator complex	IDA
		Component	chromatin remodeling complex	IDA
		Component	nucleoplasm	TAS
		Function	acetyltransferase activity	IDA
		Function	lysine N-acetyltransferase activity	IDA
		Function	transcription coactivator activity	IDA
		Function	histone deacetylase binding	IPI
		Function	protein binding	IPI
		Function	transcription cofactor activity	IPI
		Function	transcription factor binding	IPI
		Biological process	cellular response to insulin stimulus	IDA
		Biological process	histone H3 acetylation	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	N-terminal peptidyl-lysine acetylation	IDA
		Biological process	peptidyl-lysine acetylation	IDA
		Biological process	cell cycle arrest	TAS
		Biological process	gene expression	TAS
		Biological process	protein acetylation	TAS
		Biological process	transcription from RNA polymerase I promoter	TAS
		Biological process	transcription initiation from RNA polymerase I promoter	TAS
KCNAB1	KCNAB1 potassium voltagegated channel, shakerrelated subfamily, beta member 1	Function	potassium channel regulator activity	TAS
KCNB2	KCNB2 potassium voltagegated channel, Shabrelated subfamily, member 2	Function	protein binding	IPI
		Function	delayed rectifier potassium channel activity	TAS
		Biological process	regulation of smooth muscle contraction	TAS
KCNC4	KCNC4 potassium voltagegated channel, Shawrelated	Function	potassium channel activity	TAS

	subfamily, member 4			
		Biological process	potassium ion transmembrane transport	TAS
		Biological process	synaptic transmission	TAS
KCNIP1	KCNIP1 Kv channel interacting protein 1	Function	protein binding	IPI
		Biological process	detection of calcium ion	TAS
		Biological process	signal transduction	TAS
		Biological process	synaptic transmission	TAS
KCNIP3	KCNIP3 Kv channel interacting protein 3, calsenilin	Function	transcription corepressor activity	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
		Biological process	signal transduction	TAS
KCNJ11	KCNJ11 potassium inwardlyrectifying channel, subfamily J, member 11	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	potassium ion binding	TAS
		Biological process	regulation of membrane potential	IDA
		Biological process	response to ATP	IDA
		Biological process	glucose metabolic process	IMP
		Biological process	negative regulation of insulin secretion	IMP
		Biological process	neurological system process	IMP
		Biological process	regulation of insulin secretion	IMP
		Biological process	response to drug	IMP
		Biological process	energy reserve metabolic process	TAS
		Biological process	regulation of insulin secretion	TAS
KCNJ2	KCNJ2 potassium inwardlyrectifying channel, subfamily J, member 2	Component	integral to plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	synaptic transmission	TAS
KCNMA1	KCNMA1 potassium large conductance calciumactivated channel, subfamily M, alpha member 1	Component	apical plasma membrane	IDA
		Component	caveola	IDA
		Component	integral to membrane	IDA
		Component	voltage-gated potassium channel complex	IDA
		Function	actin binding	IDA

		Function	calcium-activated potassium channel activity	IDA
		Function	large conductance calcium-activated potassium channel activity	IDA
		Function	voltage-gated potassium channel activity	IDA
		Function	large conductance calcium-activated potassium channel activity	IMP
		Function	protein binding	IPI
		Biological process	cellular potassium ion homeostasis	IDA
		Biological process	micturition	IDA
		Biological process	negative regulation of cell volume	IDA
		Biological process	potassium ion transport	IDA
		Biological process	regulation of membrane potential	IDA
		Biological process	response to calcium ion	IDA
		Biological process	response to carbon monoxide	IDA
		Biological process	response to hypoxia	IDA
		Biological process	response to osmotic stress	IDA
		Biological process	smooth muscle contraction involved in micturition	IDA
		Biological process	positive regulation of apoptosis	IMP
		Biological process	response to carbon monoxide	IMP
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
KCNMB4	KCNMB4 potassium large conductance calciumactivated channel, subfamily M, beta member 4	Component	integral to plasma membrane	IDA
		Component	voltage-gated potassium channel complex	IDA
		Function	calcium-activated potassium channel activity	IDA
		Function	protein binding	IPI
		Biological process	detection of calcium ion	IDA
		Biological process	potassium ion transport	IDA
		Biological process	regulation of action potential	IDA
		Biological process	regulation of action potential in neuron	IDA
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
		Biological process	regulation of neurotransmitter secretion	TAS
		Biological process	regulation of vasoconstriction	TAS
		Biological process	synaptic transmission	TAS

KCTD10	KCTD10 potassium channel tetramerisation domain containing 10	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
KCTD5	KCTD5 potassium channel tetramerisation domain containing 5	Component	cytosol	IDA
		Function	protein binding	IPI
KHDRBS1	KHDRBS1 KH domain containing, RNA binding, signal transduction associated 1	Component	membrane	IDA
		Component	nucleus	IDA
		Function	RNA binding	IDA
		Function	SH3/SH2 adaptor activity	IPI
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Biological process	cell surface receptor linked signaling pathway	IDA
		Biological process	cell cycle arrest	TAS
		Biological process	cell proliferation	TAS
		Biological process	mRNA processing	TAS
		Biological process	signal transduction	TAS
KIAA0182	KIAA0182 KIAA0182	Function	protein binding	IPI
KIAA0319L	KIAA0319L KIAA0319like	Component	cytoplasmic vesicle part	IDA
		Function	protein binding	IPI
KIAA1191	KIAA1191 KIAA1191	Function	protein binding	IPI
KIAA1279	KIAA1279 KIAA1279	Component	mitochondrion	IDA
		Function	kinesin binding	IPI
		Function	protein binding	IPI
		Biological process	mitochondrial transport	IMP
KIAA1539	KIAA1539 KIAA1539	Component	nucleus	IDA
KIAA1715	KIAA1715 KIAA1715	Function	protein binding	IPI
KIF11	KIF11 kinesin family member 11	Component	chromatin remodeling complex	IDA
		Component	spindle	IDA
		Component	colocalizes_with spindle microtubule	IDA
		Component	colocalizes_with spindle pole	IDA
		Component	cytosol	TAS
		Component	kinesin complex	TAS

		Function	protein kinase binding	IPI
		Biological process	spindle assembly involved in mitosis	IDA
		Biological process	spindle organization	IMP
		Biological process	blood coagulation	TAS
		Biological process	microtubule-based movement	TAS
		Biological process	mitosis	TAS
		Biological process	mitotic spindle organization	TAS
KIF13B	KIF13B kinesin family member 13B	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	microtubule-based movement	TAS
		Biological process	protein targeting	TAS
KIF1B	KIF1B kinesin family member 1B	Function	protein binding	IPI
		Function	kinesin binding	TAS
KIF2A	KIF2A kinesin heavy chain member 2A	Component	colocalizes_ with spindle microtubule	IDA
		Component	colocalizes_ with spindle pole	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Function	motor activity	TAS
		Biological process	mitotic spindle organization	IDA
		Biological process	blood coagulation	TAS
		Biological process	M phase of mitotic cell cycle	TAS
		Biological process	microtubule-based movement	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic prometaphase	TAS
KIF3B	KIF3B kinesin family member 3B	Component	kinesin II complex	IDA
		Component	cytosol	TAS
		Component	plus-end kinesin complex	TAS
		Function	protein binding	IPI
		Function	microtubule motor activity	TAS
		Function	plus-end-directed microtubule motor activity	TAS
		Biological process	anterograde axon cargo transport	TAS
		Biological process	blood coagulation	TAS
		Biological process	determination of left/right symmetry	TAS
		Biological process	microtubule-based movement	TAS

		Biological process	mitotic centrosome separation	TAS
		Biological process	mitotic spindle organization	TAS
		Biological process	plus-end-directed vesicle transport along microtubule	TAS
KIF3C	KIF3C kinesin family member 3C	Component	cytosol	TAS
		Component	kinesin complex	TAS
		Function	motor activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	microtubule-based movement	TAS
KIF5A	KIF5A kinesin family member 5A	Component	cytosol	TAS
		Component	kinesin complex	TAS
		Component	membrane fraction	TAS
		Function	motor activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	microtubule-based movement	TAS
		Biological process	synaptic transmission	TAS
KIF5C	KIF5C kinesin family member 5C	Component	kinesin complex	TAS
		Function	protein binding	IPI
		Biological process	organelle organization	TAS
KIFC2	KIFC2 kinesin family member C2	Function	protein binding	IPI
KLF12	KLF12 Kruppelike factor 12	Function	DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	transcription corepressor activity	TAS
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
		Biological process	transcription, DNA-dependent	TAS
KLF3	KLF3 Kruppelike factor 3 (basic)	Biological process	multicellular organismal development	TAS
KLF4	KLF4 Kruppelike factor 4 (gut)	Biological process	negative regulation of transcription, DNA-dependent	IEP
		Biological process	mesodermal cell fate determination	TAS
		Biological process	negative regulation of cell proliferation	TAS

		Biological process	transcription, DNA-dependent	TAS
KLF6	KLF6 Kruppelike factor 6	Component	nucleus	TAS
KLF9	KLF9 Kruppelike factor 9	Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
		Biological process	transcription, DNA-dependent	TAS
KLHL12	KLHL12 kelchlike 12 (Drosophila)	Function	protein binding	IPI
KLHL3	KLHL3 kelchlike 3 (Drosophila)	Function	structural molecule activity	TAS
KPNA1	KPNA1 karyopherin alpha 1 (importin alpha 5)	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	nuclear localization sequence binding	TAS
		Biological process	apoptosis	TAS
		Biological process	cellular component disassembly involved in apoptosis	TAS
		Biological process	DNA fragmentation involved in apoptotic nuclear change	TAS
		Biological process	NLS-bearing substrate import into nucleus	TAS
		Biological process	regulation of DNA recombination	TAS
		Biological process	viral genome transport in host cell	TAS
		Biological process	viral infectious cycle	TAS
		Biological process	viral reproduction	TAS
KPNA3	KPNA3 karyopherin alpha 3 (importin alpha 4)	Function	protein binding	IPI
		Function	nuclear localization sequence binding	TAS
		Biological process	NLS-bearing substrate import into nucleus	TAS
		Biological process	protein complex assembly	TAS
KPNA6	KPNA6 karyopherin alpha 6 (importin alpha 7)	Function	protein binding	IPI
		Biological process	NLS-bearing substrate import into nucleus	TAS
KRAS	KRAS vKiras2 Kirsten rat sarcoma viral oncogene homolog	Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	activation of MAPKK activity	TAS
		Biological process	axon guidance	TAS
		Biological process	blood coagulation	TAS
		Biological process	epidermal growth factor receptor signaling	TAS

			pathway	
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	leukocyte migration	TAS
		Biological process	MAPKKK cascade	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
KRIT1	KRIT1 KRIT1, ankyrin repeat containing	Component	cell-cell junction	IDA
		Function	protein binding	IPI
		Function	small GTPase regulator activity	TAS
		Biological process	cell redox homeostasis	IMP
		Biological process	negative regulation of angiogenesis	IMP
		Biological process	negative regulation of endothelial cell apoptosis	IMP
		Biological process	negative regulation of endothelial cell migration	IMP
		Biological process	negative regulation of endothelial cell proliferation	IMP
		Biological process	regulation of establishment of cell polarity	IMP
		Biological process	small GTPase mediated signal transduction	TAS
L2HGDH	L2HGDH L2hydroxyglutarate dehydrogenase	Component	integral to membrane	IDA
		Component	mitochondrion	IDA
		Component	mitochondrial inner membrane	TAS
		Function	2-hydroxyglutarate dehydrogenase activity	IDA
		Function	2-hydroxyglutarate dehydrogenase activity	TAS
		Biological process	cellular protein metabolic process	IDA
		Biological process	2-oxoglutarate metabolic process	TAS
LAMC1	LAMC1 laminin, gamma 1 (formerly LAMB2)	Component	basement membrane	IDA
		Component	colocalizes_with extracellular matrix	IDA
		Component	extracellular region	TAS
		Component	laminin-1 complex	TAS
		Component	laminin-10 complex	TAS
		Component	laminin-11 complex	TAS
		Function	extracellular matrix structural constituent	IMP
		Biological process	cell adhesion	IDA
		Biological process	protein complex assembly	IDA
		Biological process	substrate adhesion-dependent cell spreading	IDA
		Biological process	cell migration	IMP
		Biological process	extracellular matrix disassembly	IMP
		Biological process	hemidesmosome assembly	IMP

		Biological process	axon guidance	TAS
		Biological process	endoderm development	TAS
		Biological process	positive regulation of epithelial cell proliferation	TAS
LAMC2	LAMC2 laminin, gamma 2	Biological process	cell junction assembly	TAS
		Biological process	epidermis development	TAS
LAMP2	LAMP2 lysosomalassociated membrane protein 2	Component	late endosome	IDA
		Component	lysosomal membrane	IDA
		Component	lysosome	IDA
		Component	membrane fraction	IDA
		Component	platelet dense granule membrane	IDA
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
LANCL2	LANCL2 LanC lantibiotic synthetase component Clite 2 (bacterial)	Component	cortical actin cytoskeleton	IDA
		Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	phosphatidylinositol-3-phosphate binding	IDA
		Function	phosphatidylinositol-4-phosphate binding	IDA
		Function	phosphatidylinositol-5-phosphate binding	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	positive regulation of abscisic acid mediated signaling pathway	IDA
LARP1	LARP1 La ribonucleoprotein domain family, member 1	Function	protein binding	IPI
LARP6	LARP6 La ribonucleoprotein domain family, member 6	Component	Golgi apparatus	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
LASP1	LASP1 LIM and SH3 protein 1	Function	protein binding	IPI
		Function	SH3/SH2 adaptor activity	TAS
LASS6	LASS6 LAG1 homolog, ceramide synthase 6	Component	endoplasmic reticulum membrane	TAS
		Function	sphingosine N-acyltransferase activity	TAS

		Biological process	sphingolipid metabolic process	TAS
LATS2	LATS2 LATS, large tumor suppressor, homolog 2 (Drosophila)	Component	nucleus	IDA
		Component	spindle pole	IDA
		Function	ATP binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein binding	IPI
		Biological process	G1/S transition of mitotic cell cycle	IDA
		Biological process	hippo signaling cascade	IDA
		Biological process	hormone-mediated signaling pathway	IDA
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	negative regulation of cyclin-dependent protein kinase activity	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IMP
LDHB	LDHB lactate dehydrogenase B	Component	cytoplasm	TAS
		Component	cytosol	TAS
		Biological process	pyruvate metabolic process	TAS
LDLRAP1	LDLRAP1 low density lipoprotein receptor adaptor protein 1	Component	colocalizes_with AP-1 adaptor complex	IDA
		Component	colocalizes_with AP-2 adaptor complex	IDA
		Component	basal plasma membrane	IDA
		Component	cytosol	IDA
		Component	early endosome	IDA
		Component	internal side of plasma membrane	IDA
		Component	recycling endosome	IDA
		Function	clathrin binding	IDA
		Function	phosphatidylinositol-4,5-bisphosphate binding	IDA
		Function	phosphotyrosine binding	IDA
		Function	protein binding, bridging	IDA
		Function	protein complex binding	IDA
		Function	signaling adaptor activity	IDA
		Function	receptor signaling complex scaffold activity	IMP
		Function	beta-amyloid binding	IPI

		Function	low-density lipoprotein particle receptor binding	IPI
		Function	protein binding	IPI
		Biological process	positive regulation of signal transduction	IDA
		Biological process	receptor-mediated endocytosis	IDA
		Biological process	amyloid precursor protein metabolic process	IMP
		Biological process	cholesterol homeostasis	IMP
		Biological process	positive regulation of receptor-mediated endocytosis	IMP
		Biological process	receptor internalization	IMP
		Biological process	receptor-mediated endocytosis of low-density lipoprotein particle involved in cholesterol transport	IMP
		Biological process	regulation of establishment of protein localization in plasma membrane	IMP
		Biological process	regulation of protein binding	IMP
LEFTY1	LEFTY1 leftright determination factor 1	Biological process	transforming growth factor beta receptor signaling pathway	TAS
LEMD2	LEMD2 LEM domain containing 2	Component	nuclear membrane	IDA
LHFP	LHFP lipoma HMGIC fusion partner	Function	DNA binding	TAS
LHX6	LHX6 LIM homeobox 6	Component	nucleus	IDA
LIF	LIF leukemia inhibitory factor (cholinergic differentiation factor)	Function	cytokine activity	IDA
		Function	growth factor activity	IDA
		Function	leukemia inhibitory factor receptor binding	IDA
		Function	leukemia inhibitory factor receptor binding	IPI
		Function	receptor binding	IPI
		Biological process	leukemia inhibitory factor signaling pathway	IDA
		Biological process	negative regulation of hormone secretion	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	positive regulation of macrophage differentiation	IDA
		Biological process	positive regulation of MAPKKK cascade	IDA
		Biological process	positive regulation of mesenchymal to epithelial transition involved in metanephros morphogenesis	IDA
		Biological process	positive regulation of peptidyl-serine phosphorylation	IDA

		Biological process	positive regulation of peptidyl-serine phosphorylation of STAT protein	IDA
		Biological process	positive regulation of peptidyl-tyrosine phosphorylation	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of tyrosine phosphorylation of Stat1 protein	IDA
		Biological process	positive regulation of tyrosine phosphorylation of Stat3 protein	IDA
		Biological process	regulation of metanephric nephron tubule epithelial cell differentiation	IDA
		Biological process	multicellular organismal development	TAS
LIMD1	LIMD1 LIM domains containing 1	Component	RNA-induced silencing complex	IDA
		Component	cytoplasm	IDA
		Component	cytoplasmic mRNA processing body	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	cytoplasmic mRNA processing body assembly	IMP
		Biological process	gene silencing by miRNA	IMP
		Biological process	multicellular organismal development	TAS
		Biological process	signal transduction	TAS
LIN28B	LIN28B lin28 homolog B (C. elegans)	Function	RNA binding	IDA
		Function	protein binding	IPI
		Biological process	miRNA catabolic process	IMP
		Biological process	pre-microRNA processing	IMP
		Biological process	RNA 3'-end processing	IMP
LIN7C	LIN7C lin7 homolog C (C. elegans)	Function	protein domain specific binding	IPI
LMOD1	LMOD1 leiomodulin 1 (smooth muscle)	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Component	membrane fraction	TAS
LPHN1	LPHN1 latrophilin 1	Biological process	G-protein coupled receptor protein signaling pathway	TAS
LRP1B	LRP1B low density lipoprotein receptor related protein 1B	Biological process	protein transport	TAS

		Biological process	receptor-mediated endocytosis	TAS
LRP5	LRP5 low density lipoprotein receptorrelated protein 5	Component	plasma membrane	IDA
		Component	receptor complex	IDA
		Function	NOT toxin transporter activity	IMP
		Function	protein binding	IPI
		Biological process	canonical Wnt receptor signaling pathway	IDA
		Biological process	cell surface receptor linked signaling pathway	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	positive regulation of mitosis	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	Wnt receptor signaling pathway involved in dorsal/ventral axis specification	IDA
		Biological process	adipose tissue development	IMP
		Biological process	bone marrow development	IMP
		Biological process	bone morphogenesis	IMP
		Biological process	canonical Wnt receptor signaling pathway	IMP
		Biological process	cholesterol homeostasis	IMP
		Biological process	glucose catabolic process	IMP
		Biological process	negative regulation of osteoblast differentiation	IMP
		Biological process	negative regulation of protein serine/threonine kinase activity	IMP
		Biological process	positive regulation of fat cell differentiation	IMP
		Biological process	positive regulation of mesenchymal cell proliferation	IMP
		Biological process	regulation of blood pressure	IMP
		Biological process	regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	retina morphogenesis in camera-type eye	IMP
		Biological process	retinal blood vessel morphogenesis	IMP
LRP6	LRP6 low density lipoprotein receptorrelated protein 6	Component	colocalizes_with caveola	IDA
		Component	cell surface	IDA
		Component	cytoplasmic vesicle	IDA

		Component	plasma membrane	IDA
		Function	coreceptor activity	IDA
		Function	low-density lipoprotein receptor activity	IDA
		Function	kinase inhibitor activity	IMP
		Function	toxin transporter activity	IMP
		Function	NOT toxin transporter activity	IMP
		Function	Wnt-protein binding	IPI
		Function	frizzled binding	IPI
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Function	receptor binding	IPI
		Biological process	canonical Wnt receptor signaling pathway	IDA
		Biological process	negative regulation of protein serine/threonine kinase activity	IDA
		Biological process	neural crest cell differentiation	IDA
		Biological process	neural crest formation	IDA
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IDA
		Biological process	positive regulation of sequence-specific DNA binding transcription factor activity	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of Wnt receptor signaling pathway involved in dorsal/ventral axis specification	IDA
		Biological process	Wnt receptor signaling pathway	IDA
		Biological process	Wnt receptor signaling pathway involved in dorsal/ventral axis specification	IDA
		Biological process	canonical Wnt receptor signaling pathway	IMP
		Biological process	cellular response to cholesterol	IMP
		Biological process	negative regulation of protein kinase activity	IMP
		Biological process	negative regulation of protein phosphorylation	IMP
		Biological process	negative regulation of smooth muscle cell apoptosis	IMP
		Biological process	positive regulation of cell cycle	IMP

		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	Wnt receptor signaling pathway	IMP
LRRC59	LRRC59 leucine rich repeat containing 59	Component	mitochondrial nucleoid	IDA
		Function	protein binding	IPI
LRRC7	LRRC7 leucine rich repeat containing 7	Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	focal adhesion	IDA
		Component	nucleolus	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
LRRFIP1	LRRFIP1 leucine rich repeat (in FLII) interacting protein 1	Component	cytoskeleton	TAS
		Function	protein binding	IPI
		Function	double-stranded RNA binding	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
LSM12	LSM12 LSM12 homolog (<i>S. cerevisiae</i>)	Function	protein binding	IPI
LUC7L2	LUC7L2 LUC7like 2 (<i>S. cerevisiae</i>)	Function	enzyme binding	IPI
		Function	protein binding	IPI
LYPLA1	LYPLA1 lysophospholipase I	Component	cytosol	TAS
		Function	lysophospholipase activity	TAS
		Function	palmitoyl-(protein) hydrolase activity	TAS
		Biological process	nitric oxide metabolic process	TAS
		Biological process	regulation of nitric-oxide synthase activity	TAS
LYST	LYST lysosomal trafficking regulator	Component	microtubule cytoskeleton	IDA
		Function	protein binding	IPI
		Biological process	endosome to lysosome transport via multivesicular body sorting pathway	IMP
		Biological process	natural killer cell mediated cytotoxicity	IMP
		Biological process	pigmentation	IMP
LZTS1	LZTS1 leucine zipper, putative tumor suppressor 1	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA

		Component	nucleolus	IDA
		Component	plasma membrane	IDA
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	termination of RNA polymerase III transcription	TAS
		Biological process	transcription elongation from RNA polymerase III promoter	TAS
		Biological process	transcription from RNA polymerase III promoter	TAS
M6PR	M6PR mannose6phosphate receptor (cation dependent)	Component	cell surface	IDA
		Component	endosome	IDA
		Component	integral to plasma membrane	TAS
		Function	transmembrane receptor activity	TAS
		Biological process	endosome to lysosome transport	TAS
		Biological process	receptor-mediated endocytosis	TAS
MAB21L1	MAB21L1 mab21like 1 (C. elegans)	Biological process	anatomical structure morphogenesis	TAS
MAB21L2	MAB21L2 mab21like 2 (C. elegans)	Biological process	nervous system development	TAS
MAEA	MAEA macrophage erythroblast attacher	Component	actomyosin contractile ring	IDA
		Component	cytoskeleton	IDA
		Component	integral to plasma membrane	IDA
		Component	membrane fraction	IDA
		Component	nuclear matrix	IDA
		Component	spindle	IDA
		Function	actin binding	IDA
		Biological process	cell adhesion	IDA
		Biological process	negative regulation of myeloid cell apoptosis	IDA
MAF	MAF vmaf musculoaponeurotic fibrosarcoma oncogene homolog (avian)	Component	chromatin	TAS
		Function	protein binding	IPI
		Biological process	transcription from RNA polymerase II promoter	TAS
MAFG	MAFG vmaf musculoaponeurotic fibrosarcoma oncogene homolog G (avian)	Biological process	blood coagulation	TAS
MAGI2	MAGI2 membrane associated guanylate kinase, WW and PDZ domain containing 2	Function	phosphatase binding	IPI

		Function	protein binding	IPI
MAGT1	MAGT1 magnesium transporter 1	Component	oligosaccharyltransferase complex	IDA
		Function	contributes_to dolichyl-diphosphooligosaccharide-protein glycotransferase activity	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
MAL2	MAL2 mal, Tcell differentiation protein 2 (gene/pseudogene)	Function	protein binding	IPI
MAML1	MAML1 mastermindlike 1 (Drosophila)	Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	transcription coactivator activity	IDA
		Function	peptide antigen binding	IPI
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	Notch signaling pathway	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	gene expression	TAS
MAML3	MAML3 mastermindlike 3 (Drosophila)	Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	transcription coactivator activity	IDA
		Biological process	Notch signaling pathway	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	gene expression	TAS
MAN1A1	MAN1A1 mannosidase, alpha, class 1A, member 1	Component	ER-Golgi intermediate compartment	IDA
		Component	endoplasmic reticulum	TAS
		Component	membrane fraction	TAS
		Function	mannosidase activity	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
MAN1A2	MAN1A2 mannosidase, alpha, class 1A, member 2	Component	membrane fraction	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	N-glycan processing	TAS
		Biological process	post-translational protein modification	TAS

		Biological process	protein N-linked glycosylation via asparagine	TAS
MAN2A1	MAN2A1 mannosidase, alpha, class 2A, member 1	Component	Golgi membrane	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
MAP1B	MAP1B microtubuleassociated protein 1B	Function	protein binding	IPI
MAP2K4	MAP2K4 mitogenactivated protein kinase kinase 4	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	JUN kinase kinase activity	TAS
		Function	protein kinase activity	TAS
		Biological process	cellular response to mechanical stimulus	IEP
		Biological process	innate immune response	TAS
		Biological process	JNK cascade	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	signal transduction	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
MAP4K4	MAP4K4 mitogenactivated protein kinase kinase kinase 4	Component	cytoplasm	IDA
		Function	ATP binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein binding	IPI
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	regulation of JNK cascade	IDA
		Biological process	response to stress	IDA
MAP6	MAP6 microtubuleassociated protein 6	Component	microtubule	IDA

		Component	perinuclear region of cytoplasm	IDA
MAPK1	MAPK1 mitogenactivated protein kinase 1	Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	phosphatase binding	IPI
		Function	protein binding	IPI
		Function	kinase activity	TAS
		Biological process	activation of MAPK activity	TAS
		Biological process	activation of MAPKK activity	TAS
		Biological process	axon guidance	TAS
		Biological process	blood coagulation	TAS
		Biological process	chemotaxis	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	ERK1 and ERK2 cascade	TAS
		Biological process	induction of apoptosis	TAS
		Biological process	innate immune response	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	MAPKKK cascade	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	platelet activation	TAS
		Biological process	regulation of sequence-specific DNA binding transcription factor activity	TAS
		Biological process	response to stress	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	synaptic transmission	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS

MAPK10	MAPK10 mitogenactivated protein kinase 10	Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Function	JUN kinase activity	TAS
		Function	MAP kinase kinase activity	TAS
		Biological process	innate immune response	TAS
		Biological process	JNK cascade	TAS
		Biological process	JUN phosphorylation	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	regulation of sequence-specific DNA binding transcription factor activity	TAS
		Biological process	signal transduction	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
MAPRE1	MAPRE1 microtubuleassociated protein, RP/EB family, member 1	Component	centrosome	IDA
		Component	cortical microtubule cytoskeleton	IDA
		Component	cytoplasm	IDA
		Component	microtubule	IDA
		Component	colocalizes_with spindle	IDA
		Component	cytosol	TAS
		Function	microtubule plus-end binding	IDA
		Function	protein binding	IPI
		Function	protein C-terminus binding	TAS
		Biological process	negative regulation of microtubule polymerization	IDA
		Biological process	protein localization to microtubule	IDA
		Biological process	cell proliferation	TAS

		Biological process	G2/M transition of mitotic cell cycle	TAS
		Biological process	M phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic prometaphase	TAS
MAPRE2	MAPRE2 microtubuleassociated protein, RP/EB family, member 2	Component	microtubule cytoskeleton	IDA
		Biological process	cell proliferation	TAS
		Biological process	signal transduction	TAS
MARCH3	MARCH3 membraneassociated ring finger (C3HC4) 3	Component	endosome	IDA
		Component	lysosome	IDA
MARCH5	MARCH5 membraneassociated ring finger (C3HC4) 5	Component	endoplasmic reticulum	IDA
		Component	endoplasmic reticulum membrane	IDA
		Component	mitochondrial outer membrane	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Function	ubiquitin-protein ligase activity	IMP
		Function	GTPase binding	IPI
		Function	protein binding	IPI
		Biological process	protein autoubiquitination	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	cell aging	IMP
		Biological process	protein localization in mitochondrion	IMP
		Biological process	protein ubiquitination	IMP
		Biological process	regulation of mitochondrial fission	IMP
MARCH9	MARCH9 membraneassociated ring finger (C3HC4) 9	Component	Golgi stack	IDA
		Component	trans-Golgi network	IDA
MARCKS	MARCKS myristoylated alaninerich protein kinase C substrate	Component	actin cytoskeleton	TAS
		Component	plasma membrane	TAS
		Function	actin filament binding	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	regulation of insulin secretion	TAS
MARCKSL1	MARCKSL1 MARCKSlike 1	Component	plasma membrane	IDA
MASP1	MASP1 mannanbinding lectin serine peptidase 1 (C4/C2 activating component of Rareactive factor)	Component	extracellular space	IDA
		Component	extracellular region	TAS

		Function	calcium ion binding	IDA
		Function	peptidase activity	IDA
		Function	serine-type endopeptidase activity	IDA
		Function	calcium-dependent protein binding	IPI
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	negative regulation of complement activation	IDA
		Biological process	complement activation, lectin pathway	IMP
		Biological process	complement activation	TAS
		Biological process	innate immune response	TAS
MAST3	MAST3 microtubule associated serine/threonine kinase 3	Function	protein binding	IPI
MATR3	MATR3 matrin 3	Component	nuclear inner membrane	TAS
		Function	protein binding	IPI
		Function	structural molecule activity	TAS
MBD5	MBD5 methylCpG binding domain protein 5	Function	NOT DNA binding	IDA
		Function	chromatin binding	IDA
MBD6	MBD6 methylCpG binding domain protein 6	Function	NOT DNA binding	IDA
		Function	chromatin binding	IDA
MBNL1	MBNL1 muscleblindlike (Drosophila)	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	stress granule	IDA
		Function	RNA binding	IDA
		Function	double-stranded RNA binding	IDA
		Function	protein binding	IPI
		Biological process	regulation of RNA splicing	IDA
		Biological process	RNA splicing	IDA
MBNL2	MBNL2 muscleblindlike 2 (Drosophila)	Biological process	regulation of RNA splicing	IDA
ME1	ME1 malic enzyme 1, NADP(+)dependent, cytosolic	Function	malate dehydrogenase (oxaloacetate-decarboxylating) (NADP+) activity	IDA
		Function	malic enzyme activity	IDA
		Function	manganese ion binding	IDA
		Function	ADP binding	TAS
		Function	NAD binding	TAS
		Function	NADP binding	TAS

		Function	electron carrier activity	TAS
		Biological process	malate metabolic process	IDA
		Biological process	cellular lipid metabolic process	TAS
		Biological process	NADP biosynthetic process	TAS
		Biological process	response to carbohydrate stimulus	TAS
MECP2	MECP2 methyl CpG binding protein 2 (Rett syndrome)	Component	heterochromatin	IDA
		Component	nucleus	IDA
		Function	double-stranded methylated DNA binding	IMP
		Function	protein N-terminus binding	IPI
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Function	transcription corepressor activity	TAS
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	TAS
MED1	MED1 mediator complex subunit 1	Component	mediator complex	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	RNA polymerase II transcription cofactor activity	IDA
		Function	receptor activity	IDA
		Function	thyroid hormone receptor binding	IDA
		Function	transcription coactivator activity	IDA
		Function	transcription cofactor activity	IDA
		Function	estrogen receptor binding	IPI
		Function	ligand-dependent nuclear receptor binding	IPI
		Function	peroxisome proliferator activated receptor binding	IPI
		Function	protein binding	IPI
		Function	retinoic acid receptor binding	IPI
		Function	thyroid hormone receptor binding	IPI
		Function	transcription factor binding	IPI
		Function	vitamin D receptor binding	IPI
		Biological process	androgen receptor signaling pathway	IDA
		Biological process	fat cell differentiation	IDA
		Biological process	positive regulation of transcription from RNA	IDA

			polymerase II promoter	
		Biological process	steroid hormone receptor signaling pathway	IDA
		Biological process	transcription initiation from RNA polymerase II promoter	IDA
		Biological process	androgen biosynthetic process	IMP
		Biological process	cellular lipid metabolic process	TAS
		Biological process	gene expression	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
MED13	MED13 mediator complex subunit 13	Component	mediator complex	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	RNA polymerase II transcription cofactor activity	IDA
		Function	receptor activity	IDA
		Function	thyroid hormone receptor binding	IDA
		Function	transcription coactivator activity	IDA
		Function	transcription cofactor activity	IDA
		Biological process	androgen receptor signaling pathway	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	steroid hormone receptor signaling pathway	IDA
		Biological process	transcription initiation from RNA polymerase II promoter	IDA
		Biological process	gene expression	TAS
MED22	MED22 mediator complex subunit 22	Component	mediator complex	IDA
		Component	cytoplasm	TAS
		Component	soluble fraction	TAS
		Function	protein binding	IPI
MED26	MED26 mediator complex subunit 26	Component	mediator complex	IDA
		Component	nucleoplasm	TAS
		Function	RNA polymerase II transcription cofactor activity	IDA
		Function	transcription coactivator activity	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	gene expression	TAS

		Biological process	transcription initiation from RNA polymerase II promoter	TAS
MEIS1	MEIS1 Meis homeobox 1	Function	protein binding	IPI
MEMO1	MEMO1 mediator of cell motility 1	Component	cytosol	IDA
		Component	nucleus	IDA
		Biological process	regulation of microtubule-based process	IMP
MET	MET met protooncogene (hepatocyte growth factor receptor)	Component	basal plasma membrane	IDA
		Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	hepatocyte growth factor receptor activity	TAS
		Function	protein tyrosine kinase activity	TAS
		Biological process	axon guidance	TAS
		Biological process	cell proliferation	TAS
		Biological process	hepatocyte growth factor receptor signaling pathway	TAS
		Biological process	signal transduction	TAS
METAP2	METAP2 methionyl aminopeptidase 2	Component	cytoplasm	IDA
		Function	aminopeptidase activity	IDA
		Function	metalloexopeptidase activity	IDA
		Biological process	N-terminal protein amino acid modification	IDA
		Biological process	peptidyl-methionine modification	IDA
		Biological process	protein processing	IDA
MEX3D	MEX3D mex3 homolog D (C. elegans)	Component	nucleus	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	AU-rich element binding	IDA
MGAT3	MGAT3 mannosyl (beta1,4)glycoprotein beta1,4Nacetylglucosaminyltransferase	Component	Golgi membrane	TAS
		Function	beta-1,4-mannosylglycoprotein 4-beta-N-acetylglucosaminyltransferase activity	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
MGAT4A	MGAT4A mannosyl (alpha1,3)glycoprotein	Component	Golgi membrane	TAS

	beta1,4Nacetylglucosaminyltransferase, isozyme A			
		Function	alpha-1,3-mannosylglycoprotein 4-beta-N-acetylglucosaminyltransferase activity	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	N-glycan processing	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
MINK1	MINK1 misshapenlike kinase 1	Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	JNK cascade	TAS
MKLN1	MKLN1 muskelin 1, intracellular mediator containing kelch motifs	Function	protein binding	IPI
MLKL	MLKL mixed lineage kinase domainlike	Function	protein binding	IPI
MLL2	MLL2 myeloid/lymphoid or mixedlineage leukemia 2	Component	histone methyltransferase complex	IPI
		Function	protein binding	IPI
		Biological process	response to estrogen stimulus	IDA
		Biological process	positive regulation of cell proliferation	IMP
		Biological process	positive regulation of estrogen receptor signaling pathway	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
MLL4	MLL4 myeloid/lymphoid or mixedlineage leukemia 4	Function	protein binding	IPI
		Biological process	histone H3-K4 methylation	IMP
MLLT6	MLLT6 myeloid/lymphoid or mixedlineage leukemia (trithorax homolog, Drosophila); translocated to, 6	Function	protein binding	IPI
		Biological process	regulation of transcription, DNA-dependent	TAS
MMD	MMD monocyte to macrophage differentiationassociated	Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS
MOBKL1A	MOBKL1A MOB1, Mps One Binder kinase activatorlike 1A (yeast)	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	kinase activator activity	IDA
		Function	kinase binding	IPI
		Function	protein binding	IPI

		Biological process	hippo signaling cascade	IDA
		Biological process	positive regulation of phosphorylation	IDA
		Biological process	protein autophosphorylation	IDA
MOBKL2B	MOBKL2B MOB1, Mps One Binder kinase activatorlike 2B (yeast)	Function	protein binding	IPI
MORC3	MORC3 MORC family CWtype zinc finger 3	Component	PML body	IDA
		Component	aggresome	IDA
		Component	intermediate filament cytoskeleton	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Biological process	cell aging	IDA
		Biological process	maintenance of protein location in nucleus	IDA
		Biological process	negative regulation of fibroblast proliferation	IDA
		Biological process	peptidyl-serine phosphorylation	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	protein stabilization	IDA
MORF4L1	MORF4L1 mortality factor 4 like 1	Component	NuA4 histone acetyltransferase complex	IDA
		Component	Sin3 complex	IDA
		Function	protein N-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	double-strand break repair via homologous recombination	IDA
		Biological process	histone deacetylation	IDA
		Biological process	histone H2A acetylation	IDA
		Biological process	histone H4 acetylation	IDA
MPP2	MPP2 membrane protein, palmitoylated 2 (MAGUK p55 subfamily member 2)	Component	cell surface	IDA
		Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS
		Function	guanylate kinase activity	TAS
		Biological process	signal transduction	TAS
MPP5	MPP5 membrane protein, palmitoylated 5 (MAGUK p55 subfamily member 5)	Component	cytoplasm	IDA
		Component	plasma membrane	TAS
		Function	protein binding	IPI

		Function	protein domain specific binding	IPI
		Biological process	cell junction assembly	TAS
		Biological process	cell-cell junction organization	TAS
		Biological process	tight junction assembly	TAS
MPZ	MPZ myelin protein zero	Component	integral to plasma membrane	TAS
		Biological process	synaptic transmission	TAS
MRVI1	MRVI1 murine retrovirus integration site 1 homolog	Component	endoplasmic reticulum membrane	TAS
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
MS4A2	MS4A2 membran spanning 4 domains, subfamily A, member 2 (Fc fragment of IgE, high affinity I, receptor for; beta polypeptide)	Function	calcium channel activity	TAS
		Biological process	calcium ion transmembrane transport	TAS
		Biological process	cell proliferation	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	humoral immune response	TAS
MSRB3	MSRB3 methionine sulfoxide reductase B3	Component	endoplasmic reticulum	IDA
		Component	mitochondrion	IDA
		Function	protein-methionine-R-oxide reductase activity	IDA
		Function	zinc ion binding	IDA
		Biological process	protein repair	IDA
MSTO1	MSTO1 misato homolog 1 (Drosophila)	Component	cytoplasm	IDA
		Component	mitochondrial outer membrane	IDA
		Biological process	mitochondrion distribution	IMP
		Biological process	mitochondrion organization	IMP
MTA2	MTA2 metastasis associated 1 family, member 2	Component	NuRD complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	histone deacetylase complex	TAS
		Function	protein binding	IPI
		Biological process	chromatin assembly or disassembly	TAS
MTDH	MTDH metadherin	Component	cytoplasm	IDA
		Component	endoplasmic reticulum	IDA
		Component	nuclear body	IDA

		Component	nucleolus	IDA
		Component	nucleus	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	transcription coactivator activity	IMP
		Function	NF-kappaB binding	IPI
		Function	RNA polymerase II transcription factor binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of apoptosis	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of angiogenesis	IDA
		Biological process	positive regulation of autophagy	IDA
		Biological process	positive regulation of I-kappaB kinase/NF-kappaB cascade	IDA
		Biological process	positive regulation of NF-kappaB transcription factor activity	IDA
		Biological process	positive regulation of protein kinase B signaling cascade	IDA
		Biological process	lipopolysaccharide-mediated signaling pathway	IMP
MTF1	MTF1 metalregulatory transcription factor 1	Function	protein binding	IPI
		Function	transcription coactivator activity	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
		Biological process	response to metal ion	TAS
		Biological process	transcription, DNA-dependent	TAS
MTMR14	MTMR14 myotubularin related protein 14	Component	perinuclear region of cytoplasm	IDA
		Component	ruffle	IDA
		Function	phosphatidylinositol-3-phosphatase activity	IDA
MTMR3	MTMR3 myotubularin related protein 3	Component	cytoplasm	IDA
		Component	membrane fraction	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	phosphatidylinositol-3-phosphatase activity	IDA
		Function	protein serine/threonine phosphatase activity	IDA
		Function	protein tyrosine phosphatase activity	IDA

		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	phosphatidylinositol dephosphorylation	IDA
		Biological process	protein dephosphorylation	IDA
MTMR6	MTMR6 myotubularin related protein 6	Component	cytoplasm	IDA
		Function	calcium-activated potassium channel activity	IDA
MTMR7	MTMR7 myotubularin related protein 7	Biological process	peptidyl-tyrosine dephosphorylation	TAS
		Biological process	protein dephosphorylation	TAS
MTPN	MTPN myotrophin	Function	protein binding	IPI
MXD1	MXD1 MAX dimerization protein 1	Component	cytoplasm	IDA
		Component	mitochondrion	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Function	transcription cofactor activity	TAS
		Function	transcription corepressor activity	TAS
		Biological process	cell proliferation	TAS
		Biological process	multicellular organismal development	TAS
		Biological process	transcription, DNA-dependent	TAS
MYCBP	MYCBP myc binding protein	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	transcription coactivator activity	IDA
		Function	protein binding	IPI
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	spermatogenesis	IEP
MYCL1	MYCL1 vmyc myelocytomatosis viral oncogene homolog 1, lung carcinoma derived (avian)	Function	DNA binding	TAS
MYCN	MYCN vmyc myelocytomatosis viral related oncogene, neuroblastoma derived (avian)	Component	nucleus	IDA
		Component	chromatin	TAS
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
		Biological process	transcription, DNA-dependent	TAS

MYEF2	MYEF2 myelin expression factor 2	Component	Golgi apparatus	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
MYH10	MYH10 myosin, heavy chain 10, nonmuscle	Component	cell cortex	IDA
		Component	cleavage furrow	IDA
		Component	cytoplasm	IDA
		Component	midbody	IDA
		Component	stress fiber	IDA
		Function	ADP binding	IDA
		Function	ATP binding	IDA
		Function	actin filament binding	IDA
		Function	actin-dependent ATPase activity	IDA
		Function	microfilament motor activity	IDA
		Function	protein binding	IPI
		Biological process	actin filament-based movement	IDA
		Biological process	cytokinesis after mitosis	IDA
		Biological process	axon guidance	TAS
MYH14	MYH14 myosin, heavy chain 14, nonmuscle	Biological process	axon guidance	TAS
MYLK3	MYLK3 myosin light chain kinase 3	Biological process	cellular response to interleukin-1	IMP
		Biological process	regulation of vascular permeability involved in acute inflammatory response	IMP
MYO10	MYO10 myosin X	Biological process	axon guidance	TAS
MYO15A	MYO15A myosin XVA	Function	protein binding	IPI
MYO1B	MYO1B myosin IB	Function	protein binding	IPI
MYO5A	MYO5A myosin VA (heavy chain 12, myoxin)	Component	cytoplasm	IDA
		Component	ruffle	IDA
MYST2	MYST2 MYST histone acetyltransferase 2	Component	histone acetyltransferase complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleoplasm	IDA
		Function	protein binding	IPI
		Biological process	DNA replication	IDA
		Biological process	histone H3 acetylation	IDA
		Biological process	histone H4-K12 acetylation	IDA
		Biological process	histone H4-K5 acetylation	IDA
		Biological process	histone H4-K8 acetylation	IDA

		Biological process	NOT histone H4-K16 acetylation	IDA
NAP1L5	NAP1L5 nucleosome assembly protein 1like 5	Function	protein binding	IPI
NBR1	NBR1 neighbor of BRCA1 gene 1	Component	cytosol	IDA
		Function	ubiquitin binding	IDA
		Function	protein binding	IPI
		Biological process	macroautophagy	IDA
		Biological process	protein oligomerization	IDA
NCAM1	NCAM1 neural cell adhesion molecule 1	Component	Golgi membrane	TAS
		Component	plasma membrane	TAS
		Biological process	axon guidance	TAS
		Biological process	cytokine-mediated signaling pathway	TAS
		Biological process	interferon-gamma-mediated signaling pathway	TAS
NCBP1	NCBP1 nuclear cap binding protein subunit 1, 80kDa	Component	mRNA cap binding complex	IDA
		Component	nucleus	IDA
		Component	ribonucleoprotein complex	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Function	RNA binding	TAS
		Function	RNA cap binding	TAS
		Biological process	mRNA capping	IDA
		Biological process	mRNA cleavage	IDA
		Biological process	nuclear-transcribed mRNA catabolic process, nonsense-mediated decay	IDA
		Biological process	positive regulation of mRNA 3'-end processing	IDA
		Biological process	regulation of translational initiation	IDA
		Biological process	mRNA export from nucleus	IMP
		Biological process	nuclear-transcribed mRNA catabolic process, nonsense-mediated decay	IMP
		Biological process	gene expression	TAS
		Biological process	histone mRNA metabolic process	TAS
		Biological process	mRNA 3'-end processing	TAS
		Biological process	mRNA capping	TAS
		Biological process	mRNA export from nucleus	TAS
		Biological process	mRNA processing	TAS

		Biological process	ncRNA metabolic process	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
		Biological process	positive regulation of viral transcription	TAS
		Biological process	RNA metabolic process	TAS
		Biological process	termination of RNA polymerase II transcription	TAS
		Biological process	transcription elongation from RNA polymerase II promoter	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
		Biological process	viral reproduction	TAS
NCLN	NCLN nicalin	Component	endoplasmic reticulum	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
NCOA2	NCOA2 nuclear receptor coactivator 2	Component	nucleoplasm	TAS
		Function	ligand-dependent nuclear receptor binding	IPI
		Function	protein binding	IPI
		Biological process	cellular lipid metabolic process	TAS
NCOA7	NCOA7 nuclear receptor coactivator 7	Component	intracellular	IDA
		Function	protein binding	IPI
NCOR2	NCOR2 nuclear receptor corepressor 2	Component	nuclear body	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	transcriptional repressor complex	IDA
		Component	nucleoplasm	TAS
		Function	transcription corepressor activity	IDA
		Function	transcription corepressor activity	IMP
		Function	Notch binding	IPI
		Function	histone deacetylase binding	IPI
		Function	protein N-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP

		Biological process	regulation of cellular ketone metabolic process by negative regulation of transcription from an RNA polymerase II promoter	IMP
		Biological process	cellular lipid metabolic process	TAS
NDEL1	NDEL1 nudE nuclear distribution gene E homolog (A. nidulans)like 1	Component	kinetochore	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	chromosome segregation	IMP
		Biological process	M phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic prometaphase	TAS
NDRG3	NDRG3 NDRG family member 3	Component	cytoplasm	IDA
NDST1	NDST1 Ndeacetylase/Nsulfotransferase (heparan glucosaminy) 1	Biological process	heparan sulfate proteoglycan biosynthetic process	TAS
NEFL	NEFL neurofilament, light polypeptide	Component	colocalizes_with TSC1-TSC2 complex	IDA
		Component	axon	IDA
		Component	neurofilament	IDA
		Function	structural constituent of cytoskeleton	IDA
		Function	identical protein binding	IPI
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	neurofilament bundle assembly	IDA
		Biological process	anterograde axon cargo transport	IMP
		Biological process	axon transport of mitochondrion	IMP
		Biological process	intermediate filament organization	IMP
		Biological process	neurofilament bundle assembly	IMP
		Biological process	retrograde axon cargo transport	IMP
		Biological process	synaptic transmission	TAS
NEFM	NEFM neurofilament, medium polypeptide	Component	axon	TAS
		Function	protein binding	IPI
		Function	structural constituent of cytoskeleton	TAS
NEK11	NEK11 NIMA (never in mitosis gene a) related kinase 11	Component	nucleolus	IDA
		Component	NOT nucleolus	IDA

		Component	nucleus	IDA
		Function	ATP binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	intra-S DNA damage checkpoint	IDA
		Biological process	protein phosphorylation	IDA
NEO1	NEO1 neogenin 1	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Biological process	axon guidance	TAS
		Biological process	muscle cell differentiation	TAS
NEU3	NEU3 sialidase 3 (membrane sialidase)	Component	plasma membrane	IDA
		Component	integral to plasma membrane	TAS
		Function	alpha-sialidase activity	IDA
		Function	catalytic activity	TAS
		Biological process	carbohydrate metabolic process	IDA
		Biological process	ganglioside catabolic process	TAS
NF1	NF1 neurofibromin 1	Component	axon	IDA
		Component	dendrite	IDA
		Function	Ras GTPase activator activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of Ras GTPase activity	IDA
		Biological process	cognition	IMP
		Biological process	negative regulation of cell migration	IMP
		Biological process	negative regulation of endothelial cell proliferation	IMP
		Biological process	negative regulation of MAPKKK cascade	IMP
		Biological process	positive regulation of Ras GTPase activity	IMP
		Biological process	regulation of angiogenesis	IMP
		Biological process	regulation of blood vessel endothelial cell	IMP

			migration	
		Biological process	regulation of Ras GTPase activity	IMP
NFAM1	NFAM1 NFAT activating protein with ITAM motif 1	Component	integral to membrane	IDA
		Function	transmembrane receptor activity	IDA
		Biological process	intracellular signal transduction	IDA
		Biological process	positive regulation of sequence-specific DNA binding transcription factor activity	IDA
		Biological process	signal transduction	IDA
NFASC	NFASC neurofascin	Component	node of Ranvier	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	axon guidance	TAS
		Biological process	excretion	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
NFE2L1	NFE2L1 nuclear factor (erythroidderived 2)like 1	Function	transcription cofactor activity	TAS
		Biological process	anatomical structure morphogenesis	TAS
		Biological process	heme biosynthetic process	TAS
		Biological process	inflammatory response	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
NFIA	NFIA nuclear factor I/A	Component	cell junction	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	transcription factor binding	IPI
NFIB	NFIB nuclear factor I/B	Component	nucleolus	IDA
		Component	nucleus	IDA
		Biological process	transcription, DNA-dependent	TAS
NFIX	NFIX nuclear factor I/X (CCAATbinding transcription factor)	Function	sequence-specific enhancer binding RNA polymerase II transcription factor activity	TAS
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription from RNA polymerase II promoter	TAS
		Component	cytoplasm	IDA
NFKB1	NFKB1 nuclear factor of kappa light polypeptide gene	Component	mitochondrion	IDA

	enhancer in Bcells 1			
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	I-kappaB/NF-kappaB complex	TAS
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	negative regulation of calcidiol 1-monooxygenase activity	IDA
		Biological process	cellular response to mechanical stimulus	IEP
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	anti-apoptosis	TAS
		Biological process	inflammatory response	TAS
		Biological process	innate immune response	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	positive regulation of NF-kappaB transcription factor activity	TAS
		Biological process	T cell receptor signaling pathway	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
NFYA	NFYA nuclear transcription factor Y, alpha	Component	CCAAT-binding factor complex	IDA
		Component	nucleus	IDA
		Function	DNA binding	IDA

		Function	protein binding	IPI
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	transcription from RNA polymerase II promoter	TAS
NINJ1	NINJ1 ninjurin 1	Biological process	nervous system development	TAS
NIPBL	NIPBL NippedB homolog (Drosophila)	Component	SMC loading complex	IDA
		Component	nucleus	IDA
		Function	chromo shadow domain binding	IPI
		Function	histone deacetylase binding	IPI
		Function	protein C-terminus binding	IPI
		Function	protein N-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of histone deacetylation	IDA
		Biological process	arm morphogenesis	IMP
		Biological process	brain development	IMP
		Biological process	cellular protein localization	IMP
		Biological process	cellular response to X-ray	IMP
		Biological process	cognition	IMP
		Biological process	developmental growth	IMP
		Biological process	ear morphogenesis	IMP
		Biological process	embryonic arm morphogenesis	IMP
		Biological process	embryonic digestive tract morphogenesis	IMP
		Biological process	external genitalia morphogenesis	IMP
		Biological process	eye morphogenesis	IMP
		Biological process	face morphogenesis	IMP
		Biological process	gall bladder development	IMP
		Biological process	heart morphogenesis	IMP
		Biological process	maintenance of mitotic sister chromatid cohesion	IMP
		Biological process	mitotic sister chromatid cohesion	IMP
		Biological process	outflow tract morphogenesis	IMP
		Biological process	regulation of developmental growth	IMP
		Biological process	regulation of embryonic development	IMP
		Biological process	regulation of hair cycle	IMP
		Biological process	response to DNA damage stimulus	IMP

		Biological process	sensory perception of sound	IMP
		Biological process	uterus morphogenesis	IMP
NLGN1	NLGN1 neuroligin 1	Component	postsynaptic density	TAS
		Biological process	neuron cell-cell adhesion	TAS
		Biological process	neuronal signal transduction	TAS
NLGN3	NLGN3 neuroligin 3	Component	cell surface	IDA
		Component	cytoplasm	IDA
		Function	protein binding	IPI
		Biological process	social behavior	IMP
		Biological process	synapse organization	IMP
NLRC3	NLRC3 NLR family, CARD domain containing 3	Component	cytoplasm	IDA
		Biological process	I-kappaB kinase/NF-kappaB cascade	IDA
		Biological process	negative regulation of NF-kappaB transcription factor activity	IDA
		Biological process	T cell activation	IEP
NMT1	NMT1 Nmyristoyltransferase 1	Component	actin cytoskeleton	IDA
		Component	cell junction	IDA
		Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Function	catalytic activity	TAS
		Biological process	activation of pro-apoptotic gene products	TAS
		Biological process	apoptosis	TAS
		Biological process	induction of apoptosis by intracellular signals	TAS
		Biological process	protein lipoylation	TAS
NONO	NONO nonPOU domain containing, octamerbinding	Component	nuclear matrix	IDA
		Component	paraspeckles	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
NOTCH2	NOTCH2 notch 2	Component	cell surface	IDA
		Component	integral to plasma membrane	IDA
		Component	nucleus	IDA
		Component	Golgi lumen	TAS
		Component	cytosol	TAS
		Component	endoplasmic reticulum lumen	TAS
		Component	extracellular region	TAS

		Component	nucleoplasm	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	ligand-regulated transcription factor activity	TAS
		Biological process	cell cycle arrest	IDA
		Biological process	cell growth	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	positive regulation of Ras protein signal transduction	IDA
		Biological process	organ morphogenesis	IEP
		Biological process	bone remodeling	IMP
		Biological process	anti-apoptosis	TAS
		Biological process	cell fate determination	TAS
		Biological process	gene expression	TAS
		Biological process	hemopoiesis	TAS
		Biological process	induction of apoptosis	TAS
		Biological process	Notch receptor processing	TAS
		Biological process	Notch signaling pathway	TAS
		Biological process	regulation of transcription, DNA-dependent	TAS
		Biological process	stem cell maintenance	TAS
NOVA1	NOVA1 neurooncological ventral antigen 1	Biological process	locomotory behavior	TAS
		Biological process	RNA processing	TAS
		Biological process	RNA splicing	TAS
		Biological process	synaptic transmission	TAS
NPLOC4	NPLOC4 nuclear protein localization 4 homolog (S. cerevisiae)	Function	protein binding	IPI
NR2C2	NR2C2 nuclear receptor subfamily 2, group C, member 2	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	receptor activity	TAS
		Function	transcription coactivator activity	TAS

		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	gene expression	TAS
		Biological process	nervous system development	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
		Biological process	transcription, DNA-dependent	TAS
NR3C1	NR3C1 nuclear receptor subfamily 3, group C, member 1 (glucocorticoid receptor)	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	mitochondrial matrix	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	response to protein stimulus	IDA
		Biological process	gene expression	TAS
		Biological process	glucocorticoid mediated signaling pathway	TAS
		Biological process	glucocorticoid receptor signaling pathway	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
		Biological process	signal transduction	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
		Biological process	transcription, DNA-dependent	TAS
NR3C2	NR3C2 nuclear receptor subfamily 3, group C, member 2	Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	gene expression	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
		Biological process	signal transduction	TAS
		Biological process	steroid hormone mediated signaling pathway	TAS
		Biological process	transcription, DNA-dependent	TAS
NR4A3	NR4A3 nuclear receptor subfamily 4, group A, member 3	Component	nucleoplasm	TAS

		Function	binding	TAS
		Function	thyroid hormone receptor activity	TAS
		Biological process	gene expression	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
		Biological process	steroid hormone mediated signaling pathway	TAS
NRIP1	NRIP1 nuclear receptor interacting protein 1	Component	nucleus	IDA
		Function	transcription coactivator activity	IDA
		Function	transcription corepressor activity	IDA
		Function	estrogen receptor binding	IPI
		Function	glucocorticoid receptor binding	IPI
		Function	nuclear hormone receptor binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Component	plasma membrane	TAS
		Function	growth factor binding	IPI
		Function	protein binding	IPI
		Biological process	axon guidance	TAS
		Biological process	cell-cell signaling	TAS
		Biological process	organ morphogenesis	TAS
		Biological process	positive regulation of cell proliferation	TAS
		Biological process	signal transduction	TAS
		Biological process	vascular endothelial growth factor receptor signaling pathway	TAS
NRSN2	NRSN2 neuensin 2	Component	plasma membrane	IDA
NRXN1	NRXN1 neuexin 1	Component	integral to plasma membrane	TAS
		Component	presynaptic membrane	TAS
		Function	protein binding	IPI
		Function	receptor activity	TAS
		Biological process	axon guidance	TAS
		Biological process	neuron cell-cell adhesion	TAS
		Biological process	neuronal signal transduction	TAS

NRXN3	NRXN3 neurexin 3	Component	integral to plasma membrane	TAS
		Function	receptor activity	TAS
		Biological process	axon guidance	TAS
NSF	NSF Nethylmaleimidesensitive factor	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Biological process	synaptic transmission	TAS
NTF3	NTF3 neurotrophin 3	Function	protein binding	IPI
		Function	receptor binding	TAS
		Biological process	cell-cell signaling	TAS
		Biological process	nervous system development	TAS
		Biological process	signal transduction	TAS
NTN1	NTN1 netrin 1	Component	extracellular region	TAS
		Function	protein binding	IPI
		Biological process	axon guidance	TAS
NTNG1	NTNG1 netrin G1	Function	protein binding	IPI
NUAK1	NUAK1 NUAKE family, SNF1like kinase, 1	Function	protein binding	IPI
NUFIP2	NUFIP2 nuclear fragile X mental retardation protein interacting protein 2	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	polysomal ribosome	IDA
		Function	RNA binding	IDA
		Function	protein binding	IPI
NUP153	NUP153 nucleoporin 153kDa	Component	cytoplasm	IDA
		Component	nuclear membrane	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Function	transporter activity	TAS
		Biological process	carbohydrate metabolic process	TAS
		Biological process	glucose transport	TAS
		Biological process	hexose transport	TAS
		Biological process	regulation of glucose transport	TAS
		Biological process	transmembrane transport	TAS
		Biological process	viral reproduction	TAS

NUP160	NUP160 nucleoporin 160kDa	Component	Nup107-160 complex	IDA
		Component	colocalizes_with kinetochore	IDA
		Component	nuclear pore	IDA
		Component	cytosol	TAS
		Component	nuclear envelope	TAS
		Function	nucleocytoplasmic transporter activity	IDA
		Function	protein binding	IPI
		Biological process	mRNA export from nucleus	IDA
		Biological process	carbohydrate metabolic process	TAS
		Biological process	glucose transport	TAS
		Biological process	hexose transport	TAS
		Biological process	M phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic prometaphase	TAS
		Biological process	regulation of glucose transport	TAS
		Biological process	transmembrane transport	TAS
		Biological process	viral reproduction	TAS
NUP210	NUP210 nucleoporin 210kDa	Component	nuclear envelope	TAS
		Function	protein binding	IPI
		Biological process	carbohydrate metabolic process	TAS
		Biological process	glucose transport	TAS
		Biological process	hexose transport	TAS
		Biological process	regulation of glucose transport	TAS
		Biological process	transmembrane transport	TAS
		Biological process	viral reproduction	TAS
NXF1	NXF1 nuclear RNA export factor 1	Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	mRNA export from nucleus	IDA
		Biological process	gene expression	TAS
		Biological process	mRNA export from nucleus	TAS
		Component	intracellular	IDA
OGDH	OGDH oxoglutarate (alphaketoglutarate) dehydrogenase (lipoamide)	Component	mitochondrion	IDA
		Component	mitochondrial matrix	TAS

		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	lysine catabolic process	TAS
		Biological process	tricarboxylic acid cycle	TAS
OLA1	OLA1 Obglike ATPase 1	Component	cytoplasm	IDA
		Function	ATP binding	IDA
		Function	protein binding	IPI
		Biological process	ATP catabolic process	IDA
OMG	OMG oligodendrocyte myelin glycoprotein	Biological process	nerve growth factor receptor signaling pathway	TAS
ONECUT2	ONECUT2 one cut homeobox 2	Biological process	organ morphogenesis	TAS
ORAI3	ORAI3 ORAI calcium releaseactivated calcium modulator 3	Function	protein binding	IPI
ORMDL2	ORMDL2 ORM1like 2 (<i>S. cerevisiae</i>)	Component	endoplasmic reticulum	IDA
		Biological process	ceramide metabolic process	IMP
OTOR	OTOR otoraplin	Biological process	sensory perception of sound	TAS
OTUD4	OTUD4 OTU domain containing 4	Function	protein binding	IPI
OXSR1	OXSR1 oxidativestress responsive 1	Function	ATP binding	IDA
		Function	magnesium ion binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	protein phosphorylation	IDA
PACSIN1	PACSIN1 protein kinase C and casein kinase substrate in neurons 1	Component	cytoplasm	IDA
		Function	protein binding	IPI
PAFAH2	PAFAH2 plateletactivating factor acetylhydrolase 2, 40kDa	Function	phospholipid binding	TAS
		Biological process	lipid metabolic process	TAS
PAN3	PAN3 PAN3 poly(A) specific ribonuclease subunit homolog (<i>S. cerevisiae</i>)	Component	centrosome	IDA
		Component	cytosol	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	nuclear-transcribed mRNA catabolic process, deadenylation-dependent decay	TAS
		Biological process	nuclear-transcribed mRNA poly(A) tail shortening	TAS

		Biological process	RNA metabolic process	TAS
PANK1	PANK1 pantothenate kinase 1	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Biological process	coenzyme biosynthetic process	TAS
		Biological process	pantothenate metabolic process	TAS
		Biological process	vitamin metabolic process	TAS
		Biological process	water-soluble vitamin metabolic process	TAS
PAPD5	PAPD5 PAP associated domain containing 5	Biological process	histone mRNA catabolic process	IMP
PAPOLA	PAPOLA poly(A) polymerase alpha	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytoplasm	TAS
		Component	nucleoplasm	TAS
		Component	nucleus	TAS
		Function	polynucleotide adenylyltransferase activity	TAS
		Biological process	gene expression	TAS
		Biological process	mRNA 3'-end processing	TAS
		Biological process	mRNA processing	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
		Biological process	termination of RNA polymerase II transcription	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
PAPSS2	PAPSS2 3'-phosphoadenosine 5'-phosphosulfate synthase 2	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	adenylylsulfate kinase activity	TAS
		Function	sulfate adenylyltransferase (ATP) activity	TAS
		Biological process	3'-phosphoadenosine 5'-phosphosulfate biosynthetic process	TAS
		Biological process	3'-phosphoadenosine 5'-phosphosulfate metabolic process	TAS
		Biological process	skeletal system development	TAS
		Biological process	xenobiotic metabolic process	TAS
PARP8	PARP8 poly (ADPribose) polymerase family, member 8	Component	intracellular	IDA
PATZ1	PATZ1 POZ (BTB) and AT hook containing zinc finger	Component	nucleus	TAS

	1			
		Biological process	regulation of transcription, DNA-dependent	TAS
PAX2	PAX2 paired box 2	Component	centriolar satellite	IDA
		Component	microtubule organizing center	IDA
		Component	nucleus	IDA
		Function	core promoter proximal region sequence-specific DNA binding	IDA
		Biological process	negative regulation of apoptosis	IDA
		Biological process	negative regulation of caspase activity	IDA
		Biological process	negative regulation of reactive oxygen species metabolic process	IDA
		Biological process	positive regulation of epithelial cell proliferation	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	branching involved in ureteric bud morphogenesis	IEP
		Biological process	metanephric epithelium development	IEP
		Biological process	anti-apoptosis	IMP
		Biological process	negative regulation of cytolysis	IMP
		Biological process	negative regulation of transcription, DNA-dependent	IMP
		Biological process	regulation of metanephros size	IMP
		Biological process	axonogenesis	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
		Biological process	visual perception	TAS
PAX3	PAX3 paired box 3	Function	sequence-specific DNA binding	IDA
		Function	protein binding	IPI
		Biological process	apoptosis	TAS
		Biological process	organ morphogenesis	TAS
		Biological process	sensory perception of sound	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
PAX6	PAX6 paired box 6	Component	cytoplasm	IDA
		Component	nuclear chromatin	IDA
		Component	NOT nucleolus	IDA

		Component	nucleus	IDA
		Function	RNA polymerase II core promoter sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding RNA polymerase II transcription factor activity	IDA
		Function	R-SMAD binding	IPI
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription from RNA polymerase II promoter	IDA
		Biological process	response to wounding	IEP
		Biological process	blood vessel development	IMP
		Biological process	cornea development in camera-type eye	IMP
		Biological process	glucose homeostasis	IMP
		Biological process	iris morphogenesis	IMP
		Biological process	pancreatic A cell development	IMP
		Biological process	positive regulation of gene expression	IMP
		Biological process	transcription from RNA polymerase II promoter	IMP
		Biological process	central nervous system development	TAS
		Biological process	eye development	TAS
		Biological process	organ morphogenesis	TAS
		Biological process	transcription, DNA-dependent	TAS
		Biological process	visual perception	TAS
PAX8	PAX8 paired box 8	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	RNA polymerase II core promoter sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	DNA binding	IMP
		Function	protein binding	IPI
		Function	thyroid-stimulating hormone receptor activity	TAS
		Biological process	cellular response to gonadotropin stimulus	IDA

		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	branching involved in ureteric bud morphogenesis	IEP
		Biological process	central nervous system development	IEP
		Biological process	kidney development	IEP
		Biological process	mesenchymal to epithelial transition involved in metanephros morphogenesis	IEP
		Biological process	metanephric comma-shaped body morphogenesis	IEP
		Biological process	metanephric epithelium development	IEP
		Biological process	metanephric S-shaped body morphogenesis	IEP
		Biological process	otic vesicle development	IEP
		Biological process	thyroid gland development	IEP
		Biological process	positive regulation of thyroid hormone generation	IMP
		Biological process	regulation of thyroid-stimulating hormone secretion	IMP
		Biological process	thyroid gland development	IMP
		Biological process	anatomical structure morphogenesis	TAS
		Biological process	transcription, DNA-dependent	TAS
PBX1	PBX1 preBcell leukemia homeobox 1	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	negative regulation of sequence-specific DNA binding transcription factor activity	IDA
PCDH11X	PCDH11X protocadherin 11 Xlinked	Component	integral to plasma membrane	TAS
PCDH7	PCDH7 protocadherin 7	Component	integral to plasma membrane	TAS
PCGF5	PCGF5 polycomb group ring finger 5	Component	centrosome	IDA
PCOLCE2	PCOLCE2 procollagen Cendopeptidase enhancer 2	Function	collagen binding	IDA
		Function	heparin binding	IDA
		Function	peptidase activator activity	IDA

		Biological process	positive regulation of peptidase activity	IDA
PCSK2	PCSK2 proprotein convertase subtilisin/kexin type 2	Component	extracellular space	IDA
		Component	membrane	IDA
		Component	soluble fraction	IDA
		Function	serine-type endopeptidase activity	IDA
		Function	protein binding	IPI
		Biological process	insulin processing	IDA
		Biological process	proteolysis	IDA
PDAP1	PDAP1 PDGFA associated protein 1	Biological process	cell proliferation	TAS
		Biological process	signal transduction	TAS
PDCD7	PDCD7 programmed cell death 7	Component	U12-type spliceosomal complex	IDA
PDE11A	PDE11A phosphodiesterase 11A	Component	cytosol	TAS
		Function	3',5'-cyclic-AMP phosphodiesterase activity	TAS
		Function	3',5'-cyclic-nucleotide phosphodiesterase activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
PDE1B	PDE1B phosphodiesterase 1B, calmodulindependent	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Function	3',5'-cyclic-AMP phosphodiesterase activity	TAS
		Function	calmodulin-dependent cyclic-nucleotide phosphodiesterase activity	TAS
		Biological process	activation of phospholipase C activity	TAS
		Biological process	apoptosis	TAS
		Biological process	blood coagulation	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	platelet activation	TAS
PDE1C	PDE1C phosphodiesterase 1C, calmodulindependent 70kDa	Component	cytosol	TAS
		Function	calmodulin-dependent cyclic-nucleotide phosphodiesterase activity	TAS
		Biological process	activation of phospholipase C activity	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
PDE4A	PDE4A phosphodiesterase 4A, cAMPspecific	Component	perinuclear region of cytoplasm	IDA

		Component	cytosol	TAS
		Component	insoluble fraction	TAS
		Component	membrane fraction	TAS
		Component	soluble fraction	TAS
		Function	protein binding	IPI
		Function	3',5'-cyclic-AMP phosphodiesterase activity	TAS
PDE4D	PDE4D phosphodiesterase 4D, cAMPspecific	Component	cytosol	TAS
		Component	insoluble fraction	TAS
		Component	soluble fraction	TAS
		Function	3',5'-cyclic-AMP phosphodiesterase activity	TAS
PDE5A	PDE5A phosphodiesterase 5A, cGMPspecific	Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
PDE8B	PDE8B phosphodiesterase 8B	Component	cytosol	TAS
		Function	3',5'-cyclic-AMP phosphodiesterase activity	TAS
PDGFRA	PDGFRA plateletderived growth factor receptor, alpha polypeptide	Component	integral to plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	platelet-derived growth factor alpha-receptor activity	IDA
		Function	protein homodimerization activity	IDA
		Function	vascular endothelial growth factor receptor activity	IDA
		Function	growth factor binding	IPI
		Function	platelet-derived growth factor binding	IPI
		Function	platelet-derived growth factor receptor binding	IPI
		Biological process	peptidyl-tyrosine phosphorylation	IDA
		Biological process	platelet-derived growth factor receptor signaling pathway	IDA
		Biological process	platelet-derived growth factor receptor-alpha signaling pathway	IDA
		Biological process	positive regulation of cell migration	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	positive regulation of DNA replication	IDA
		Biological process	positive regulation of fibroblast proliferation	IDA
		Biological process	protein autophosphorylation	IDA
		Biological process	vascular endothelial growth factor receptor	IDA

			signaling pathway	
		Biological process	cell activation	TAS
PDGFRB	PDGFRB plateletderived growth factor receptor, beta polypeptide	Component	membrane	IDA
		Component	plasma membrane	TAS
		Function	platelet-derived growth factor beta-receptor activity	IDA
		Function	growth factor binding	IPI
		Function	platelet-derived growth factor binding	IPI
		Function	platelet-derived growth factor receptor binding	IPI
		Function	protein binding	IPI
		Function	receptor binding	IPI
		Function	platelet activating factor receptor activity	TAS
		Function	platelet-derived growth factor receptor activity	TAS
		Biological process	cell chemotaxis	IDA
		Biological process	peptidyl-tyrosine phosphorylation	IDA
		Biological process	platelet-derived growth factor receptor signaling pathway	IDA
		Biological process	platelet-derived growth factor receptor-beta signaling pathway	IDA
		Biological process	positive regulation of cell migration	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	protein autophosphorylation	IDA
		Biological process	signal transduction	IDA
		Biological process	platelet-derived growth factor receptor signaling pathway	TAS
PDHX	PDHX pyruvate dehydrogenase complex, component X	Component	mitochondrial matrix	TAS
		Biological process	pyruvate metabolic process	TAS
PDIA3	PDIA3 protein disulfide isomerase family A, member 3	Component	endoplasmic reticulum	IDA
		Component	endoplasmic reticulum	TAS
		Function	protein binding	IPI
		Function	cysteine-type endopeptidase activity	TAS
		Function	phospholipase C activity	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	post-translational protein modification	TAS

		Biological process	protein import into nucleus	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
		Biological process	protein retention in ER lumen	TAS
		Biological process	signal transduction	TAS
PDIA6	PDIA6 protein disulfide isomerase family A, member 6	Component	ER-Golgi intermediate compartment	IDA
		Component	endoplasmic reticulum	TAS
		Function	protein binding	IPI
		Biological process	protein folding	TAS
PDLIM2	PDLIM2 PDZ and LIM domain 2 (mystique)	Component	actin cytoskeleton	IDA
		Component	cell surface	IDA
		Component	focal adhesion	IDA
PDPR	PDPR pyruvate dehydrogenase phosphatase regulatory subunit	Component	mitochondrial matrix	TAS
		Biological process	pyruvate metabolic process	TAS
PDZD2	PDZD2 PDZ domain containing 2	Component	cytoplasm	IDA
PEG10	PEG10 paternally expressed 10	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of transforming growth factor beta receptor signaling pathway	IDA
PELI2	PELI2 pellino homolog 2 (Drosophila)	Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	positive regulation of MAPKKK cascade	IDA
		Biological process	positive regulation of protein phosphorylation	IDA
		Biological process	innate immune response	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	positive regulation of I-kappaB kinase/NF-kappaB cascade	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
PEX7	PEX7 peroxisomal biogenesis factor 7	Function	peroxisome matrix targeting signal-2 binding	IDA
		Biological process	protein import into peroxisome matrix	IDA

		Biological process	ether lipid biosynthetic process	IMP
		Biological process	protein import into peroxisome matrix	IMP
PFAS	PFAS phosphoribosylformylglycinamide synthase	Component	cytosol	TAS
		Function	phosphoribosylformylglycinamide synthase activity	IDA
		Function	protein binding	IPI
		Function	phosphoribosylformylglycinamide synthase activity	TAS
		Biological process	nucleobase, nucleoside and nucleotide metabolic process	TAS
		Biological process	purine base metabolic process	TAS
PGAP1	PGAP1 postGPI attachment to proteins 1	Component	endoplasmic reticulum membrane	TAS
		Function	hydrolase activity, acting on ester bonds	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	C-terminal protein lipidation	TAS
		Biological process	post-translational protein modification	TAS
PGM5	PGM5 phosphoglucomutase 5	Component	cell-cell adherens junction	IDA
		Component	costamere	IDA
		Component	focal adhesion	IDA
		Component	intercalated disc	IDA
		Component	internal side of plasma membrane	IDA
		Component	sarcolemma	IDA
		Component	spot adherens junction	IDA
		Component	stress fiber	IDA
		Function	NOT phosphoglucomutase activity	IDA
PGR	PGR progesterone receptor	Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	receptor binding	IPI
		Function	DNA binding	TAS
		Biological process	cell-cell signaling	TAS
		Biological process	gene expression	TAS

		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
		Biological process	signal transduction	TAS
		Biological process	steroid hormone mediated signaling pathway	TAS
PHC2	PHC2 polyhomeotic homolog 2 (Drosophila)	Function	identical protein binding	IPI
PHC2	PHC2 polyhomeotic homolog 2 (Drosophila)	Function	protein binding	IPI
PHF15	PHF15 PHD finger protein 15	Component	histone acetyltransferase complex	IDA
		Biological process	histone H3 acetylation	IDA
		Biological process	histone H4-K12 acetylation	IDA
		Biological process	histone H4-K5 acetylation	IDA
		Biological process	histone H4-K8 acetylation	IDA
		Biological process	NOT histone H4-K16 acetylation	IDA
PHF21A	PHF21A PHD finger protein 21A	Component	histone deacetylase complex	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	blood coagulation	TAS
PHF8	PHF8 PHD finger protein 8	Component	nucleolus	IDA
		Component	nucleus	IDA
		Function	chromatin binding	IDA
		Function	histone demethylase activity	IDA
		Function	histone demethylase activity (H3-K27 specific)	IDA
		Function	histone demethylase activity (H3-K36 specific)	IDA
		Function	histone demethylase activity (H3-K9 specific)	IDA
		Function	histone demethylase activity (H4-K20 specific)	IDA
		Function	iron ion binding	IDA
		Function	methylated histone residue binding	IDA
		Function	oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen, 2-oxoglutarate as one donor, and incorporation of one atom each of oxygen into both donors	IDA
		Function	zinc ion binding	IDA
		Function	protein binding	IPI
		Biological process	histone H3-K27 demethylation	IDA
		Biological process	histone H3-K36 demethylation	IDA

		Biological process	histone H3-K9 demethylation	IDA
		Biological process	histone H4-K20 demethylation	IDA
		Biological process	negative regulation of chromatin silencing at rDNA	IDA
		Biological process	positive regulation of transcription from RNA polymerase I promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	G1/S transition of mitotic cell cycle	IMP
		Biological process	positive regulation of transcription, DNA-dependent	IMP
PHKA2	PHKA2 phosphorylase kinase, alpha 2 (liver)	Component	cytosol	TAS
		Component	phosphorylase kinase complex	TAS
		Function	phosphorylase kinase activity	TAS
		Biological process	carbohydrate metabolic process	TAS
		Biological process	generation of precursor metabolites and energy	TAS
		Biological process	glucose metabolic process	TAS
		Biological process	glycogen catabolic process	TAS
		Biological process	protein modification process	TAS
PHLDA1	PHLDA1 pleckstrin homologylike domain, family A, member 1	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
PHLDB2	PHLDB2 pleckstrin homologylike domain, family B, member 2	Component	cytoplasm	IDA
		Component	intermediate filament cytoskeleton	IDA
		Component	plasma membrane	IDA
PHOX2B	PHOX2B pairedlike homeobox 2b	Function	transcription cofactor activity	TAS
		Biological process	nervous system development	TAS
		Biological process	transcription, DNA-dependent	TAS
PIGA	PIGA phosphatidylinositol glycan anchor biosynthesis, class A	Component	endoplasmic reticulum membrane	IDA
		Component	glycosylphosphatidylinositol-N-acetylglucosaminyltransferase (GPI-GnT) complex	IDA

		Component	endoplasmic reticulum membrane	TAS
		Function	protein binding	IPI
		Function	UDP-glycosyltransferase activity	TAS
		Function	phosphatidylinositol N-acetylglucosaminyltransferase activity	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	C-terminal protein lipidation	TAS
		Biological process	GPI anchor biosynthetic process	TAS
		Biological process	positive regulation of metabolic process	TAS
		Biological process	post-translational protein modification	TAS
PIGH	PIGH phosphatidylinositol glycan anchor biosynthesis, class H	Component	cytoplasm	IDA
		Component	glycosylphosphatidylinositol-N-acetylglucosaminyltransferase (GPI-GnT) complex	IDA
		Component	mitochondrion	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Component	endoplasmic reticulum	TAS
		Component	endoplasmic reticulum membrane	TAS
		Function	catalytic activity	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	C-terminal protein lipidation	TAS
		Biological process	GPI anchor biosynthetic process	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein modification process	TAS
PIK3C2B	PIK3C2B phosphoinositide3kinase, class 2, beta polypeptide	Function	protein binding	IPI
PIK3R3	PIK3R3 phosphoinositide3kinase, regulatory subunit 3 (gamma)	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	1-phosphatidylinositol-3-kinase activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
		Biological process	T cell costimulation	TAS
PKHD1L1	PKHD1L1 polycystic kidney and hepatic disease 1	Component	cytosol	TAS

	(autosomal recessive)like 1			
PKM2	PKM2 pyruvate kinase, muscle	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Function	pyruvate kinase activity	TAS
		Biological process	programmed cell death	IDA
		Biological process	carbohydrate metabolic process	TAS
		Biological process	glucose metabolic process	TAS
		Biological process	glycolysis	TAS
PKN2	PKN2 protein kinase N2	Function	histone deacetylase binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein kinase activity	TAS
PKNOX2	PKNOX2 PBX/knotted 1 homeobox 2	Function	DNA binding	IDA
PLAGL2	PLAGL2 pleiomorphic adenoma genelike 2	Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription, DNA-dependent	TAS
PLEKHA1	PLEKHA1 pleckstrin homology domain containing, family A (phosphoinositide binding specific) member 1	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Component	ruffle membrane	IDA
		Function	phosphatidylinositol-3,4-bisphosphate binding	IDA
		Function	PDZ domain binding	IPI
		Function	protein binding	IPI
		Biological process	B cell receptor signaling pathway	IDA
		Biological process	cellular response to hydrogen peroxide	IDA
		Biological process	establishment of protein localization	IDA
		Biological process	phosphatidylinositol 3-kinase cascade	IDA
		Biological process	ruffle organization	IDA
		Biological process	negative regulation of protein kinase B signaling cascade	IMP
PLEKHG5	PLEKHG5 pleckstrin homology domain containing,	Component	cytosol	TAS

	family G (with RhoGef domain) member 5			
		Function	signal transducer activity	IMP
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	positive regulation of I-kappaB kinase/NF-kappaB cascade	IMP
		Biological process	signal transduction	IMP
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
PLXNA2	PLXNA2 plexin A2	Component	plasma membrane	TAS
		Biological process	axon guidance	TAS
PLXNA4	PLXNA4 plexin A4	Component	plasma membrane	TAS
		Biological process	axon guidance	TAS
PLXND1	PLXND1 plexin D1	Biological process	axon guidance	TAS
PODXL	PODXL podocalyxinlike	Component	actin cytoskeleton	IDA
		Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	filopodium	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	lamellipodium	IDA
		Component	nucleolus	IDA
		Component	plasma membrane	IDA
		Component	ruffle	IDA
		Component	integral to plasma membrane	TAS
		Biological process	positive regulation of cell migration	IDA
		Biological process	positive regulation of cell-cell adhesion mediated by integrin	IDA
POGZ	POGZ pogo transposable element with ZNF domain	Component	cytoplasm	IDA
		Component	nuclear chromatin	IDA
		Function	protein binding	IPI
		Biological process	kinetochore assembly	IMP
		Biological process	mitotic sister chromatid cohesion	IMP
POLK	POLK polymerase (DNA directed) kappa	Biological process	nucleotide-excision repair, DNA gap filling	IMP
		Biological process	DNA repair	TAS

POLR3D	POLR3D polymerase (RNA) III (DNA directed) polypeptide D, 44kDa	Component	nucleoplasm	TAS
		Biological process	positive regulation of innate immune response	IDA
		Biological process	positive regulation of interferon-beta production	IDA
		Biological process	termination of RNA polymerase III transcription	TAS
		Biological process	transcription elongation from RNA polymerase III promoter	TAS
		Biological process	transcription from RNA polymerase III promoter	TAS
POLR3H	POLR3H polymerase (RNA) III (DNA directed) polypeptide H (22.9kD)	Component	DNA-directed RNA polymerase III complex	IDA
		Component	nucleoplasm	IDA
		Component	nucleoplasm	TAS
		Function	DNA-directed RNA polymerase activity	IDA
		Biological process	nucleobase, nucleoside, nucleotide and nucleic acid metabolic process	IDA
		Biological process	transcription from RNA polymerase III promoter	IDA
		Biological process	termination of RNA polymerase III transcription	TAS
		Biological process	transcription elongation from RNA polymerase III promoter	TAS
		Biological process	transcription from RNA polymerase III promoter	TAS
POM121	POM121 POM121 membrane glycoprotein	Component	nuclear envelope	TAS
		Biological process	carbohydrate metabolic process	TAS
		Biological process	glucose transport	TAS
		Biological process	hexose transport	TAS
		Biological process	regulation of glucose transport	TAS
		Biological process	transmembrane transport	TAS
		Biological process	viral reproduction	TAS
POM121C	POM121C POM121 membrane glycoprotein C	Function	protein binding	IPI
POU2AF1	POU2AF1 POU class 2 associating factor 1	Function	protein binding	IPI
		Function	transcription coactivator activity	TAS
		Function	transcription cofactor activity	TAS
		Biological process	humoral immune response	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
POU2F2	POU2F2 POU class 2 homeobox 2	Component	nucleus	IDA
		Function	sequence-specific DNA binding	IDA

		Biological process	humoral immune response	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
POU3F1	POU3F1 POU class 3 homeobox 1	Function	sequence-specific DNA binding	IDA
		Biological process	axon ensheathment	TAS
		Biological process	transcription, DNA-dependent	TAS
PPARA	PPARA peroxisome proliferatoractivated receptor alpha	Component	nucleoplasm	TAS
		Component	nucleus	TAS
		Function	drug binding	IDA
		Function	ligand-dependent nuclear receptor activity	IDA
		Function	ligand-regulated transcription factor activity	IDA
		Function	lipid binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	steroid hormone receptor activity	IDA
		Function	protein binding	IPI
		Function	ubiquitin conjugating enzyme binding	IPI
		Function	DNA binding	TAS
		Biological process	negative regulation of cholesterol storage	IDA
		Biological process	negative regulation of macrophage derived foam cell differentiation	IDA
		Biological process	negative regulation of receptor biosynthetic process	IDA
		Biological process	negative regulation of sequestering of triglyceride	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	regulation of cellular ketone metabolic process by positive regulation of transcription from an RNA polymerase II promoter	IDA
		Biological process	regulation of glycolysis by positive regulation of transcription from an RNA polymerase II promoter	IDA
		Biological process	regulation of lipid transport by positive regulation of transcription from an RNA polymerase II promoter	IDA

		Biological process	steroid hormone mediated signaling pathway	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	cellular lipid metabolic process	TAS
		Biological process	fatty acid metabolic process	TAS
		Biological process	fatty acid transport	TAS
		Biological process	gene expression	TAS
		Biological process	lipid metabolic process	TAS
		Biological process	positive regulation of fatty acid beta-oxidation	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
PPCS	PPCS phosphopantothenoylcysteine synthetase	Component	cytosol	TAS
		Function	phosphopantothenate--cysteine ligase activity	TAS
		Biological process	coenzyme biosynthetic process	TAS
		Biological process	pantothenate metabolic process	TAS
		Biological process	vitamin metabolic process	TAS
		Biological process	water-soluble vitamin metabolic process	TAS
PPFIA3	PPFIA3 protein tyrosine phosphatase, receptor type, f polypeptide (PTPRF), interacting protein (liprin), alpha 3	Function	protein binding	IPI
PPM1E	PPM1E protein phosphatase, Mg ²⁺ /Mn ²⁺ dependent, 1E	Component	nucleolus	IDA
		Component	nucleus	IDA
PPM1K	PPM1K protein phosphatase, Mg ²⁺ /Mn ²⁺ dependent, 1K	Component	mitochondrion	IDA
PPP1R10	PPP1R10 protein phosphatase 1, regulatory (inhibitor) subunit 10	Biological process	protein import into nucleus	TAS
PPP1R12A	PPP1R12A protein phosphatase 1, regulatory (inhibitor) subunit 12A	Component	contractile fiber	IDA
		Function	protein binding	IPI
PPP1R16B	PPP1R16B protein phosphatase 1, regulatory (inhibitor) subunit 16B	Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
PPP1R2	PPP1R2 protein phosphatase 1, regulatory (inhibitor) subunit 2	Function	protein binding	IPI

		Function	protein serine/threonine phosphatase inhibitor activity	TAS
		Biological process	generation of precursor metabolites and energy	TAS
PPP1R7	PPP1R7 protein phosphatase 1, regulatory (inhibitor) subunit 7	Component	cytoplasm	TAS
		Function	protein binding	IPI
		Function	protein phosphatase type 1 regulator activity	TAS
PPP1R8	PPP1R8 protein phosphatase 1, regulatory (inhibitor) subunit 8	Component	nuclear speck	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Function	protein serine/threonine phosphatase inhibitor activity	TAS
		Function	ribonuclease E activity	TAS
		Biological process	RNA catabolic process	TAS
PPP1R9B	PPP1R9B protein phosphatase 1, regulatory (inhibitor) subunit 9B	Component	cytoplasm	IDA
		Component	filopodium	IDA
		Component	lamellipodium	IDA
		Component	plasma membrane	IDA
		Component	ruffle membrane	IDA
		Component	nucleoplasm	IMP
		Component	protein phosphatase type 1 complex	TAS
		Function	protein binding	IPI
		Biological process	negative regulation of cell growth	IDA
		Biological process	cell migration	IMP
		Biological process	filopodium assembly	IMP
		Biological process	cell cycle arrest	TAS
		Biological process	regulation of cell growth by extracellular stimulus	TAS
PPP2CA	PPP2CA protein phosphatase 2, catalytic subunit, alpha isozyme	Component	protein phosphatase type 2A complex	IDA
		Component	cytosol	TAS
		Component	protein phosphatase type 2A complex	TAS
		Function	protein binding	IPI

		Biological process	negative regulation of epithelial to mesenchymal transition	IMP
		Biological process	positive regulation of protein serine/threonine kinase activity	IMP
		Biological process	induction of apoptosis	TAS
		Biological process	protein dephosphorylation	TAS
PPP2CB	PPP2CB protein phosphatase 2, catalytic subunit, beta isozyme	Component	protein phosphatase type 2A complex	TAS
		Function	protein binding	IPI
		Function	contributes_to protein serine/threonine phosphatase activity	TAS
		Biological process	protein dephosphorylation	TAS
PPP2R1B	PPP2R1B protein phosphatase 2, regulatory subunit A, beta	Function	protein binding	IPI
PPP2R2A	PPP2R2A protein phosphatase 2, regulatory subunit B, alpha	Component	protein phosphatase type 2A complex	IDA
		Function	protein serine/threonine phosphatase activity	IDA
		Function	protein binding	IPI
		Function	protein phosphatase type 2A regulator activity	TAS
		Biological process	protein dephosphorylation	IDA
PRDM1	PRDM1 PR domain containing 1, with ZNF domain	Component	cytoplasm	IDA
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	negative regulation of transcription from RNA polymerase II promoter	TAS
		Biological process	transcription, DNA-dependent	TAS
PRDM2	PRDM2 PR domain containing 2, with ZNF domain	Component	Golgi apparatus	IDA
		Component	nucleus	IDA
PRDM4	PRDM4 PR domain containing 4	Biological process	cell proliferation	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	signal transduction	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
PRIC285	PRIC285 peroxisomal proliferatoractivated receptor A interacting complex 285	Component	nucleoplasm	TAS
		Biological process	cellular lipid metabolic process	TAS

PRICKLE2	PRICKLE2 prickle homolog 2 (Drosophila)	Component	cytoplasm	IDA
PRKAA1	PRKAA1 protein kinase, AMPactivated, alpha 1 catalytic subunit	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	cell cycle arrest	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	protein phosphorylation	TAS
		Biological process	signal transduction	TAS
PRKAB1	PRKAB1 protein kinase, AMPactivated, beta 1 noncatalytic subunit	Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	cell cycle arrest	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	signal transduction	TAS
PRKAG2	PRKAG2 protein kinase, AMPactivated, gamma 2 noncatalytic subunit	Component	AMP-activated protein kinase complex	IDA
		Component	cytosol	TAS
		Function	ADP binding	IDA
		Function	ATP binding	IDA
		Function	cAMP-dependent protein kinase inhibitor activity	IDA
		Function	protein kinase binding	IDA
		Function	cAMP-dependent protein kinase regulator activity	IMP
		Function	phosphorylase kinase regulator activity	IMP
		Function	protein kinase activator activity	IMP
		Biological process	negative regulation of protein kinase activity	IDA
		Biological process	glycogen metabolic process	IMP
		Biological process	intracellular protein kinase cascade	IMP
		Biological process	positive regulation of peptidyl-threonine phosphorylation	IMP
		Biological process	positive regulation of protein kinase activity	IMP
		Biological process	regulation of fatty acid metabolic process	IMP
		Biological process	regulation of glycolysis	IMP
		Biological process	ATP biosynthetic process	TAS
		Biological process	cell cycle arrest	TAS

		Biological process	cellular lipid metabolic process	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	regulation of fatty acid biosynthetic process	TAS
		Biological process	regulation of fatty acid oxidation	TAS
		Biological process	regulation of glucose import	TAS
		Biological process	sterol biosynthetic process	TAS
PRKCE	PRKCE protein kinase C, epsilon	Component	cytoplasm	IDA
		Component	endoplasmic reticulum	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Component	plasma membrane	TAS
		Function	protein kinase C activity	IDA
		Function	enzyme activator activity	IMP
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	protein kinase C activity	TAS
		Function	signal transducer activity	TAS
		Biological process	protein phosphorylation	IDA
		Biological process	positive regulation of catalytic activity	IMP
		Biological process	activation of phospholipase C activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	induction of apoptosis	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	platelet activation	TAS
		Biological process	signal transduction	TAS
PRKCG	PRKCG protein kinase C, gamma	Function	protein kinase activity	IDA
		Biological process	negative regulation of protein catabolic process	IDA
		Biological process	negative regulation of protein ubiquitination	IDA
		Biological process	phosphorylation	IDA
		Biological process	positive regulation of mismatch repair	IDA
		Biological process	activation of phospholipase C activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	platelet activation	TAS

		Biological process	synaptic transmission	TAS
PRKD3	PRKD3 protein kinase D3	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	activation of protein kinase C activity by G-protein coupled receptor protein signaling pathway	TAS
PRPF40A	PRPF40A PRP40 premRNA processing factor 40 homolog A (<i>S. cerevisiae</i>)	Component	nuclear matrix	IDA
		Function	protein binding	IPI
PRRX1	PRRX1 paired related homeobox 1	Function	transcription coactivator activity	TAS
PSEN1	PSEN1 presenilin 1	Component	Golgi apparatus	IDA
		Component	centrosome	IDA
		Component	endoplasmic reticulum	IDA
		Component	gamma-secretase complex	IDA
		Component	integral to plasma membrane	IDA
		Component	kinetochore	IDA
		Component	mitochondrion	IDA
		Component	nuclear membrane	IDA
		Component	nuclear outer membrane	IDA
		Component	rough endoplasmic reticulum	IDA
		Component	smooth endoplasmic reticulum	IDA
		Component	integral to membrane	TAS
		Component	membrane fraction	TAS
		Component	plasma membrane	TAS
		Function	endopeptidase activity	IDA
		Function	calcium channel activity	IMP
		Function	PDZ domain binding	IPI
		Function	beta-catenin binding	IPI
		Function	protein binding	IPI
		Biological process	anti-apoptosis	IDA
		Biological process	endoplasmic reticulum calcium ion homeostasis	IDA
		Biological process	membrane protein ectodomain proteolysis	IDA
		Biological process	positive regulation of catalytic activity	IDA
		Biological process	protein processing	IDA

		Biological process	regulation of phosphorylation	IDA
		Biological process	endoplasmic reticulum calcium ion homeostasis	IGI
		Biological process	calcium ion transmembrane transport	IMP
		Biological process	cell-cell adhesion	IMP
		Biological process	amyloid precursor protein catabolic process	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	Notch receptor processing	TAS
		Biological process	Notch signaling pathway	TAS
PSIP1	PSIP1 PC4 and SFRS1 interacting protein 1	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Biological process	provirus integration	TAS
		Biological process	viral reproduction	TAS
PSMD10	PSMD10 proteasome (prosome, macropain) 26S subunit, nonATPase, 10	Component	actin cytoskeleton	IDA
		Component	cytoplasm	IDA
		Component	intermediate filament cytoskeleton	IDA
		Component	nucleus	IDA
		Component	colocalizes_ with proteasome regulatory particle, base subcomplex	IDA
		Component	proteasome complex	TAS
		Component	proteasome regulatory particle	TAS
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	cytoplasmic sequestering of NF-kappaB	IDA
		Biological process	negative regulation of apoptosis	IDA
		Biological process	negative regulation of DNA damage response, signal transduction by p53 class mediator	IDA
		Biological process	negative regulation of NF-kappaB transcription factor activity	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of cell growth	IDA
		Biological process	positive regulation of cyclin-dependent protein	IDA

			kinase activity	
		Biological process	positive regulation of proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	negative regulation of apoptosis	IMP
		Biological process	negative regulation of MAPKKK cascade	IMP
		Biological process	negative regulation of release of cytochrome c from mitochondria	IMP
		Biological process	positive regulation of protein ubiquitination	IMP
		Biological process	proteasome regulatory particle assembly	IMP
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS
		Biological process	apoptosis	TAS
		Biological process	cell cycle checkpoint	TAS
		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	DNA damage response, signal transduction by p53 class mediator resulting in cell cycle arrest	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
		Biological process	M/G1 transition of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	positive regulation of proteasomal ubiquitin-dependent protein catabolic process	TAS
		Biological process	regulation of apoptosis	TAS
		Biological process	regulation of cellular amino acid metabolic process	TAS
		Biological process	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	TAS
		Biological process	RNA metabolic process	TAS
		Biological process	S phase of mitotic cell cycle	TAS
		Biological process	viral reproduction	TAS
PSME1	PSME1 proteasome (prosome, macropain) activator subunit 1 (PA28 alpha)	Component	cytoplasm	TAS
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS

		Biological process	apoptosis	TAS
		Biological process	cell cycle checkpoint	TAS
		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	DNA damage response, signal transduction by p53 class mediator resulting in cell cycle arrest	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
		Biological process	M/G1 transition of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	regulation of apoptosis	TAS
		Biological process	regulation of cellular amino acid metabolic process	TAS
		Biological process	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	TAS
		Biological process	RNA metabolic process	TAS
		Biological process	S phase of mitotic cell cycle	TAS
		Biological process	viral reproduction	TAS
PSME3	PSME3 proteasome (prosome, macropain) activator subunit 3 (PA28 gamma; Ki)	Function	MDM2 binding	IDA
		Function	endopeptidase activator activity	IDA
		Function	p53 binding	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	positive regulation of endopeptidase activity	IDA
		Biological process	regulation of apoptosis	IDA
		Biological process	regulation of proteasomal protein catabolic process	IDA
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS
		Biological process	apoptosis	TAS
		Biological process	cell cycle checkpoint	TAS
		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	DNA damage response, signal transduction by p53 class mediator resulting in cell cycle arrest	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
		Biological process	M/G1 transition of mitotic cell cycle	TAS

		Biological process	mitotic cell cycle	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	regulation of apoptosis	TAS
		Biological process	regulation of cellular amino acid metabolic process	TAS
		Biological process	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	TAS
		Biological process	RNA metabolic process	TAS
		Biological process	S phase of mitotic cell cycle	TAS
		Biological process	viral reproduction	TAS
PTBP1	PTBP1 polypyrimidine tract binding protein 1	Component	heterogeneous nuclear ribonucleoprotein complex	TAS
		Component	nucleolus	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Function	poly-pyrimidine tract binding	TAS
		Biological process	gene expression	TAS
		Biological process	mRNA processing	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
PTCH1	PTCH1 patched 1	Component	integral to plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	anatomical structure morphogenesis	TAS
		Biological process	cell proliferation	TAS
PTEN	PTEN phosphatase and tensin homolog	Component	cytoplasm	IDA
		Component	internal side of plasma membrane	IDA
		Component	nucleus	IDA
		Component	cytoplasm	TAS
		Component	cytosol	TAS
		Function	inositol-1,3,4,5-tetrakisphosphate 3-phosphatase activity	IDA
		Function	phosphatidylinositol-3,4,5-trisphosphate 3-phosphatase activity	IDA
		Function	phosphatidylinositol-3,4-bisphosphate 3-phosphatase activity	IDA
		Function	phosphatidylinositol-3-phosphatase activity	IDA
		Function	phosphoprotein phosphatase activity	IDA
		Function	protein serine/threonine phosphatase activity	IDA

		Function	protein tyrosine phosphatase activity	IDA
		Function	PDZ domain binding	IPI
		Function	anaphase-promoting complex binding	IPI
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	phosphatidylinositol-3,4,5-trisphosphate 3-phosphatase activity	TAS
		Biological process	activation of mitotic anaphase-promoting complex activity	IDA
		Biological process	canonical Wnt receptor signaling pathway	IDA
		Biological process	inositol phosphate dephosphorylation	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of cyclin-dependent protein kinase activity involved in G1/S	IDA
		Biological process	negative regulation of G1/S transition of mitotic cell cycle	IDA
		Biological process	negative regulation of protein phosphorylation	IDA
		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	phosphatidylinositol dephosphorylation	IDA
		Biological process	positive regulation of protein ubiquitination involved in ubiquitin-dependent protein catabolic process	IDA
		Biological process	protein dephosphorylation	IDA
		Biological process	protein stabilization	IDA
		Biological process	negative regulation of cell migration	IMP
		Biological process	negative regulation of cell proliferation	IMP
		Biological process	negative regulation of focal adhesion assembly	IMP
		Biological process	negative regulation of protein kinase B signaling cascade	IMP
		Biological process	positive regulation of sequence-specific DNA binding transcription factor activity	IMP
		Biological process	regulation of protein stability	IMP
		Biological process	cell proliferation	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	phosphatidylinositol-mediated signaling	TAS

		Biological process	protein dephosphorylation	TAS
		Biological process	regulation of cyclin-dependent protein kinase activity	TAS
		Biological process	T cell receptor signaling pathway	TAS
PTGDR	PTGDR prostaglandin D2 receptor (DP)	Component	plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	protein binding	IPI
PTGES3	PTGES3 prostaglandin E synthase 3 (cytosolic)	Component	telomerase holoenzyme complex	IDA
		Function	prostaglandin-E synthase activity	IDA
		Function	telomerase activity	IDA
		Function	unfolded protein binding	IDA
		Function	protein binding	IPI
		Biological process	chaperone cofactor-dependent protein refolding	IDA
		Biological process	prostaglandin biosynthetic process	IDA
		Biological process	hormone biosynthetic process	TAS
		Biological process	prostanoid metabolic process	TAS
		Biological process	signal transduction	TAS
		Biological process	telomere maintenance	TAS
PTGFRN	PTGFRN prostaglandin F2 receptor negative regulator	Function	protein binding	IPI
PTP4A1	PTP4A1 protein tyrosine phosphatase type IVA, member 1	Component	cytoplasm	IDA
		Component	internal side of plasma membrane	IDA
		Function	protein binding	IPI
PTPLAD1	PTPLAD1 protein tyrosine phosphatase like A domain containing 1	Function	protein binding	IPI
		Function	GTPase activator activity	TAS
		Biological process	activation of JUN kinase activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	small GTPase mediated signal transduction	TAS
PTPLB	PTPLB protein tyrosine phosphatase like (proline instead of catalytic arginine), member b	Function	protein binding	IPI
PTPN1	PTPN1 protein tyrosine phosphatase, nonreceptor type 1	Component	endoplasmic reticulum	IDA
		Component	cytosol	TAS
		Function	protein tyrosine phosphatase activity	IDA
		Function	zinc ion binding	IDA

		Function	protein binding	IPI
		Function	protein tyrosine phosphatase activity	TAS
		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	blood coagulation	TAS
		Biological process	cytokine-mediated signaling pathway	TAS
		Biological process	interferon-gamma-mediated signaling pathway	TAS
		Biological process	peptidyl-tyrosine dephosphorylation	TAS
		Biological process	regulation of interferon-gamma-mediated signaling pathway	TAS
		Biological process	regulation of type I interferon-mediated signaling pathway	TAS
		Biological process	signal transduction	TAS
		Biological process	type I interferon-mediated signaling pathway	TAS
PTPN11	PTPN11 protein tyrosine phosphatase, nonreceptor type 11	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Function	non-membrane spanning protein tyrosine phosphatase activity	IMP
		Function	protein binding	IPI
		Function	protein tyrosine phosphatase activity	TAS
		Biological process	ephrin receptor signaling pathway	IDA
		Biological process	peptidyl-tyrosine dephosphorylation	IMP
		Biological process	regulation of cell adhesion mediated by integrin	IMP
		Biological process	axon guidance	TAS
		Biological process	blood coagulation	TAS
		Biological process	cell junction assembly	TAS
		Biological process	cytokine-mediated signaling pathway	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	fibroblast growth factor receptor signaling pathway	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	interferon-gamma-mediated signaling pathway	TAS
		Biological process	leukocyte migration	TAS
		Biological process	peptidyl-tyrosine dephosphorylation	TAS
		Biological process	platelet activation	TAS

		Biological process	regulation of interferon-gamma-mediated signaling pathway	TAS
		Biological process	regulation of type I interferon-mediated signaling pathway	TAS
		Biological process	T cell costimulation	TAS
		Biological process	type I interferon-mediated signaling pathway	TAS
PTPN4	PTPN4 protein tyrosine phosphatase, nonreceptor type 4 (megakaryocyte)	Component	cytoplasm	IDA
		Component	internal side of plasma membrane	IDA
		Function	protein binding	IPI
		Biological process	protein dephosphorylation	TAS
PTPN5	PTPN5 protein tyrosine phosphatase, nonreceptor type 5 (striatumenriched)	Component	integral to membrane	TAS
		Function	phosphotyrosine binding	IDA
		Function	protein tyrosine phosphatase activity	TAS
		Biological process	peptidyl-tyrosine dephosphorylation	TAS
		Biological process	protein dephosphorylation	TAS
PTPN7	PTPN7 protein tyrosine phosphatase, nonreceptor type 7	Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	internal side of plasma membrane	IDA
		Function	protein binding	IPI
		Biological process	peptidyl-tyrosine dephosphorylation	TAS
		Biological process	protein dephosphorylation	TAS
PTPRD	PTPRD protein tyrosine phosphatase, receptor type, D	Component	integral to plasma membrane	TAS
		Function	protein binding	IPI
		Function	transmembrane receptor protein tyrosine phosphatase activity	TAS
		Biological process	protein dephosphorylation	TAS
		Biological process	transmembrane receptor protein tyrosine phosphatase signaling pathway	TAS
PTPRG	PTPRG protein tyrosine phosphatase, receptor type, G	Component	integral to plasma membrane	TAS
		Function	protein tyrosine phosphatase activity	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	transmembrane receptor protein tyrosine	TAS

			phosphatase activity	
		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	transmembrane receptor protein tyrosine kinase signaling pathway	TAS
PTPRJ	PTPRJ protein tyrosine phosphatase, receptor type, J	Component	cell surface	IDA
		Component	cell-cell junction	IDA
		Component	immunological synapse	IDA
		Component	plasma membrane	IDA
		Component	integral to plasma membrane	TAS
		Function	phosphatase activity	IDA
		Function	protein tyrosine phosphatase activity	IDA
		Function	phosphatase activity	IMP
		Function	protein tyrosine phosphatase activity	IMP
		Function	beta-catenin binding	IPI
		Function	delta-catenin binding	IPI
		Function	gamma-catenin binding	IPI
		Function	mitogen-activated protein kinase binding	IPI
		Function	platelet-derived growth factor receptor binding	IPI
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	negative regulation of cell growth	IDA
		Biological process	negative regulation of cell migration	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of MAP kinase activity	IDA
		Biological process	negative regulation of platelet-derived growth factor receptor signaling pathway	IDA
		Biological process	negative regulation of T cell receptor signaling pathway	IDA
		Biological process	negative regulation of vascular permeability	IDA
		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	positive chemotaxis	IDA
		Biological process	positive regulation of survival gene product expression	IDA
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	IMP

		Biological process	negative regulation of protein kinase B signaling cascade	IMP
		Biological process	negative regulation of T cell receptor signaling pathway	IMP
		Biological process	peptidyl-tyrosine dephosphorylation	IMP
		Biological process	platelet-derived growth factor receptor signaling pathway	IMP
		Biological process	positive regulation of cell adhesion	IMP
		Biological process	positive regulation of focal adhesion assembly	IMP
		Biological process	positive regulation of protein kinase B signaling cascade	IMP
		Biological process	regulation of cell adhesion	IMP
PTPRK	PTPRK protein tyrosine phosphatase, receptor type, K	Component	cell surface	IDA
		Component	cell-cell junction	IDA
		Component	leading edge membrane	IDA
		Function	protein tyrosine phosphatase activity	IDA
		Function	beta-catenin binding	IPI
		Function	gamma-catenin binding	IPI
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	cellular response to reactive oxygen species	IDA
		Biological process	cellular response to UV	IDA
		Biological process	negative regulation of cell cycle	IDA
		Biological process	negative regulation of cell migration	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of keratinocyte proliferation	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	protein dephosphorylation	IDA
		Biological process	protein localization at cell surface	IDA
		Biological process	signal transduction	IDA
		Biological process	transforming growth factor beta receptor signaling pathway	IDA
		Biological process	cell adhesion	IMP

		Biological process	cell migration	IMP
		Biological process	focal adhesion assembly	IMP
PTPRM	PTPRM protein tyrosine phosphatase, receptor type, M	Component	cell-cell adherens junction	IDA
		Component	cell-cell junction	IDA
		Component	cytoplasm	IDA
		Component	lamellipodium	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	cadherin binding	IDA
		Function	protein tyrosine phosphatase activity	IDA
		Function	transmembrane receptor protein tyrosine phosphatase activity	IDA
		Function	protein binding	IPI
		Biological process	homophilic cell adhesion	IDA
		Biological process	neuron projection development	IDA
		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	protein dephosphorylation	IDA
		Biological process	response to drug	IDA
		Biological process	retinal ganglion cell axon guidance	IDA
		Biological process	signal transduction	IDA
		Biological process	negative regulation of angiogenesis	IMP
		Biological process	negative regulation of endothelial cell migration	IMP
		Biological process	negative regulation of endothelial cell proliferation	IMP
		Biological process	neuron projection development	IMP
		Biological process	retina layer formation	IMP
PTPRU	PTPRU protein tyrosine phosphatase, receptor type, U	Component	cell-cell junction	IDA
		Function	protein tyrosine phosphatase activity	IDA
		Function	protein tyrosine phosphatase activity	IMP
		Function	beta-catenin binding	IPI
		Function	protein binding	IPI
		Biological process	canonical Wnt receptor signaling pathway	IDA
		Biological process	cell-cell adhesion	IDA
		Biological process	negative regulation of cell migration	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA

		Biological process	peptidyl-tyrosine dephosphorylation	IDA
		Biological process	protein dephosphorylation	IDA
		Biological process	protein localization at cell surface	IDA
		Biological process	peptidyl-tyrosine dephosphorylation	IMP
PTPRZ1	PTPRZ1 protein tyrosine phosphatase, receptortype, Z polypeptide 1	Component	integral to plasma membrane	TAS
		Function	protein binding	IPI
		Function	transmembrane receptor protein tyrosine phosphatase activity	TAS
		Biological process	central nervous system development	TAS
		Biological process	protein dephosphorylation	TAS
PUM2	PUM2 pumilio homolog 2 (Drosophila)	Component	perinuclear region of cytoplasm	IDA
		Function	protein binding	IPI
PURA	PURA purinerich element binding protein A	Component	nucleus	IDA
		Function	double-stranded telomeric DNA binding	IDA
		Function	protein binding	IPI
		Function	sequence-specific enhancer binding RNA polymerase II transcription factor activity	TAS
		Biological process	DNA unwinding involved in replication	IDA
		Biological process	DNA-dependent DNA replication initiation	TAS
PXMP4	PXMP4 peroxisomal membrane protein 4, 24kDa	Component	peroxisome	IDA
		Component	membrane fraction	TAS
QKI	QKI quaking homolog, KH domain RNA binding (mouse)	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
RAB10	RAB10 RAB10, member RAS oncogene family	Function	protein binding	IPI
RAB11A	RAB11A RAB11A, member RAS oncogene family	Component	cleavage furrow	IDA
		Component	trans-Golgi network	IDA
		Function	GTPase activity	IDA
		Function	protein binding	IPI
		Biological process	GTP catabolic process	IDA
		Biological process	protein localization in plasma membrane	IDA
		Biological process	vesicle-mediated transport	IDA

		Biological process	cytokinesis	IMP
		Biological process	neuron projection development	IMP
RAB11FIP1	RAB11FIP1 RAB11 family interacting protein 1 (class I)	Component	centrosome	IDA
		Component	cytoplasm	IDA
		Function	protein binding	IPI
RAB22A	RAB22A RAB22A, member RAS oncogene family	Component	early endosome	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
		Function	GTPase activity	TAS
		Biological process	endocytosis	IDA
		Biological process	endosome organization	IEP
		Biological process	GTP catabolic process	TAS
		Component	dendrite	IDA
		Component	exocytic vesicle	IDA
		Component	late endosome	IDA
		Component	lysosome	IDA
		Component	melanosome	IDA
		Function	protein binding	IPI
		Biological process	exocytosis	IDA
		Biological process	GTP catabolic process	TAS
RAB30	RAB30 RAB30, member RAS oncogene family	Component	Golgi stack	TAS
		Function	GTPase activity	TAS
		Biological process	GTP catabolic process	TAS
RAB35	RAB35 RAB35, member RAS oncogene family	Component	cell projection membrane	IDA
		Component	clathrin-coated endocytic vesicle	IDA
		Component	coated pit	IDA
		Component	intercellular bridge	IDA
		Component	plasma membrane	IDA
		Function	phosphatidylinositol-4,5-bisphosphate binding	IDA
		Function	GTPase activity	TAS
		Biological process	cytokinesis	IMP
		Biological process	endosome transport	IMP
		Biological process	protein localization	IMP
		Biological process	GTP catabolic process	TAS

RAB5A	RAB5A RAB5A, member RAS oncogene family	Component	early endosome	IDA
		Function	GDP binding	IDA
		Function	GTP binding	IDA
		Function	GTPase activity	IDA
		Function	protein binding	IPI
		Biological process	endocytosis	IDA
		Biological process	GTP catabolic process	IDA
		Biological process	receptor internalization	IDA
		Biological process	blood coagulation	TAS
		Biological process	GTP catabolic process	TAS
RABEP1	RABEP1 rabaptin, RAB GTPase binding effector protein 1	Component	centrosome	IDA
		Component	cytoplasm	IDA
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	cellular membrane fusion	TAS
RACGAP1	RACGAP1 Rac GTPase activating protein 1	Component	midbody	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Function	GTPase activator activity	IDA
		Function	alpha-tubulin binding	IDA
		Function	beta-tubulin binding	IDA
		Function	gamma-tubulin binding	IDA
		Function	protein binding	IPI
		Function	GTPase activator activity	TAS
		Biological process	cytokinesis	IDA
		Biological process	positive regulation of GTPase activity	IDA
		Biological process	sulfate transport	IDA
		Biological process	spermatogenesis	IEP
		Biological process	cytokinesis, actomyosin contractile ring assembly	IMP
		Biological process	cytokinesis, initiation of separation	IMP
		Biological process	blood coagulation	TAS
		Biological process	microtubule-based movement	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal	TAS

			transduction	
		Biological process	small GTPase mediated signal transduction	TAS
RAD23B	RAD23B RAD23 homolog B (<i>S. cerevisiae</i>)	Component	XPC complex	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	polyubiquitin binding	IDA
		Function	protein binding	IPI
		Function	single-stranded DNA binding	TAS
		Biological process	nucleotide-excision repair	IDA
		Biological process	nucleotide-excision repair, DNA damage recognition	IDA
		Biological process	regulation of proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	DNA repair	TAS
		Biological process	nucleotide-excision repair	TAS
		Biological process	nucleotide-excision repair, DNA damage recognition	TAS
RAD51	RAD51 RAD51 homolog (<i>S. cerevisiae</i>)	Component	PML body	IDA
		Component	cytoplasm	IDA
		Component	mitochondrion	IDA
		Component	nucleus	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	ATP binding	IDA
		Function	double-stranded DNA binding	IDA
		Function	single-stranded DNA binding	IDA
		Function	single-stranded DNA-dependent ATPase activity	IDA
		Function	identical protein binding	IPI
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	DNA unwinding involved in replication	IDA
		Biological process	double-strand break repair via homologous recombination	IDA
		Biological process	positive regulation of DNA ligation	IDA

		Biological process	protein homooligomerization	IPI
		Biological process	DNA recombinase assembly	TAS
		Biological process	DNA recombination	TAS
		Biological process	DNA repair	TAS
		Biological process	double-strand break repair	TAS
		Biological process	double-strand break repair via homologous recombination	TAS
		Biological process	mitotic recombination	TAS
		Biological process	reciprocal meiotic recombination	TAS
RAD9A	RAD9A RAD9 homolog A (<i>S. pombe</i>)	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	3'-5' exonuclease activity	IDA
		Function	SH3 domain binding	IPI
		Function	enzyme binding	IPI
		Function	histone deacetylase binding	IPI
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	response to DNA damage stimulus	IDA
		Biological process	cell cycle checkpoint	TAS
		Biological process	DNA damage checkpoint	TAS
		Biological process	DNA replication checkpoint	TAS
RAG1	RAG1 recombination activating gene 1	Function	protein binding	IPI
		Function	DNA binding	TAS
		Biological process	immune response	TAS
RALA	RALA vral simian leukemia viral oncogene homolog A (ras related)	Component	cell surface	IDA
		Component	cleavage furrow	IDA
		Component	colocalizes_with endocytic vesicle	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Function	Edg-2 lysophosphatidic acid receptor binding	IDA
		Function	protein binding	IPI
		Biological process	actin cytoskeleton reorganization	IDA
		Biological process	cytokinesis	IDA

		Biological process	membrane raft localization	IDA
		Biological process	positive regulation of filopodium assembly	IDA
		Biological process	regulation of exocytosis	IDA
		Biological process	chemotaxis	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
RAN	RAN RAN, member RAS oncogene family	Component	colocalizes_with chromatin	IDA
		Component	cytoplasm	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	GTP binding	IDA
		Function	protein binding	IPI
		Function	GTPase activity	TAS
		Function	chromatin binding	TAS
		Biological process	DNA metabolic process	TAS
		Biological process	GTP catabolic process	TAS
		Biological process	mitosis	TAS
		Biological process	mitotic spindle organization	TAS
		Biological process	signal transduction	TAS
		Biological process	viral genome transport in host cell	TAS
		Biological process	viral infectious cycle	TAS
		Biological process	viral reproduction	TAS
RAP1B	RAP1B RAP1B, member of RAS oncogene family	Component	cell-cell junction	IDA
		Component	intracellular	IDA
		Component	membrane	TAS
		Component	plasma membrane	TAS
		Function	GDP binding	IDA
		Function	GTP binding	IDA
		Function	GTPase activity	IDA
		Function	protein binding	IPI
		Biological process	GTP catabolic process	IDA
		Biological process	regulation of establishment of cell polarity	IMP
		Biological process	blood coagulation	TAS
		Biological process	energy reserve metabolic process	TAS
		Biological process	regulation of insulin secretion	TAS
RAPGEF1	RAPGEF1 Rap guanine nucleotide exchange factor	Component	cytosol	TAS

	(GEF) 1			
		Function	protein binding	IPI
		Biological process	activation of MAPKK activity	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	transmembrane receptor protein tyrosine kinase signaling pathway	TAS
RAPGEF5	RAPGEF5 Rap guanine nucleotide exchange factor (GEF) 5	Component	nucleus	IDA
		Function	Rap guanyl-nucleotide exchange factor activity	IDA
		Function	GTP-dependent protein binding	IPI
		Function	Ras guanyl-nucleotide exchange factor activity	TAS
RAPH1	RAPH1 Ras association (RalGDS/AF6) and pleckstrin homology domains 1	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
RARB	RARB retinoic acid receptor, beta	Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Biological process	embryonic digestive tract development	IMP
		Biological process	gene expression	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
		Biological process	retinoic acid receptor signaling pathway	TAS
		Biological process	signal transduction	TAS
RASD1	RASD1 RAS, dexamethasoneinduced 1	Biological process	G-protein coupled receptor protein signaling pathway	TAS
		Biological process	GTP catabolic process	TAS
		Biological process	signal transduction	TAS
RBAK	RBAK RBassociated KRAB zinc finger	Component	nucleus	TAS
		Biological process	regulation of transcription, DNA-dependent	TAS
RBBP5	RBBP5 retinoblastoma binding protein 5	Component	MLL1 complex	IDA
		Component	Set1C/COMPASS complex	IDA
		Component	histone methyltransferase complex	IDA
		Component	nucleus	IDA

		Component	histone methyltransferase complex	IPI
		Function	contributes_to histone methyltransferase activity (H3-K4 specific)	IDA
		Function	protein binding	IPI
		Biological process	histone H3-K4 methylation	IDA
		Biological process	response to estrogen stimulus	IDA
RBM8A	RBM8A RNA binding motif protein 8A	Component	catalytic step 2 spliceosome	IDA
		Component	exon-exon junction complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	nuclear-transcribed mRNA catabolic process, nonsense-mediated decay	IMP
		Biological process	gene expression	TAS
		Biological process	mRNA 3'-end processing	TAS
		Biological process	mRNA export from nucleus	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
		Biological process	termination of RNA polymerase II transcription	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
RBMX	RBMX RNA binding motif protein, Xlinked	Component	catalytic step 2 spliceosome	IDA
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	gene expression	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
RBPJL	RBPJL recombination signal binding protein for immunoglobulin kappa J regionlike	Biological process	signal transduction	TAS
		Biological process	transcription, DNA-dependent	TAS
RCHY1	RCHY1 ring finger and CHY zinc finger domain containing 1	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	ubiquitin ligase complex	IDA
		Function	ubiquitin-protein ligase activity	IDA

		Function	zinc ion binding	IDA
		Function	p53 binding	IPI
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	positive regulation of proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	positive regulation of protein ubiquitination	IDA
		Biological process	protein autoubiquitination	IDA
		Biological process	protein ubiquitination	IDA
		Biological process	protein ubiquitination involved in ubiquitin-dependent protein catabolic process	IDA
		Function	protein binding	IPI
RCOR1	RCOR1 REST corepressor 1	Biological process	blood coagulation	TAS
RCOR3	RCOR3 REST corepressor 3	Function	protein binding	IPI
RDX	RDX radixin	Component	Golgi apparatus	IDA
		Component	colocalizes_with focal adhesion	IDA
		Component	nucleolus	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
REEP1	REEP1 receptor accessory protein 1	Component	cytoplasm	IDA
		Function	olfactory receptor binding	IMP
		Biological process	protein insertion into membrane	IDA
RELL1	RELL1 RELTlike 1	Component	cytoplasm	IDA
		Component	microtubule cytoskeleton	IDA
		Component	plasma membrane	IDA
REPS1	REPS1 RALBP1 associated Eps domain containing 1	Component	coated pit	IDA
		Component	plasma membrane	IDA
		Function	SH3 domain binding	IPI
		Function	protein binding	IPI
RER1	RER1 RER1 retention in endoplasmic reticulum 1 homolog (<i>S. cerevisiae</i>)	Component	integral to Golgi membrane	IDA
		Biological process	retrograde vesicle-mediated transport, Golgi to ER	IDA
RFFL	RFFL ring finger and FYVElike domain containing 1	Component	cytoplasm	IDA
		Component	intracellular membrane-bounded organelle	IDA
RFX5	RFX5 regulatory factor X, 5 (influences HLA class II	Function	protein binding	IPI

	expression)			
RGL1	RGL1 ral guanine nucleotide dissociatorlike 1	Function	protein binding	IPI
		Biological process	cellular lipid metabolic process	TAS
RGMB	RGMB RGM domain family, member B	Biological process	axon guidance	TAS
RGS4	RGS4 regulator of Gprotein signaling 4	Function	calmodulin binding	TAS
		Biological process	inactivation of MAPK activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of G-protein coupled receptor protein signaling pathway	TAS
RGS7	RGS7 regulator of Gprotein signaling 7	Function	protein binding	IPI
RHOBTB3	RHOBTB3 Rhorelated BTB domain containing 3	Function	ATP binding	IDA
		Function	ATPase activity	IDA
		Function	Rab GTPase binding	IPI
		Function	protein binding	IPI
		Biological process	ATP catabolic process	IDA
		Biological process	retrograde transport, endosome to Golgi	IMP
RHPN2	RHPN2 rhophilin, Rho GTPase binding protein 2	Function	protein binding	IPI
RIMS2	RIMS2 regulating synaptic membrane exocytosis 2	Function	protein binding	IPI
RND2	RND2 Rho family GTPase 2	Function	protein binding	IPI
		Function	GTPase activity	TAS
		Biological process	GTP catabolic process	TAS
		Biological process	signal transduction	TAS
RNF138	RNF138 ring finger protein 138	Function	protein kinase binding	IPI
RNF139	RNF139 ring finger protein 139	Component	endoplasmic reticulum	IDA
		Component	integral to membrane	TAS
		Function	small conjugating protein ligase activity	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Function	ligase activity	TAS
		Function	receptor activity	TAS
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	protein ubiquitination	IDA
		Biological process	regulation of protein ubiquitination	IDA
RNF144A	RNF144A ring finger protein 144A	Component	Golgi apparatus	IDA

RNF146	RNF146 ring finger protein 146	Component	cytosol	IDA
		Function	poly-ADP-D-ribose binding	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	protein autoubiquitination	IDA
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	protein K48-linked ubiquitination	IMP
		Biological process	protein ubiquitination involved in ubiquitin-dependent protein catabolic process	IMP
RNF4	RNF4 ring finger protein 4	Component	colocalizes_with PML body	IDA
		Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	response to arsenic-containing substance	IDA
		Biological process	proteasomal ubiquitin-dependent protein catabolic process	IMP
		Biological process	regulation of kinetochore assembly	IMP
		Biological process	regulation of spindle assembly	IMP
		Biological process	transcription, DNA-dependent	TAS
RNF41	RNF41 ring finger protein 41	Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	induction of apoptosis	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	regulation of reactive oxygen species metabolic process	IMP
RNF43	RNF43 ring finger protein 43	Function	protein binding	IPI
RNF8	RNF8 ring finger protein 8	Component	nucleus	IDA
		Component	ubiquitin ligase complex	IDA

		Function	chromatin binding	IDA
		Function	histone binding	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	double-strand break repair	IDA
		Biological process	histone H2A ubiquitination	IDA
		Biological process	positive regulation of DNA repair	IDA
		Biological process	response to ionizing radiation	IDA
ROBO2	ROBO2 roundabout, axon guidance receptor, homolog 2 (Drosophila)	Component	cell surface	IDA
		Function	identical protein binding	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	homophilic cell adhesion	IDA
		Biological process	negative regulation of negative chemotaxis	IDA
		Biological process	positive regulation of axonogenesis	IDA
		Biological process	apoptosis involved in luteolysis	IEP
		Biological process	brain development	IEP
		Biological process	cellular response to hormone stimulus	IEP
		Biological process	ureteric bud development	IMP
		Biological process	axon guidance	TAS
ROCK2	ROCK2 Rhoassociated, coiledcoil containing protein kinase 2	Function	protein binding	IPI
		Biological process	axon guidance	TAS
RPA1	RPA1 replication protein A1, 70kDa	Component	PML body	IDA
		Component	actin cytoskeleton	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	DNA replication factor A complex	IPI
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	cell cycle checkpoint	TAS
		Biological process	DNA recombinase assembly	TAS
		Biological process	DNA repair	TAS

		Biological process	DNA strand elongation involved in DNA replication	TAS
		Biological process	DNA-dependent DNA replication	TAS
		Biological process	double-strand break repair	TAS
		Biological process	double-strand break repair via homologous recombination	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
		Biological process	M/G1 transition of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	nucleotide-excision repair	TAS
		Biological process	S phase of mitotic cell cycle	TAS
		Biological process	telomere maintenance	TAS
		Biological process	telomere maintenance via recombination	TAS
		Biological process	telomere maintenance via semi-conservative replication	TAS
		Biological process	transcription-coupled nucleotide-excision repair	TAS
RPL15	RPL15 ribosomal protein L15	Component	cytosol	TAS
		Function	RNA binding	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	endocrine pancreas development	TAS
		Biological process	gene expression	TAS
		Biological process	translation	TAS
		Biological process	translational termination	TAS
		Biological process	viral infectious cycle	TAS
		Biological process	viral reproduction	TAS
		Biological process	viral transcription	TAS
RPP25	RPP25 ribonuclease P/MRP 25kDa subunit	Function	protein binding	IPI
RPRM	RPRM reprimo, TP53 dependent G2 arrest mediator candidate	Function	protein binding	IPI
RPS6KA2	RPS6KA2 ribosomal protein S6 kinase, 90kDa, polypeptide 2	Component	nucleoplasm	TAS
		Biological process	axon guidance	TAS
		Biological process	innate immune response	TAS
		Biological process	intracellular signal transduction	TAS
		Biological process	MyD88-dependent toll-like receptor signaling	TAS

			pathway	
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	synaptic transmission	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
RPS6KA3	RPS6KA3 ribosomal protein S6 kinase, 90kDa, polypeptide 3	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	caspase inhibitor activity	IDA
		Function	protein kinase activity	TAS
		Biological process	negative regulation of caspase activity	IDA
		Biological process	axon guidance	TAS
		Biological process	central nervous system development	TAS
		Biological process	innate immune response	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	MyD88-independent toll-like receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	signal transduction	TAS
		Biological process	skeletal system development	TAS
		Biological process	stress-activated MAPK cascade	TAS
		Biological process	synaptic transmission	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 3 signaling pathway	TAS

		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
RPS6KA4	RPS6KA4 ribosomal protein S6 kinase, 90kDa, polypeptide 4	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	ATP binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	mitogen-activated protein kinase p38 binding	IGI
		Function	protein binding	IPI
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	interleukin-1-mediated signaling pathway	IMP
		Biological process	positive regulation of histone acetylation	IMP
		Biological process	positive regulation of histone phosphorylation	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	axon guidance	TAS
		Biological process	histone phosphorylation	TAS
RSU1	RSU1 Ras suppressor protein 1	Function	protein binding	IPI
		Biological process	cell junction assembly	TAS
		Biological process	signal transduction	TAS
RTF1	RTF1 Rtf1, Paf1/RNA polymerase II complex component, homolog (<i>S. cerevisiae</i>)	Function	single-stranded DNA binding	IDA
		Function	protein binding	IPI
RUNX1	RUNX1 runtrelated transcription factor 1	Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleus	TAS
		Function	DNA binding	IDA
		Function	calcium ion binding	IDA
		Function	protein heterodimerization activity	IDA
		Function	protein homodimerization activity	IDA
		Function	sequence-specific DNA binding transcription	IDA

			factor activity	
		Function	transcription factor binding	IDA
		Function	protein binding	IPI
		Biological process	myeloid cell differentiation	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	negative regulation of granulocyte differentiation	IMP
		Biological process	positive regulation of granulocyte differentiation	IMP
		Biological process	hemopoiesis	TAS
RUNX1T1	RUNX1T1 runtrelated transcription factor 1; translocated to, 1 (cyclin Drelated)	Function	protein binding	IPI
		Biological process	generation of precursor metabolites and energy	TAS
		Biological process	transcription, DNA-dependent	TAS
RUNX2	RUNX2 runtrelated transcription factor 2	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	osteoblast differentiation	IEP
		Biological process	ossification	TAS
		Biological process	osteoblast differentiation	TAS
RYBP	RYBP RING1 and YY1 binding protein	Function	protein binding	IPI
		Biological process	multicellular organismal development	TAS
S100BPB	S100BPB S100P binding protein	Component	nucleus	IDA
		Function	calcium-dependent protein binding	IPI
S1PR1	S1PR1 sphingosine1phosphate receptor 1	Component	plasma membrane	TAS
		Biological process	cell adhesion	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
SCAMP5	SCAMP5 secretory carrier membrane protein 5	Component	Golgi membrane	IDA
		Component	colocalizes_with SNARE complex	IDA
		Component	integral to membrane	IDA

		Component	plasma membrane	IDA
		Component	recycling endosome membrane	IDA
		Component	trans-Golgi network membrane	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of endocytosis	IDA
		Biological process	positive regulation of calcium ion-dependent exocytosis	IDA
		Biological process	positive regulation of cytokine secretion	IDA
		Biological process	response to endoplasmic reticulum stress	IDA
SCD	SCD stearylCoA desaturase (delta9desaturase)	Component	endoplasmic reticulum	IDA
SCN2B	SCN2B sodium channel, voltagegated, type II, beta	Component	voltage-gated sodium channel complex	TAS
		Biological process	sodium ion transport	TAS
		Biological process	synaptic transmission	TAS
SCN5A	SCN5A sodium channel, voltagegated, type V, alpha subunit	Component	sarcolemma	IDA
		Function	protein binding	IPI
		Function	sodium channel activity	TAS
		Biological process	muscle contraction	TAS
		Biological process	regulation of heart contraction	TAS
		Biological process	sodium ion transmembrane transport	TAS
		Biological process	sodium ion transport	TAS
SCRG1	SCRG1 stimulator of chondrogenesis 1	Component	extracellular space	TAS
		Biological process	nervous system development	TAS
SDHC	SDHC succinate dehydrogenase complex, subunit C, integral membrane protein, 15kDa	Component	integral to membrane	TAS
		Component	mitochondrion	TAS
		Component	respiratory chain complex II	TAS
		Biological process	aerobic respiration	TAS
		Biological process	oxidation-reduction process	TAS
		Biological process	respiratory electron transport chain	TAS
		Biological process	tricarboxylic acid cycle	TAS
SEC14L1	SEC14L1 SEC14like 1 (S. cerevisiae)	Component	Golgi apparatus	TAS
		Component	membrane	TAS
		Function	binding	TAS
SEC23A	SEC23A Sec23 homolog A (S. cerevisiae)	Component	ER to Golgi transport vesicle membrane	TAS

		Component	cytosol	TAS
		Component	endoplasmic reticulum membrane	TAS
		Function	protein binding	IPI
		Biological process	cellular protein metabolic process	TAS
		Biological process	COPII vesicle coating	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
SEC61B	SEC61B Sec61 beta subunit	Function	epidermal growth factor binding	IPI
		Function	protein binding	IPI
		Biological process	ER-associated protein catabolic process	IDA
		Biological process	protein import into nucleus, translocation	IMP
		Biological process	retrograde protein transport, ER to cytosol	IMP
SEC62	SEC62 SEC62 homolog (<i>S. cerevisiae</i>)	Component	aggresome	IDA
		Component	endoplasmic reticulum	IDA
		Component	intermediate filament cytoskeleton	IDA
		Function	receptor activity	TAS
		Biological process	cotranslational protein targeting to membrane	TAS
SEMA3A	SEMA3A sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3A	Component	extracellular region	TAS
		Biological process	regulation of axon extension involved in axon guidance	IDA
		Biological process	axon guidance	TAS
SEMA3F	SEMA3F sema domain, immunoglobulin domain (Ig), short basic domain, secreted, (semaphorin) 3F	Component	extracellular space	TAS
		Function	chemorepellent activity	IDA
		Biological process	axon guidance	IDA
		Biological process	negative chemotaxis	IDA
SEMA4C	SEMA4C sema domain, immunoglobulin domain (Ig), transmembrane domain (TM) and short cytoplasmic domain, (semaphorin) 4C	Biological process	muscle cell differentiation	IDA
		Biological process	positive regulation of stress-activated MAPK cascade	IDA
SEPHS1	SEPHS1 selenophosphate synthetase 1	Function	GTP binding	TAS
		Biological process	protein modification process	TAS
SEPT2	SEPT2 septin 2	Component	actin cytoskeleton	IDA

		Component	cytoplasm	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
SERBP1	SERBP1 SERPINE1 mRNA binding protein 1	Function	mRNA 3'-UTR binding	IDA
		Function	protein binding	IPI
SERINC1	SERINC1 serine incorporator 1	Function	protein binding	IPI
SERP1	SERP1 stressassociated endoplasmic reticulum protein 1	Component	ribosome	TAS
		Biological process	plasma membrane organization	TAS
		Biological process	protein modification process	TAS
		Biological process	response to stress	TAS
SERPINE1	SERPINE1 serpin peptidase inhibitor, clade E (nexin, plasminogen activator inhibitor type 1), member 1	Component	extracellular matrix	IDA
		Component	extracellular region	IDA
		Component	extracellular space	IDA
		Component	extracellular region	TAS
		Component	platelet alpha granule lumen	TAS
		Function	serine-type endopeptidase inhibitor activity	IDA
		Function	protease binding	IPI
		Function	protein binding	IPI
		Function	contributes_to receptor binding	IPI
		Function	serine-type endopeptidase inhibitor activity	IPI
		Biological process	negative regulation of cell adhesion mediated by integrin	IDA
		Biological process	negative regulation of cell migration	IDA
		Biological process	negative regulation of endopeptidase activity	IDA
		Biological process	negative regulation of fibrinolysis	IDA
		Biological process	negative regulation of plasminogen activation	IDA
		Biological process	negative regulation of smooth muscle cell migration	IDA
		Biological process	negative regulation of smooth muscle cell-matrix adhesion	IDA
		Biological process	positive regulation of receptor-mediated endocytosis	IDA

		Biological process	regulation of receptor activity	IDA
		Biological process	angiogenesis	IEP
		Biological process	chronological cell aging	IEP
		Biological process	defense response to Gram-negative bacterium	IGI
		Biological process	negative regulation of vascular wound healing	IGI
		Biological process	positive regulation of inflammatory response	IGI
		Biological process	cellular response to chemical stimulus	IMP
		Biological process	cellular response to lipopolysaccharide	IMP
		Biological process	negative regulation of apoptosis	IMP
		Biological process	negative regulation of plasminogen activation	IMP
		Biological process	positive regulation of angiogenesis	IMP
		Biological process	positive regulation of blood coagulation	IMP
		Biological process	positive regulation of interleukin-8 production	IMP
		Biological process	positive regulation of leukotriene production involved in inflammatory response	IMP
		Biological process	positive regulation of monocyte chemotaxis	IMP
		Biological process	blood coagulation	TAS
		Biological process	fibrinolysis	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
SERTAD2	SERTAD2 SERTA domain containing 2	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Biological process	negative regulation of cell growth	IDA
SERTAD4	SERTAD4 SERTA domain containing 4	Function	protein binding	IPI
SESN2	SESN2 sestrin 2	Component	cytoplasm	IDA
SFN	SFN stratifin	Component	cytoplasm	IDA
		Component	extracellular space	TAS
		Function	protein binding	IPI
		Function	protein kinase C inhibitor activity	TAS
		Biological process	apoptosis	IDA
		Biological process	DNA damage response, signal transduction resulting in induction of apoptosis	IDA
		Biological process	negative regulation of caspase activity	IDA
		Biological process	release of cytochrome c from mitochondria	IDA
		Biological process	cell proliferation	TAS

		Biological process	negative regulation of protein kinase activity	TAS
		Biological process	signal transduction	TAS
SFRP1	SFRP1 secreted frizzledrelated protein 1	Component	cell surface	IDA
		Component	cytosol	IDA
		Component	extracellular matrix	IDA
		Component	colocalizes_with extracellular matrix	IDA
		Component	extracellular space	IDA
		Component	intracellular	IDA
		Component	proteinaceous extracellular matrix	IDA
		Function	drug binding	IDA
		Function	heparin binding	IDA
		Function	cysteine-type endopeptidase activity	IMP
		Function	Wnt-protein binding	IPI
		Function	frizzled binding	IPI
		Function	identical protein binding	IPI
		Biological process	canonical Wnt receptor signaling pathway	IDA
		Biological process	cellular response to estrogen stimulus	IDA
		Biological process	cellular response to fibroblast growth factor stimulus	IDA
		Biological process	cellular response to growth factor stimulus	IDA
		Biological process	cellular response to heparin	IDA
		Biological process	cellular response to tumor necrosis factor	IDA
		Biological process	DNA fragmentation involved in apoptotic nuclear change	IDA
		Biological process	dorsal/ventral axis specification	IDA
		Biological process	hemopoietic progenitor cell differentiation	IDA
		Biological process	hemopoietic stem cell differentiation	IDA
		Biological process	negative regulation of androgen receptor signaling pathway	IDA
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IDA
		Biological process	negative regulation of canonical Wnt receptor signaling pathway involved in controlling type B pancreatic cell proliferation	IDA
		Biological process	negative regulation of cell growth	IDA

		Biological process	negative regulation of cell migration	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of epithelial cell proliferation	IDA
		Biological process	negative regulation of epithelial to mesenchymal transition	IDA
		Biological process	negative regulation of fibroblast apoptosis	IDA
		Biological process	negative regulation of fibroblast proliferation	IDA
		Biological process	negative regulation of gene expression	IDA
		Biological process	negative regulation of insulin secretion	IDA
		Biological process	negative regulation of ossification	IDA
		Biological process	negative regulation of peptidyl-tyrosine phosphorylation	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	negative regulation of Wnt receptor signaling pathway	IDA
		Biological process	negative regulation of Wnt receptor signaling pathway involved in dorsal/ventral axis specification	IDA
		Biological process	positive regulation of apoptosis	IDA
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IDA
		Biological process	positive regulation of cell growth	IDA
		Biological process	positive regulation of cell proliferation	IDA
		Biological process	positive regulation of fat cell differentiation	IDA
		Biological process	positive regulation of fibroblast apoptosis	IDA
		Biological process	positive regulation of non-canonical Wnt receptor signaling pathway	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	positive regulation of Wnt receptor signaling pathway	IDA
		Biological process	response to drug	IDA
		Biological process	response to organic cyclic compound	IDA
		Biological process	cellular response to BMP stimulus	IEP

		Biological process	cellular response to estradiol stimulus	IEP
		Biological process	cellular response to hypoxia	IEP
		Biological process	cellular response to interleukin-1	IEP
		Biological process	cellular response to prostaglandin E stimulus	IEP
		Biological process	cellular response to starvation	IEP
		Biological process	cellular response to transforming growth factor beta stimulus	IEP
		Biological process	cellular response to vitamin D	IEP
		Biological process	menstrual cycle phase	IEP
		Biological process	osteoblast differentiation	IEP
		Biological process	negative regulation of apoptosis	IMP
		Biological process	negative regulation of B cell differentiation	IMP
		Biological process	negative regulation of bone remodeling	IMP
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	negative regulation of cysteine-type endopeptidase activity	IMP
		Biological process	negative regulation of ossification	IMP
		Biological process	negative regulation of osteoblast proliferation	IMP
		Biological process	negative regulation of transcription, DNA-dependent	IMP
		Biological process	negative regulation of Wnt receptor signaling pathway	IMP
		Biological process	positive regulation of apoptosis	IMP
		Biological process	positive regulation of epithelial cell proliferation	IMP
		Biological process	positive regulation of smoothened signaling pathway	IMP
		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	regulation of cell cycle process	IMP
SFRP4	SFRP4 secreted frizzledrelated protein 4	Component	cell surface	IDA
		Component	cytoplasm	IDA
		Component	extracellular space	IDA
		Component	nucleus	IDA
		Biological process	negative regulation of canonical Wnt receptor	IDA

			signaling pathway	
		Biological process	negative regulation of sequence-specific DNA binding transcription factor activity	IDA
		Biological process	negative regulation of sodium-dependent phosphate transport	IDA
		Biological process	phosphate ion homeostasis	IDA
		Biological process	positive regulation of apoptosis	IDA
		Biological process	positive regulation of epidermal cell differentiation	IDA
		Biological process	positive regulation of gene expression	IDA
		Biological process	positive regulation of receptor internalization	IDA
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IGI
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	negative regulation of cell proliferation	IMP
		Biological process	positive regulation of apoptosis	IMP
SGCD	SGCD sarcoglycan, delta (35kDa dystrophin-associated glycoprotein)	Component	dystrophin-associated glycoprotein complex	IDA
		Component	plasma membrane	TAS
		Biological process	muscle organ development	TAS
SGK1	SGK1 serum/glucocorticoid regulated kinase 1	Function	protein binding	IPI
		Biological process	sodium ion transport	TAS
SGMS2	SGMS2 sphingomyelin synthase 2	Component	Golgi apparatus	IDA
		Component	integral to Golgi membrane	IDA
		Component	integral to plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	ceramide cholinephosphotransferase activity	IDA
		Function	sphingomyelin synthase activity	TAS
		Biological process	sphingomyelin biosynthetic process	IDA
		Biological process	sphingolipid metabolic process	TAS
SGPP1	SGPP1 sphingosine 1-phosphate phosphatase 1	Component	endoplasmic reticulum membrane	TAS
		Function	dihydrosphingosine-1-phosphate phosphatase activity	TAS
		Function	sphingosine-1-phosphate phosphatase activity	TAS
		Biological process	sphingolipid metabolic process	TAS

SH2B3	SH2B3 SH2B adaptor protein 3	Biological process	blood coagulation	TAS
SH2D1A	SH2D1A SH2 domain containing 1A	Component	cytoplasm	IDA
		Biological process	cell-cell signaling	IDA
SH2D2A	SH2D2A SH2 domain containing 2A	Component	soluble fraction	TAS
		Function	protein binding	IPI
		Function	SH3/SH2 adaptor activity	TAS
		Biological process	signal transduction	TAS
SH3BGRL	SH3BGRL SH3 domain binding glutamic acidrich protein like	Component	cytoplasm	TAS
		Component	nucleus	TAS
		Function	SH3/SH2 adaptor activity	TAS
SH3PXD2A	SH3PXD2A SH3 and PX domains 2A	Component	podosome	IDA
		Function	protein binding	IPI
SH3PXD2B	SH3PXD2B SH3 and PX domains 2B	Biological process	bone development	IMP
		Biological process	eye development	IMP
		Biological process	heart development	IMP
		Biological process	skeletal system development	IMP
SH3RF2	SH3RF2 SH3 domain containing ring finger 2	Function	protein phosphatase 1 binding	IDA
SH3RF2	SH3RF2 SH3 domain containing ring finger 2	Function	protein binding	IPI
SHOX2	SHOX2 short stature homeobox 2	Biological process	heart development	TAS
		Biological process	nervous system development	TAS
		Biological process	skeletal system development	TAS
SIX4	SIX4 SIX homeobox 4	Biological process	anatomical structure morphogenesis	TAS
SIX5	SIX5 SIX homeobox 5	Function	protein binding	IPI
SKAP2	SKAP2 src kinase associated phosphoprotein 2	Component	plasma membrane	IDA
		Function	protein binding	IPI
		Function	SH3/SH2 adaptor activity	TAS
		Biological process	cell junction assembly	TAS
		Biological process	protein complex assembly	TAS
		Biological process	signal transduction	TAS
SKI	SKI vski sarcoma viral oncogene homolog (avian)	Component	PML body	IDA
		Component	nuclear body	IDA
		Component	nucleus	IDA
		Function	transcription corepressor activity	IDA
		Function	zinc ion binding	IDA

		Function	transcription corepressor activity	IMP
		Function	SMAD binding	IPI
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Function	protein kinase binding	IPI
		Function	repressing transcription factor binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Biological process	myotube differentiation	IDA
		Biological process	negative regulation of activin receptor signaling pathway	IDA
		Biological process	negative regulation of BMP signaling pathway	IDA
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of osteoblast differentiation	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	negative regulation of transforming growth factor beta receptor signaling pathway	IDA
		Biological process	positive regulation of DNA binding	IDA
		Biological process	SMAD protein signal transduction	IDA
		Biological process	negative regulation of Schwann cell proliferation	IGI
		Biological process	negative regulation of transforming growth factor beta receptor signaling pathway	IGI
		Biological process	negative regulation of BMP signaling pathway	IMP
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	negative regulation of transforming growth factor beta receptor signaling pathway	IMP
		Biological process	protein heterotrimerization	IPI
		Biological process	protein homotrimerization	IPI
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
SKP1	SKP1 Sphase kinaseassociated protein 1	Component	SCF ubiquitin ligase complex	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	ubiquitin-protein ligase activity	IDA

		Function	protein binding	IPI
		Biological process	protein ubiquitination	IDA
		Biological process	SCF-dependent proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS
		Biological process	G1/S transition of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	TAS
		Biological process	S phase of mitotic cell cycle	TAS
		Biological process	viral reproduction	TAS
SLA	SLA Srlikeadaptor	Function	SH3/SH2 adaptor activity	TAS
SLA2	SLA2 Srlikeadaptor 2	Component	cytoplasm	TAS
		Component	plasma membrane	TAS
		Function	SH3/SH2 adaptor activity	IDA
		Function	protein N-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of calcium-mediated signaling	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	antigen receptor-mediated signaling pathway	TAS
		Biological process	B cell mediated immunity	TAS
		Biological process	intracellular receptor mediated signaling pathway	TAS
		Biological process	negative regulation of B cell activation	TAS
		Biological process	T cell activation	TAS
SLC12A5	SLC12A5 solute carrier family 12 (potassium/chloride transporter), member 5	Component	plasma membrane	TAS
		Function	potassium:chloride symporter activity	TAS
		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC16A2	SLC16A2 solute carrier family 16, member 2 (monocarboxylic acid transporter 8)	Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS

		Function	monocarboxylic acid transmembrane transporter activity	TAS
		Function	transporter activity	TAS
		Biological process	monocarboxylic acid transport	TAS
		Biological process	transport	TAS
SLC16A3	SLC16A3 solute carrier family 16, member 3 (monocarboxylic acid transporter 4)	Component	actin cytoskeleton	IDA
		Component	nuclear membrane	IDA
		Component	plasma membrane	IDA
		Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS
		Component	plasma membrane	TAS
		Function	monocarboxylic acid transmembrane transporter activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	leukocyte migration	TAS
		Biological process	monocarboxylic acid transport	TAS
		Biological process	pyruvate metabolic process	TAS
		Biological process	transmembrane transport	TAS
SLC16A6	SLC16A6 solute carrier family 16, member 6 (monocarboxylic acid transporter 7)	Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS
		Function	monocarboxylic acid transmembrane transporter activity	TAS
		Biological process	monocarboxylic acid transport	TAS
SLC17A5	SLC17A5 solute carrier family 17 (anion/sugar transporter), member 5	Component	lysosomal membrane	IDA
		Component	integral to plasma membrane	TAS
		Component	lysosomal membrane	TAS
		Component	membrane fraction	TAS
		Function	sialic acid transmembrane transporter activity	IDA
		Function	sialic acid:hydrogen symporter activity	TAS
		Function	sugar:hydrogen symporter activity	TAS
		Biological process	sialic acid transport	IDA
		Biological process	anion transport	TAS

		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC17A6	SLC17A6 solute carrier family 17 (sodiumdependent inorganic phosphate cotransporter), member 6	Component	synaptic vesicle membrane	TAS
		Function	L-glutamate transmembrane transporter activity	TAS
		Biological process	ion transport	TAS
		Biological process	L-glutamate transport	TAS
		Biological process	transmembrane transport	TAS
SLC22A7	SLC22A7 solute carrier family 22 (organic anion transporter), member 7	Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS
		Component	plasma membrane	TAS
		Function	anion:anion antiporter activity	TAS
		Function	sodium-independent organic anion transmembrane transporter activity	TAS
		Biological process	organic anion transport	TAS
		Biological process	transmembrane transport	TAS
SLC23A3	SLC23A3 solute carrier family 23 (nucleobase transporters), member 3	Function	protein binding	IPI
SLC24A3	SLC24A3 solute carrier family 24 (sodium/potassium/calcium exchanger), member 3	Component	plasma membrane	TAS
		Function	calcium, potassium:sodium antiporter activity	TAS
		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC2A13	SLC2A13 solute carrier family 2 (facilitated glucose transporter), member 13	Biological process	transmembrane transport	TAS
SLC30A4	SLC30A4 solute carrier family 30 (zinc transporter), member 4	Component	cytoplasmic part	IDA
		Component	late endosome	IDA
		Biological process	regulation of sequestering of zinc ion	IDA
		Biological process	response to toxin	IDA
		Biological process	zinc ion transmembrane transport	TAS
SLC30A7	SLC30A7 solute carrier family 30 (zinc transporter), member 7	Component	Golgi apparatus	IDA
		Component	cytoplasmic part	IDA

		Component	vesicle	IDA
		Function	protein binding	IPI
		Biological process	transmembrane transport	TAS
SLC31A1	SLC31A1 solute carrier family 31 (copper transporters), member 1	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	copper ion transmembrane transporter activity	TAS
		Biological process	copper ion transmembrane transport	TAS
		Biological process	copper ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC35B4	SLC35B4 solute carrier family 35, member B4	Component	Golgi apparatus	IDA
		Function	UDP-N-acetylglucosamine transmembrane transporter activity	IDA
		Function	UDP-xylose transmembrane transporter activity	IDA
		Biological process	UDP-N-acetylglucosamine transport	IDA
		Biological process	UDP-xylose transport	IDA
		Biological process	transmembrane transport	TAS
SLC36A1	SLC36A1 solute carrier family 36 (proton/amino acid symporter), member 1	Component	endoplasmic reticulum	IDA
		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC38A3	SLC38A3 solute carrier family 38, member 3	Component	plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	L-alanine transmembrane transporter activity	IDA
		Function	L-asparagine transmembrane transporter activity	IDA
		Function	L-glutamine transmembrane transporter activity	IDA
		Function	L-histidine transmembrane transporter activity	IDA
		Function	amino acid transmembrane transporter activity	TAS
		Biological process	asparagine transport	IDA
		Biological process	glutamine transport	IDA
		Biological process	histidine transport	IDA
		Biological process	L-alanine transport	IDA
		Biological process	amino acid transmembrane transport	TAS
		Biological process	cellular nitrogen compound metabolic process	TAS

		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC39A1	SLC39A1 solute carrier family 39 (zinc transporter), member 1	Component	plasma membrane	IDA
		Component	membrane fraction	TAS
		Component	plasma membrane	TAS
		Function	inorganic cation transmembrane transporter activity	TAS
		Function	zinc ion transmembrane transporter activity	TAS
		Biological process	zinc ion transmembrane transport	IMP
		Biological process	cation transport	TAS
		Biological process	transmembrane transport	TAS
		Biological process	zinc ion transmembrane transport	TAS
SLC39A10	SLC39A10 solute carrier family 39 (zinc transporter), member 10	Biological process	transmembrane transport	TAS
SLC41A1	SLC41A1 solute carrier family 41, member 1	Component	plasma membrane	TAS
		Function	magnesium ion transmembrane transporter activity	TAS
		Biological process	magnesium ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC44A1	SLC44A1 solute carrier family 44, member 1	Component	integral to membrane	TAS
		Component	plasma membrane	TAS
		Function	choline transmembrane transporter activity	TAS
		Biological process	choline transport	TAS
		Biological process	transmembrane transport	TAS
SLC4A4	SLC4A4 solute carrier family 4, sodium bicarbonate cotransporter, member 4	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	sodium:bicarbonate symporter activity	TAS
		Biological process	bicarbonate transport	TAS
		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
		Biological process	transport	TAS
SLC4A7	SLC4A7 solute carrier family 4, sodium bicarbonate cotransporter, member 7	Component	plasma membrane	TAS

		Function	protein binding	IPI
		Function	sodium:bicarbonate symporter activity	TAS
		Biological process	bicarbonate transport	TAS
		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC5A3	SLC5A3 solute carrier family 5 (sodium/myoinositol cotransporter), member 3	Component	integral to membrane	TAS
		Component	integral to plasma membrane	TAS
		Biological process	transmembrane transport	TAS
		Biological process	transport	TAS
SLC6A1	SLC6A1 solute carrier family 6 (neurotransmitter transporter, GABA), member 1	Component	integral to membrane	TAS
		Component	membrane fraction	TAS
		Component	plasma membrane	TAS
		Function	gamma-aminobutyric acid:sodium symporter activity	TAS
		Biological process	neurotransmitter secretion	TAS
		Biological process	synaptic transmission	TAS
		Biological process	transmembrane transport	TAS
SLC7A11	SLC7A11 solute carrier family 7, (cationic amino acid transporter, y+ system) member 11	Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	cystine:glutamate antiporter activity	TAS
		Biological process	response to toxin	IDA
		Biological process	blood coagulation	TAS
		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	ion transport	TAS
		Biological process	leukocyte migration	TAS
		Biological process	transmembrane transport	TAS
SLC7A8	SLC7A8 solute carrier family 7 (amino acid transporter, Ltype), member 8	Component	plasma membrane	IDA
		Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	amino acid transmembrane transporter activity	IDA
		Function	organic cation transmembrane transporter activity	IDA

		Function	toxin transporter activity	IDA
		Function	protein binding	IPI
		Function	amino acid transmembrane transporter activity	TAS
		Function	neutral amino acid transmembrane transporter activity	TAS
		Biological process	amino acid transmembrane transport	IDA
		Biological process	amino acid transport	IDA
		Biological process	organic cation transport	IDA
		Biological process	amino acid transmembrane transport	TAS
		Biological process	blood coagulation	TAS
		Biological process	cellular amino acid metabolic process	TAS
		Biological process	cellular nitrogen compound metabolic process	TAS
		Biological process	ion transport	TAS
		Biological process	leukocyte migration	TAS
		Biological process	neutral amino acid transport	TAS
		Biological process	transmembrane transport	TAS
		Biological process	transport	TAS
SLC8A1	SLC8A1 solute carrier family 8 (sodium/calcium exchanger), member 1	Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	calcium ion transmembrane transporter activity	TAS
		Function	calcium:sodium antiporter activity	TAS
		Function	sodium ion transmembrane transporter activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	calcium ion transmembrane transport	TAS
		Biological process	calcium ion transport	TAS
		Biological process	cytosolic calcium ion transport	TAS
		Biological process	ion transport	TAS
		Biological process	muscle contraction	TAS
		Biological process	platelet activation	TAS
		Biological process	sodium ion export	TAS
		Biological process	sodium ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC9A2	SLC9A2 solute carrier family 9 (sodium/hydrogen exchanger), member 2	Component	plasma membrane	TAS

		Function	sodium:hydrogen antiporter activity	TAS
		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
SLC9A3R2	SLC9A3R2 solute carrier family 9 (sodium/hydrogen exchanger), member 3 regulator 2	Component	plasma membrane	IDA
		Function	beta-catenin binding	IPI
		Function	phosphatase binding	IPI
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Function	receptor binding	IPI
		Biological process	protein complex assembly	TAS
SLC9A9	SLC9A9 solute carrier family 9 (sodium/hydrogen exchanger), member 9	Component	recycling endosome	IDA
		Biological process	ion transport	TAS
		Biological process	transmembrane transport	TAS
SMAD3	SMAD3 SMAD family member 3	Component	cytoplasm	IDA
		Component	nuclear inner membrane	IDA
		Component	nucleus	IDA
		Component	receptor complex	IMP
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	contributes_to sequence-specific DNA binding transcription factor activity	IDA
		Function	transforming growth factor beta receptor, pathway-specific cytoplasmic mediator activity	IDA
		Function	R-SMAD binding	IPI
		Function	RNA polymerase II activating transcription factor binding	IPI
		Function	beta-catenin binding	IPI
		Function	co-SMAD binding	IPI
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI

		Function	protein kinase binding	IPI
		Function	transcription factor binding	IPI
		Function	transforming growth factor beta receptor binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Biological process	evasion of host defenses by virus	IDA
		Biological process	negative regulation of cell growth	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription factor import into nucleus	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	SMAD protein complex assembly	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	transforming growth factor beta receptor signaling pathway	IDA
		Biological process	transport	IDA
		Biological process	activation of caspase activity	IMP
		Biological process	cell cycle arrest	IMP
		Biological process	cell-cell junction organization	IMP
		Biological process	immune response	IMP
		Biological process	induction of apoptosis	IMP
		Biological process	negative regulation of mitotic cell cycle	IMP
		Biological process	negative regulation of protein catabolic process	IMP
		Biological process	negative regulation of protein phosphorylation	IMP
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	positive regulation of catenin import into nucleus	IMP
		Biological process	positive regulation of epithelial to mesenchymal transition	IMP
		Biological process	positive regulation of transcription from RNA	IMP

			polymerase II promoter	
		Biological process	protein stabilization	IMP
		Biological process	regulation of transforming growth factor beta receptor signaling pathway	IMP
		Biological process	regulation of transforming growth factor-beta2 production	IMP
		Biological process	response to hypoxia	IMP
		Biological process	primary microRNA processing	TAS
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
		Biological process	wound healing	TAS
SMAD4	SMAD4 SMAD family member 4	Component	activin responsive factor complex	IDA
		Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	transcription factor complex	IDA
		Component	transcription factor complex	IPI
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	contributes_to DNA binding	IDA
		Function	contributes_to sequence-specific DNA binding	IDA
		Function	contributes_to sequence-specific DNA binding transcription factor activity	IDA
		Function	transforming growth factor beta receptor, common-partner cytoplasmic mediator activity	IDA
		Function	I-SMAD binding	IPI
		Function	R-SMAD binding	IPI
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	BMP signaling pathway	IDA
		Biological process	negative regulation of cell growth	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA

		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	positive regulation of transforming growth factor beta receptor signaling pathway	IDA
		Biological process	response to transforming growth factor beta stimulus	IDA
		Biological process	SMAD protein complex assembly	IDA
		Biological process	SMAD protein signal transduction	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	transforming growth factor beta receptor signaling pathway	IDA
		Biological process	negative regulation of protein catabolic process	IMP
		Biological process	regulation of transforming growth factor beta receptor signaling pathway	IMP
		Biological process	regulation of transforming growth factor-beta2 production	IMP
		Biological process	response to hypoxia	IMP
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
SMAD5	SMAD5 SMAD family member 5	Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Component	nucleus	TAS
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Function	transforming growth factor beta receptor, pathway-specific cytoplasmic mediator activity	TAS
		Biological process	BMP signaling pathway	TAS
SMARCD1	SMARCD1 SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 1	Component	SWI/SNF complex	IDA
		Component	chromatin remodeling complex	IDA
		Component	nucleoplasm	TAS
		Function	protein complex scaffold	IDA
		Function	protein binding	IPI
		Function	transcription coactivator activity	TAS

		Biological process	chromatin remodeling	IMP
		Biological process	chromatin-mediated maintenance of transcription	IMP
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
SMARCD2	SMARCD2 SWI/SNF related, matrix associated, actin dependent regulator of chromatin, subfamily d, member 2	Component	SWI/SNF complex	IDA
		Function	protein binding	IPI
SMC1A	SMC1A structural maintenance of chromosomes 1A	Component	cytoplasm	IDA
		Component	kinetochore	IDA
		Component	meiotic cohesin complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cohesin core heterodimer	TAS
		Component	condensed nuclear chromosome	TAS
		Component	nucleoplasm	TAS
		Function	chromatin binding	IDA
		Function	protein binding	IPI
		Function	protein heterodimerization activity	IPI
		Biological process	cell cycle checkpoint	IDA
		Biological process	signal transduction in response to DNA damage	IDA
		Biological process	response to radiation	IEP
		Biological process	negative regulation of DNA endoreduplication	IMP
		Biological process	sister chromatid cohesion	IMP
		Biological process	DNA repair	TAS
		Biological process	gene expression	TAS
		Biological process	M phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic metaphase/anaphase transition	TAS
		Biological process	mitotic prometaphase	TAS
		Biological process	mitotic sister chromatid cohesion	TAS
		Biological process	mitotic sister chromatid segregation	TAS
		Biological process	mitotic spindle organization	TAS
		Biological process	nuclear mRNA splicing, via spliceosome	TAS
SMC6	SMC6 structural maintenance of chromosomes 6	Component	intracellular	IDA

SMG1	SMG1 SMG1 homolog, phosphatidylinositol 3kinaserelated kinase (C. elegans)	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	nuclear-transcribed mRNA catabolic process, nonsense-mediated decay	IDA
		Biological process	peptidyl-serine phosphorylation	IDA
		Biological process	phosphatidylinositol phosphorylation	IDA
		Biological process	protein autophosphorylation	IDA
		Biological process	response to stress	IDA
		Biological process	mRNA export from nucleus	TAS
		Biological process	nuclear-transcribed mRNA catabolic process, nonsense-mediated decay	TAS
		Biological process	peptidyl-serine phosphorylation	TAS
SMURF1	SMURF1 SMAD specific E3 ubiquitin protein ligase 1	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Function	ubiquitin-protein ligase activity	IDA
		Function	I-SMAD binding	IPI
		Function	R-SMAD binding	IPI
		Function	activin binding	IPI
		Function	protein binding	IPI
		Biological process	cell differentiation	IDA
		Biological process	negative regulation of transforming growth factor beta receptor signaling pathway	IDA
		Biological process	positive regulation of protein ubiquitination	IDA
		Biological process	proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	protein export from nucleus	IDA
		Biological process	protein localization at cell surface	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	protein ubiquitination	IDA
		Biological process	protein ubiquitination involved in ubiquitin-	IDA

			dependent protein catabolic process	
		Biological process	receptor catabolic process	IDA
		Biological process	ubiquitin-dependent SMAD protein catabolic process	IDA
		Biological process	ectoderm development	TAS
		Biological process	negative regulation of BMP signaling pathway	TAS
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
		Component	nucleoplasm	TAS
		Biological process	transcription from RNA polymerase III promoter	TAS
SNAPIN	SNAPIN SNAPassociated protein	Component	BLOC-1 complex	IDA
		Component	perinuclear region of cytoplasm	IDA
		Component	synaptosome	IDA
		Component	synaptic vesicle	TAS
		Function	SNARE binding	IDA
		Function	protein binding	IPI
		Biological process	synaptic vesicle exocytosis	IDA
		Biological process	intracellular protein transport	TAS
		Biological process	neurotransmitter secretion	TAS
SNCA	SNCA synuclein, alpha (non A4 component of amyloid precursor)	Component	actin cytoskeleton	IDA
		Component	axon	IDA
		Component	cell cortex	IDA
		Component	cytoplasm	IDA
		Component	cytosol	IDA
		Component	fibril	IDA
		Component	growth cone	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Component	colocalizes_with platelet alpha granule membrane	IDA
		Function	calcium ion binding	IDA
		Function	caspase inhibitor activity	IDA
		Function	NOT fatty acid binding	IDA
		Function	ferrous iron binding	IDA
		Function	histone binding	IDA

		Function	magnesium ion binding	IDA
		Function	NOT phospholipase D inhibitor activity	IDA
		Function	phosphoprotein binding	IDA
		Function	tau protein binding	IDA
		Function	zinc ion binding	IDA
		Function	Hsp70 protein binding	IPI
		Function	alpha-tubulin binding	IPI
		Function	dynein binding	IPI
		Function	kinesin binding	IPI
		Function	protein binding	IPI
		Biological process	activation of caspase activity	IDA
		Biological process	negative regulation of caspase activity	IDA
		Biological process	negative regulation of dopamine uptake	IDA
		Biological process	negative regulation of histone acetylation	IDA
		Biological process	negative regulation of microtubule polymerization	IDA
		Biological process	negative regulation of monooxygenase activity	IDA
		Biological process	negative regulation of norepinephrine uptake	IDA
		Biological process	negative regulation of platelet-derived growth factor receptor signaling pathway	IDA
		Biological process	negative regulation of serotonin uptake	IDA
		Biological process	negative regulation of thrombin receptor signaling pathway	IDA
		Biological process	negative regulation of transporter activity	IDA
		Biological process	NOT calcium ion homeostasis	IDA
		Biological process	positive regulation of endocytosis	IDA
		Biological process	positive regulation of inositol phosphate biosynthetic process	IDA
		Biological process	positive regulation of protein serine/threonine kinase activity	IDA
		Biological process	positive regulation of receptor recycling	IDA
		Biological process	positive regulation of release of sequestered calcium ion into cytosol	IDA
		Biological process	receptor internalization	IDA
		Biological process	regulation of phospholipase activity	IDA
		Biological process	response to interferon-gamma	IDA

		Biological process	response to interleukin-1	IDA
		Biological process	response to iron(II) ion	IDA
		Biological process	response to lipopolysaccharide	IDA
		Biological process	response to magnesium ion	IDA
		Biological process	anti-apoptosis	IMP
		Biological process	negative regulation of caspase activity	IMP
		Biological process	negative regulation of exocytosis	IMP
SNRK	SNRK SNF related kinase	Function	ATP binding	IDA
		Function	magnesium ion binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein binding	IPI
		Biological process	protein phosphorylation	IDA
		Biological process	myeloid cell differentiation	TAS
SNTB2	SNTB2 syntrophin, beta 2 (dystrophin-associated protein A1, 59kDa, basic component 2)	Component	cytoplasm	IDA
		Component	dystrophin-associated glycoprotein complex	TAS
		Component	membrane fraction	TAS
		Function	protein binding	IPI
SNX1	SNX1 sorting nexin 1	Component	cytoplasm	IDA
		Component	early endosome membrane	IDA
		Component	endosome membrane	IDA
		Function	phosphatidylinositol binding	IDA
		Function	protein binding	IPI
		Biological process	early endosome to Golgi transport	IMP
		Biological process	intracellular protein transport	IMP
		Biological process	endocytosis	TAS
SNX13	SNX13 sorting nexin 13	Component	early endosome	IDA
		Function	phosphatidylinositol binding	IDA
		Biological process	positive regulation of GTPase activity	IDA
		Biological process	intracellular protein transport	IMP
SNX16	SNX16 sorting nexin 16	Component	early endosome	IDA
		Component	extrinsic to endosome membrane	IDA
		Component	late endosome	IDA
		Function	phosphatidylinositol binding	IDA
		Function	identical protein binding	IPI

		Biological process	early endosome to late endosome transport	IMP
		Biological process	endosome to lysosome transport	IMP
		Biological process	protein targeting to lysosome	IMP
SNX18	SNX18 sorting nexin 18	Component	colocalizes_with clathrin-coated vesicle	IDA
		Component	extrinsic to internal side of plasma membrane	IDA
		Function	protein binding	IPI
		Biological process	endocytosis	IDA
		Biological process	positive regulation of GTPase activity	IDA
SNX27	SNX27 sorting nexin family member 27	Function	protein binding	IPI
SNX4	SNX4 sorting nexin 4	Component	cytoplasm	IDA
		Component	cytoplasmic dynein complex	IDA
		Component	early endosome membrane	IDA
		Function	phosphatidylinositol binding	IMP
		Function	protein binding	IPI
		Biological process	endocytic recycling	IMP
		Biological process	protein transport	IMP
		Biological process	endocytosis	TAS
SNX6	SNX6 sorting nexin 6	Component	cytoplasm	IDA
		Component	early endosome membrane	IDA
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	negative regulation of transforming growth factor beta receptor signaling pathway	IDA
		Biological process	intracellular protein transport	IMP
		Biological process	retrograde transport, endosome to Golgi	IMP
SOLH	SOLH small optic lobes homolog (Drosophila)	Function	cysteine-type peptidase activity	TAS
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription, DNA-dependent	TAS
SORCS1	SORCS1 sortilinrelated VPS10 domain containing receptor 1	Component	membrane	IDA
		Function	protein binding	IPI
SOS1	SOS1 son of sevenless homolog 1 (Drosophila)	Component	cytosol	TAS

		Function	protein binding	IPI
		Function	Ras guanyl-nucleotide exchange factor activity	TAS
		Function	Rho GTPase activator activity	TAS
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	axon guidance	TAS
		Biological process	blood coagulation	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	fibroblast growth factor receptor signaling pathway	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	leukocyte migration	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	positive regulation of Rho GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
SOX11	SOX11 SRY (sex determining region Y)box 11	Component	cytoplasm	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Function	translation factor activity, nucleic acid binding	IDA
		Biological process	translation	IDA
SOX12	SOX12 SRY (sex determining region Y)box 12	Biological process	cell fate commitment	IEP
SOX21	SOX21 SRY (sex determining region Y)box 21	Biological process	stem cell differentiation	IDA
SOX4	SOX4 SRY (sex determining region Y)box 4	Component	cytoplasm	IDA
		Component	mitochondrion	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	negative regulation of apoptosis	IMP

		Biological process	positive regulation of apoptosis	IMP
		Biological process	positive regulation of cell proliferation	IMP
		Biological process	protein stabilization	IMP
		Biological process	transcription, DNA-dependent	TAS
SOX5	SOX5 SRY (sex determining region Y)box 5	Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
SOX6	SOX6 SRY (sex determining region Y)box 6	Component	nucleus	IDA
		Function	protein binding	IPI
SOX9	SOX9 SRY (sex determining region Y)box 9	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Biological process	male gonad development	IEP
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
SP1	SP1 Sp1 transcription factor	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	double-stranded DNA binding	IDA
		Function	protein homodimerization activity	IDA
		Function	sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	histone deacetylase binding	IPI
		Function	identical protein binding	IPI
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	positive regulation by host of viral transcription	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter, global	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA

		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
SP2	SP2 Sp2 transcription factor	Component	nucleus	IDA
		Function	histone deacetylase binding	IPI
		Biological process	immune response	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
SP3	SP3 Sp3 transcription factor	Function	protein binding	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
SPHAR	SPHAR Sphase response (cyclin related)	Biological process	DNA replication	TAS
SPRY1	SPRY1 sprouty homolog 1, antagonist of FGF signaling (Drosophila)	Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	TAS
SPTLC2	SPTLC2 serine palmitoyltransferase, long chain base subunit 2	Component	serine C-palmitoyltransferase complex	IDA
		Component	endoplasmic reticulum membrane	TAS
		Function	serine C-palmitoyltransferase activity	IDA
		Biological process	sphingolipid biosynthetic process	TAS
		Biological process	sphingolipid metabolic process	TAS
SRC	SRC vsrc sarcoma (SchmidtRuppin A2) viral oncogene homolog (avian)	Component	caveola	IDA
		Component	mitochondrial inner membrane	IDA
		Component	cytosol	TAS
		Component	plasma membrane	TAS
		Function	heme binding	IDA
		Function	protein kinase activity	IDA
		Function	SH2 domain binding	IPI
		Function	ion channel binding	IPI
		Function	protein binding	IPI
		Function	receptor binding	IPI
		Function	SH3/SH2 adaptor activity	TAS
		Function	integrin binding	TAS

		Function	non-membrane spanning protein tyrosine kinase activity	TAS
		Function	protein kinase activity	TAS
		Function	protein tyrosine kinase activity	TAS
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	response to interleukin-1	IMP
		Biological process	axon guidance	TAS
		Biological process	blood coagulation	TAS
		Biological process	cell junction assembly	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	fibroblast growth factor receptor signaling pathway	TAS
		Biological process	leukocyte migration	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	platelet activation	TAS
		Biological process	positive regulation of integrin activation	TAS
		Biological process	regulation of bone resorption	TAS
		Biological process	regulation of vascular permeability	TAS
		Biological process	signal complex assembly	TAS
		Biological process	signal transduction	TAS
		Biological process	T cell costimulation	TAS
SRF	SRF serum response factor (cfos serum response elementbinding transcription factor)	Component	cytoplasm	IDA
		Component	endoplasmic reticulum	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytoplasm	TAS
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	serum response element binding	IDA
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Function	transcription factor binding	IPI
		Biological process	positive regulation of cell differentiation	IDA
		Biological process	positive regulation of smooth muscle contraction	IDA

		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription initiation from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription via serum response element binding	IDA
		Biological process	response to hormone stimulus	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	trophectodermal cell differentiation	IDA
		Biological process	cell migration involved in sprouting angiogenesis	IMP
		Biological process	cellular senescence	IMP
		Biological process	response to cytokine stimulus	IMP
		Biological process	angiogenesis involved in wound healing	TAS
		Biological process	neuron development	TAS
		Biological process	regulation of smooth muscle cell differentiation	TAS
		Biological process	response to toxin	TAS
SRGAP1	SRGAP1 SLITROBO Rho GTPase activating protein 1	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	GTPase activator activity	TAS
		Biological process	axon guidance	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
SRI	SRI sorcin	Component	cytoplasm	TAS
		Function	calcium channel regulator activity	TAS
		Function	receptor binding	TAS
		Biological process	heart development	TAS
		Biological process	intracellular sequestering of iron ion	TAS
		Biological process	muscle organ development	TAS
		Biological process	regulation of action potential	TAS
		Biological process	regulation of heart contraction	TAS
		Biological process	regulation of striated muscle contraction	TAS
		Biological process	signal transduction	TAS
		Biological process	transport	TAS

SRP72	SRP72 signal recognition particle 72kDa	Component	cytoplasm	IDA
		Component	nucleolus	IDA
		Component	plasma membrane	IDA
		Component	signal recognition particle, endoplasmic reticulum targeting	IDA
		Component	cytosol	TAS
		Function	signal recognition particle binding	IPI
		Biological process	response to drug	IDA
SRPR	SRPR signal recognition particle receptor (docking protein)	Component	integral to membrane	TAS
		Biological process	cotranslational protein targeting to membrane	TAS
SRPX2	SRPX2 sushirepeat containing protein, Xlinked 2	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Function	receptor binding	IPI
		Biological process	cell motility	IDA
		Biological process	cell-cell adhesion	IDA
		Biological process	regulation of phosphorylation	IDA
SRRM2	SRRM2 serine/arginine repetitive matrix 2	Component	Cajal body	IDA
		Component	catalytic step 2 spliceosome	IDA
		Component	nuclear speck	IDA
		Function	C2H2 zinc finger domain binding	IDA
		Function	protein N-terminus binding	IPI
		Function	protein binding	IPI
SS18	SS18 synovial sarcoma translocation, chromosome 18	Function	ligand-dependent nuclear receptor transcription coactivator activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
SSR1	SSR1 signal sequence receptor, alpha	Component	endoplasmic reticulum	IDA
		Function	signal sequence binding	TAS
		Biological process	cotranslational protein targeting to membrane	TAS
		Biological process	positive regulation of cell proliferation	TAS
SSX2IP	SSX2IP synovial sarcoma, X breakpoint 2 interacting protein	Component	protein complex	IDA
		Function	protein binding	IPI

ST3GAL5	ST3GAL5 ST3 betagalactoside alpha2,3sialyltransferase 5	Component	integral to membrane	TAS
		Component	integral to plasma membrane	TAS
		Function	lactosylceramide alpha-2,3-sialyltransferase activity	IDA
		Function	neolactotetraosylceramide alpha-2,3- sialyltransferase activity	TAS
		Function	sialyltransferase activity	TAS
		Biological process	carbohydrate metabolic process	TAS
		Biological process	glycosphingolipid biosynthetic process	TAS
ST8SIA1	ST8SIA1 ST8 alphaNacetylneuraminide alpha2,8sialyltransferase 1	Function	sialyltransferase activity	TAS
		Biological process	carbohydrate metabolic process	TAS
		Biological process	glycosphingolipid biosynthetic process	TAS
ST8SIA2	ST8SIA2 ST8 alphaNacetylneuraminide alpha2,8sialyltransferase 2	Component	Golgi membrane	TAS
		Function	alpha-N-acetylneuraminase alpha-2,8- sialyltransferase activity	TAS
		Function	sialyltransferase activity	TAS
		Biological process	axon guidance	TAS
		Biological process	carbohydrate metabolic process	TAS
		Biological process	cellular protein metabolic process	TAS
		Biological process	nervous system development	TAS
		Biological process	N-glycan processing	TAS
		Biological process	oligosaccharide biosynthetic process	TAS
		Biological process	post-translational protein modification	TAS
		Biological process	protein modification process	TAS
		Biological process	protein N-linked glycosylation via asparagine	TAS
ST8SIA4	ST8SIA4 ST8 alphaNacetylneuraminide alpha2,8sialyltransferase 4	Component	Golgi membrane	TAS
		Function	alpha-N-acetylneuraminase alpha-2,8- sialyltransferase activity	TAS
		Function	sialyltransferase activity	TAS
		Biological process	axon guidance	TAS
		Biological process	nervous system development	TAS

		Biological process	N-glycan processing	TAS
		Biological process	oligosaccharide metabolic process	TAS
		Biological process	protein modification process	TAS
STAC	STAC SH3 and cysteine rich domain	Component	soluble fraction	TAS
		Biological process	signal transduction	TAS
STAG2	STAG2 stromal antigen 2	Component	chromatin	IDA
		Component	nucleoplasm	TAS
		Component	nucleus	TAS
		Function	protein binding	IPI
		Biological process	negative regulation of DNA endoreduplication	IMP
		Biological process	sister chromatid cohesion	IMP
		Biological process	M phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic metaphase/anaphase transition	TAS
		Biological process	mitotic prometaphase	TAS
STAM2	STAM2 signal transducing adaptor molecule (SH3 domain and ITAM motif) 2	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	endosome transport	TAS
		Biological process	epidermal growth factor receptor signaling pathway	TAS
		Biological process	negative regulation of epidermal growth factor receptor signaling pathway	TAS
STAT5B	STAT5B signal transducer and activator of transcription 5B	Component	cytosol	TAS
		Function	glucocorticoid receptor binding	IPI
		Function	protein binding	IPI
		Biological process	cellular response to hormone stimulus	IDA
		Biological process	JAK-STAT cascade involved in growth hormone signaling pathway	IDA
		Biological process	response to estradiol stimulus	IDA
		Biological process	JAK-STAT cascade	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS

		Biological process	transcription, DNA-dependent	TAS
STAT6	STAT6 signal transducer and activator of transcription 6, interleukin4 induced	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
		Biological process	signal transduction	TAS
		Biological process	transcription, DNA-dependent	TAS
STAU1	STAU1 staufen, RNA binding protein, homolog 1 (Drosophila)	Component	cytoplasm	IDA
		Component	microtubule associated complex	TAS
		Function	protein binding	IPI
STC1	STC1 stanniocalcin 1	Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	cell-cell signaling	TAS
		Biological process	cellular calcium ion homeostasis	TAS
		Biological process	response to nutrient	TAS
STC2	STC2 stanniocalcin 2	Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	cell-cell signaling	TAS
		Biological process	response to nutrient	TAS
STK17A	STK17A serine/threonine kinase 17a	Component	nucleus	IDA
		Function	ATP binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	induction of apoptosis	IMP
STK24	STK24 serine/threonine kinase 24	Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	apoptosis	TAS
		Biological process	cellular component disassembly involved in apoptosis	TAS
		Biological process	signal transduction	TAS
STK3	STK3 serine/threonine kinase 3	Function	ATP binding	IDA

		Function	magnesium ion binding	IDA
		Function	protein serine/threonine kinase activator activity	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein binding	IPI
		Function	protein kinase activity	TAS
		Biological process	hippo signaling cascade	IDA
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	positive regulation of protein serine/threonine kinase activity	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IMP
STK4	STK4 serine/threonine kinase 4	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	ATP binding	IDA
		Function	magnesium ion binding	IDA
		Function	protein dimerization activity	IDA
		Function	protein homodimerization activity	IDA
		Function	protein serine/threonine kinase activator activity	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	cell morphogenesis	IDA
		Biological process	hippo signaling cascade	IDA
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	peptidyl-serine phosphorylation	IDA
		Biological process	positive regulation of apoptosis	IDA
		Biological process	positive regulation of protein serine/threonine kinase activity	IDA
		Biological process	protein autophosphorylation	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	negative regulation of canonical Wnt receptor signaling pathway	IMP
STK40	STK40 serine/threonine kinase 40	Component	cytoplasm	IDA

		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
STMN3	STMN3 stathminlike 3	Biological process	nervous system development	TAS
STRN3	STRN3 striatin, calmodulin binding protein 3	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	nucleoplasm	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Component	colocalizes_ with protein phosphatase type 2A complex	IDA
		Function	protein complex binding	IDA
		Function	protein phosphatase 2A binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	armadillo repeat domain binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
STX16	STX16 syntaxin 16	Component	SNARE complex	TAS
		Component	microsome	TAS
		Function	SNAP receptor activity	IDA
		Function	protein binding	IPI
		Biological process	retrograde transport, endosome to Golgi	IDA
		Biological process	intra-Golgi vesicle-mediated transport	TAS
STX17	STX17 syntaxin 17	Component	endoplasmic reticulum	IDA
		Component	nucleolus	IDA
STX1B	STX1B syntaxin 1B	Component	integral to plasma membrane	TAS
		Function	extracellular ligand-gated ion channel activity	TAS
		Function	extracellular-glutamate-gated ion channel activity	TAS
		Biological process	transport	TAS
SULF1	SULF1 sulfatase 1	Component	cell surface	IDA
		Function	arylsulfatase activity	IDA

SUMO3	SUMO3 SMT3 suppressor of mif two 3 homolog 3 (<i>S. cerevisiae</i>)	Component	kinetochore	TAS
		Function	protein binding	IPI
		Biological process	protein sumoylation	IDA
SUPT16H	SUPT16H suppressor of Ty 16 homolog (<i>S. cerevisiae</i>)	Component	nucleoplasm	TAS
		Biological process	gene expression	TAS
		Biological process	nucleosome disassembly	TAS
		Biological process	positive regulation of viral transcription	TAS
		Biological process	transcription elongation from RNA polymerase II promoter	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
		Biological process	viral reproduction	TAS
SUPT6H	SUPT6H suppressor of Ty 6 homolog (<i>S. cerevisiae</i>)	Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription, DNA-dependent	TAS
SV2A	SV2A synaptic vesicle glycoprotein 2A	Component	cytoplasm	IDA
		Component	endoplasmic reticulum	IDA
SYDE1	SYDE1 synapse defective 1, Rho GTPase, homolog 1 (<i>C. elegans</i>)	Component	cytosol	TAS
		Function	GTPase activator activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
SYN2	SYN2 synapsin II	Biological process	synaptic transmission	TAS
SYNCRIP	SYNCRIP synaptotagmin binding, cytoplasmic RNA interacting protein	Component	CRD-mediated mRNA stability complex	IDA
		Component	catalytic step 2 spliceosome	IDA
		Component	ribonucleoprotein complex	IDA
		Function	protein binding	IPI
		Biological process	CRD-mediated mRNA stabilization	IMP
		Biological process	RNA processing	TAS
SYNJ1	SYNJ1 synaptojanin 1	Function	inositol-polyphosphate 5-phosphatase activity	TAS
		Biological process	phosphate metabolic process	TAS
		Biological process	synaptic vesicle endocytosis	TAS

SYP	SYP synaptophysin	Function	cholesterol binding	IDA
SYT11	SYT11 synaptotagmin XI	Function	protein binding	IPI
SYT2	SYT2 synaptotagmin II	Component	intracellular membrane-bounded organelle	IDA
		Component	endocytic vesicle membrane	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	neurotransmitter secretion	TAS
SYVN1	SYVN1 synovial apoptosis inhibitor 1, synoviolin	Component	endoplasmic reticulum	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	acid-amino acid ligase activity	IDA
		Function	protein binding	IPI
		Biological process	ER-associated protein catabolic process	IDA
TACR1	TACR1 tachykinin receptor 1	Component	plasma membrane	IDA
		Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	tachykinin receptor activity	TAS
		Biological process	tachykinin receptor signaling pathway	IDA
		Biological process	activation of phospholipase C activity by G-protein coupled receptor protein signaling pathway coupled to IP3 second messenger	TAS
		Biological process	behavior	TAS
		Biological process	detection of abiotic stimulus	TAS
		Biological process	inflammatory response	TAS
		Biological process	mechanosensory behavior	TAS
TAGAP	TAGAP Tcell activation RhoGTPase activating protein	Component	cytosol	TAS
		Function	GTPase activator activity	TAS
		Biological process	positive regulation of GTPase activity	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
TAGLN2	TAGLN2 transgelin 2	Component	nuclear membrane	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI

TARDBP	TARDBP TAR DNA binding protein	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	RNA binding	IDA
		Function	double-stranded DNA binding	IDA
		Function	mRNA 3'-UTR binding	IDA
		Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	3'-UTR-mediated mRNA stabilization	IDA
		Biological process	negative regulation by host of viral transcription	IDA
		Biological process	RNA splicing	IDA
		Biological process	transcription from RNA polymerase II promoter	TAS
TBL1XR1	TBL1XR1 transducin (beta)like 1 Xlinked receptor 1	Component	colocalizes_with histone deacetylase complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	spindle microtubule	IDA
		Component	transcriptional repressor complex	IDA
		Component	nucleoplasm	TAS
		Function	histone binding	IDA
		Function	transcription corepressor activity	IDA
		Function	transcription corepressor activity	IGI
		Function	beta-catenin binding	IPI
		Function	protein N-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	canonical Wnt receptor signaling pathway	IMP
		Biological process	cellular lipid metabolic process	TAS
TBX21	TBX21 Tbox 21	Function	transcription regulatory region DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	lymphocyte migration	IDA
		Biological process	positive regulation of transcription, DNA-	IDA

			dependent	
		Biological process	response to virus	IEP
		Biological process	multicellular organismal development	TAS
		Biological process	regulation of transcription, DNA-dependent	TAS
		Biological process	transcription, DNA-dependent	TAS
TBX4	TBX4 Tbox 4	Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	leg morphogenesis	IMP
		Biological process	skeletal system morphogenesis	IMP
		Biological process	transcription, DNA-dependent	TAS
TBX6	TBX6 Tbox 6	Biological process	anatomical structure morphogenesis	TAS
		Biological process	mesoderm development	TAS
TCAP	TCAP titincap (telethonin)	Component	Z disc	IDA
		Component	cytosol	TAS
		Function	titin binding	IDA
		Function	protein binding	IPI
		Function	titin Z domain binding	IPI
		Function	structural constituent of muscle	TAS
		Biological process	adult heart development	IEP
		Biological process	cardiac muscle contraction	IEP
		Biological process	skeletal muscle contraction	IEP
		Biological process	cardiac muscle fiber development	IMP
		Biological process	cardiac muscle tissue morphogenesis	IMP
		Biological process	sarcomere organization	IMP
		Biological process	skeletal muscle myosin thick filament assembly	IMP
		Biological process	skeletal muscle thin filament assembly	IMP
		Biological process	detection of mechanical stimulus	TAS
		Biological process	muscle filament sliding	TAS
		Biological process	protein complex assembly	TAS
		Biological process	response to stress	TAS
		Biological process	sarcomere organization	TAS
TCF12	TCF12 transcription factor 12	Component	nucleus	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI

		Biological process	transcription, DNA-dependent	IDA
		Biological process	immune response	TAS
		Biological process	muscle organ development	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
TCF4	TCF4 transcription factor 4	Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
TCHP	TCHP trichoplein, keratin filament binding	Component	apical cortex	IDA
		Component	cytoplasm	IDA
		Component	keratin filament	IDA
		Component	mitochondrion	IDA
		Component	plasma membrane	IDA
		Function	protein binding	IPI
		Biological process	apoptosis	IDA
		Biological process	negative regulation of cell growth	IDA
TEAD1	TEAD1 TEA domain family member 1 (SV40 transcriptional enhancer factor)	Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Biological process	hippo signaling cascade	IDA
		Biological process	transcription, DNA-dependent	IDA
TEAD3	TEAD3 TEA domain family member 3	Component	nucleus	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Biological process	hippo signaling cascade	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	female pregnancy	TAS
		Biological process	regulation of transcription from RNA polymerase	TAS

			II promoter	
TEF	TEF thyrotrophic embryonic factor	Biological process	regulation of transcription from RNA polymerase II promoter	TAS
TERF2	TERF2 telomeric repeat binding factor 2	Component	Golgi apparatus	IDA
		Component	colocalizes_with Mre11 complex	IDA
		Component	chromosome, telomeric region	IDA
		Component	cytoplasm	IDA
		Component	nuclear telomere cap complex	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	telomeric DNA binding	IDA
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Function	protein homodimerization activity	IPI
		Biological process	negative regulation of telomere maintenance	IDA
		Biological process	telomeric loop formation	IDA
		Biological process	protection from non-homologous end joining at telomere	IMP
		Biological process	protein localization to chromosome, telomeric region	IMP
		Biological process	telomere capping	IMP
		Biological process	telomere maintenance	IMP
		Biological process	telomere maintenance via telomere shortening	IMP
		Biological process	telomere maintenance	TAS
TET2	TET2 tet oncogene family member 2	Function	methylcytosine dioxygenase activity	IMP
		Biological process	myeloid cell differentiation	IMP
TFAP2A	TFAP2A transcription factor AP2 alpha (activating enhancer binding protein 2 alpha)	Component	Golgi apparatus	IDA
		Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	nucleus	IMP

		Function	DNA binding	IDA
		Function	protein dimerization activity	IDA
		Function	transcription coactivator activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of bone mineralization	IDA
		Biological process	positive regulation of tooth mineralization	IDA
		Biological process	ectoderm development	TAS
TFCP2L1	TFCP2L1 transcription factor CP2like 1	Component	mitochondrion	IDA
		Component	nucleolus	IDA
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Function	transcription corepressor activity	TAS
		Biological process	female pregnancy	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS
		Biological process	steroid biosynthetic process	TAS
		Biological process	transcription, DNA-dependent	TAS
TFEC	TFEC transcription factor EC	Function	sequence-specific DNA binding transcription factor activity	TAS
		Function	transcription coactivator activity	TAS
		Function	transcription corepressor activity	TAS
		Biological process	transcription, DNA-dependent	TAS
TGFBI	TGFBI transforming growth factor, betainduced, 68kDa	Component	colocalizes_ with extracellular matrix	IDA
		Function	integrin binding	TAS
		Biological process	angiogenesis	IEP
		Biological process	cell proliferation	TAS
		Biological process	negative regulation of cell adhesion	TAS
TGFBR1	TGFBR1 transforming growth factor, beta receptor 1	Component	plasma membrane part	IDA
		Component	receptor complex	IDA
		Component	plasma membrane	TAS
		Function	ATP binding	IDA
		Function	SMAD binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	transforming growth factor beta binding	IDA
		Function	transforming growth factor beta receptor activity	IDA

		Function	transforming growth factor beta receptor activity, type I	IDA
		Function	transmembrane receptor protein serine/threonine kinase activity	IDA
		Function	type II transforming growth factor beta receptor binding	IDA
		Function	contributes_to transforming growth factor beta binding	IMP
		Function	transforming growth factor beta receptor activity	IMP
		Function	contributes_to transforming growth factor beta receptor activity	IMP
		Function	I-SMAD binding	IPI
		Function	SMAD binding	IPI
		Function	contributes_to growth factor binding	IPI
		Function	protein binding	IPI
		Function	transforming growth factor beta binding	IPI
		Function	type II transforming growth factor beta receptor binding	IPI
		Biological process	activation of MAPKK activity	IDA
		Biological process	pathway-restricted SMAD protein phosphorylation	IDA
		Biological process	peptidyl-serine phosphorylation	IDA
		Biological process	peptidyl-threonine phosphorylation	IDA
		Biological process	positive regulation of cell growth	IDA
		Biological process	positive regulation of pathway-restricted SMAD protein phosphorylation	IDA
		Biological process	positive regulation of protein kinase B signaling cascade	IDA
		Biological process	positive regulation of SMAD protein import into nucleus	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	regulation of transcription, DNA-dependent	IDA
		Biological process	response to cholesterol	IDA
		Biological process	signal transduction	IDA

		Biological process	transforming growth factor beta receptor signaling pathway	IDA
		Biological process	cell motility	IMP
		Biological process	positive regulation of cell proliferation	IMP
		Biological process	positive regulation of cellular component movement	IMP
		Biological process	positive regulation of survival gene product expression	IMP
		Biological process	regulation of transcription, DNA-dependent	IMP
		Biological process	transforming growth factor beta receptor signaling pathway	IMP
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
TGFBR2	TGFBR2 transforming growth factor, beta receptor II (70/80kDa)	Component	caveola	IDA
		Component	external side of plasma membrane	IDA
		Component	integral to membrane	IDA
		Component	receptor complex	IDA
		Component	plasma membrane	TAS
		Function	SMAD binding	IDA
		Function	glycosaminoglycan binding	IDA
		Function	transforming growth factor beta binding	IDA
		Function	transforming growth factor beta receptor activity	IDA
		Function	transmembrane receptor protein serine/threonine kinase activity	IDA
		Function	type I transforming growth factor beta receptor binding	IDA
		Function	type III transforming growth factor beta receptor binding	IDA
		Function	transforming growth factor beta receptor activity	IMP
		Function	protein binding	IPI
		Function	contributes_to protein binding	IPI
		Function	transforming growth factor beta binding	IPI
		Function	type I transforming growth factor beta receptor binding	IPI

		Biological process	pathway-restricted SMAD protein phosphorylation	IDA
		Biological process	peptidyl-serine phosphorylation	IDA
		Biological process	peptidyl-threonine phosphorylation	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	response to cholesterol	IDA
		Biological process	response to drug	IDA
		Biological process	transforming growth factor beta receptor signaling pathway	IDA
		Biological process	positive regulation of reactive oxygen species metabolic process	IMP
		Biological process	transforming growth factor beta receptor signaling pathway	IMP
		Biological process	blood vessel development	TAS
		Biological process	positive regulation of cell proliferation	TAS
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
THBD	THBD thrombomodulin	Component	cell surface	IDA
		Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Function	receptor activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	leukocyte migration	TAS
		Biological process	negative regulation of blood coagulation	TAS
		Biological process	negative regulation of fibrinolysis	TAS
		Biological process	negative regulation of platelet activation	TAS
		Component	nucleoplasm	TAS
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Function	transcription corepressor activity	TAS
		Biological process	gene expression	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
THTPA	THTPA thiamine triphosphatase	Component	cytoplasm	IDA

		Component	nucleolus	IDA
		Component	nucleus	IDA
		Function	thiamin-triphosphatase activity	IDA
		Function	hydrolase activity	TAS
		Biological process	dephosphorylation	IDA
		Biological process	thiamine metabolic process	TAS
		Biological process	vitamin metabolic process	TAS
		Biological process	water-soluble vitamin metabolic process	TAS
TIAM1	TIAM1 Tcell lymphoma invasion and metastasis 1	Component	cell-cell junction	IDA
		Component	cytosol	TAS
		Function	Rho guanyl-nucleotide exchange factor activity	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	regulation of small GTPase mediated signal transduction	TAS
		Biological process	small GTPase mediated signal transduction	TAS
TIGD6	TIGD6 tigger transposable element derived 6	Component	nucleus	IDA
TIMM17A	TIMM17A translocase of inner mitochondrial membrane 17 homolog A (yeast)	Biological process	protein targeting to mitochondrion	TAS
TIMP2	TIMP2 TIMP metallopeptidase inhibitor 2	Function	protein binding	IPI
TIMP3	TIMP3 TIMP metallopeptidase inhibitor 3	Component	colocalizes_with extracellular matrix	IDA
		Function	protein binding	IPI
		Function	metalloendopeptidase inhibitor activity	TAS
		Biological process	negative regulation of membrane protein ectodomain proteolysis	IMP
TIPARP	TIPARP TCDDinducible poly(ADPRibose) polymerase	Function	protein binding	IPI
TLK1	TLK1 tousledlike kinase 1	Component	nucleus	IDA
		Component	nucleus	TAS
		Function	ATP binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein binding	IPI
		Function	protein serine/threonine kinase activity	TAS
		Biological process	intracellular protein transport	IDA
		Biological process	intracellular signal transduction	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	regulation of chromatin assembly or disassembly	IDA

TLK2	TLK2 tousledlike kinase 2	Component	nucleus	IDA
		Function	ATP binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein binding	IPI
		Biological process	intracellular signal transduction	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	regulation of chromatin assembly or disassembly	IDA
TLL1	TLL1 tolloidlike 1	Biological process	skeletal system development	TAS
TLR4	TLR4 tolllike receptor 4	Component	cytoplasm	IDA
		Component	external side of plasma membrane	IDA
		Component	integral to plasma membrane	IDA
		Component	lipopolysaccharide receptor complex	IDA
		Component	perinuclear region of cytoplasm	IDA
		Component	plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	lipopolysaccharide receptor activity	IDA
		Function	lipopolysaccharide binding	IMP
		Function	protein binding	IPI
		Function	receptor activity	TAS
		Biological process	detection of lipopolysaccharide	IDA
		Biological process	I-kappaB phosphorylation	IDA
		Biological process	lipopolysaccharide-mediated signaling pathway	IDA
		Biological process	positive regulation of chemokine production	IDA
		Biological process	positive regulation of interleukin-12 biosynthetic process	IDA
		Biological process	positive regulation of interleukin-6 production	IDA
		Biological process	positive regulation of interleukin-8 biosynthetic process	IDA
		Biological process	positive regulation of interleukin-8 production	IDA
		Biological process	positive regulation of NF-kappaB import into nucleus	IDA
		Biological process	positive regulation of NF-kappaB transcription factor activity	IDA
		Biological process	positive regulation of tumor necrosis factor biosynthetic process	IDA

		Biological process	response to lipopolysaccharide	IDA
		Biological process	cellular response to mechanical stimulus	IEP
		Biological process	macrophage activation	IMP
		Biological process	defense response to bacterium	TAS
		Biological process	I-kappaB kinase/NF-kappaB cascade	TAS
		Biological process	immune response	TAS
		Biological process	innate immune response	TAS
		Biological process	MyD88-dependent toll-like receptor signaling pathway	TAS
		Biological process	Toll signaling pathway	TAS
		Biological process	toll-like receptor 1 signaling pathway	TAS
		Biological process	toll-like receptor 2 signaling pathway	TAS
		Biological process	toll-like receptor 4 signaling pathway	TAS
		Biological process	toll-like receptor signaling pathway	TAS
TM9SF3	TM9SF3 transmembrane 9 superfamily member 3	Function	binding	IDA
TMED10	TMED10 transmembrane emp24like trafficking protein 10 (yeast)	Component	ER-Golgi intermediate compartment	IDA
		Function	protein binding	IPI
TMED5	TMED5 transmembrane emp24 protein transport domain containing 5	Component	ER-Golgi intermediate compartment	IDA
TMEM147	TMEM147 transmembrane protein 147	Function	protein binding	IPI
TMEM181	TMEM181 transmembrane protein 181	Function	toxin binding	IDA
		Biological process	pathogenesis	IMP
TMEM63B	TMEM63B transmembrane protein 63B	Function	protein binding	IPI
TMEM97	TMEM97 transmembrane protein 97	Component	lysosome	IDA
		Component	nuclear membrane	IDA
		Component	plasma membrane	IDA
		Component	rough endoplasmic reticulum	IDA
		Function	protein binding	IPI
		Biological process	cholesterol homeostasis	IDA
TMF1	TMF1 TATA element modulatory factor 1	Function	protein binding	IPI
		Function	transcription cofactor activity	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
TMSB4X	TMSB4X thymosin beta 4, Xlinked	Component	extracellular region	TAS
		Component	platelet alpha granule lumen	TAS

		Function	protein binding	IPI
		Biological process	blood coagulation	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
TNFRSF10B	TNFRSF10B tumor necrosis factor receptor superfamily, member 10b	Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	cellular response to mechanical stimulus	IEP
		Biological process	positive regulation of I-kappaB kinase/NF-kappaB cascade	IEP
		Biological process	activation of caspase activity	TAS
		Biological process	apoptosis	TAS
		Biological process	cell surface receptor linked signaling pathway	TAS
		Biological process	induction of apoptosis by extracellular signals	TAS
TNFRSF19	TNFRSF19 tumor necrosis factor receptor superfamily, member 19	Component	mitochondrion	IDA
		Function	protein binding	IPI
TNFRSF21	TNFRSF21 tumor necrosis factor receptor superfamily, member 21	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Biological process	cellular lipid metabolic process	TAS
TNKS	TNKS tankyrase, TRF1interacting ankyrinrelated ADPribose polymerase	Component	chromosome, telomeric region	IDA
		Component	microsome	IDA
		Component	nuclear chromosome, telomeric region	IDA
		Component	nuclear membrane	TAS
		Component	nuclear pore	TAS
		Component	pericentriolar material	TAS
		Function	NAD+ ADP-ribosyltransferase activity	IDA
		Function	zinc ion binding	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of DNA binding	IDA
		Biological process	peptidyl-serine phosphorylation	IDA
		Biological process	peptidyl-threonine phosphorylation	IDA
		Biological process	positive regulation of telomere maintenance via	IDA

			telomerase	
		Biological process	protein ADP-ribosylation	IDA
		Biological process	protein auto-ADP-ribosylation	IDA
		Biological process	protein poly-ADP-ribosylation	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	positive regulation of telomere maintenance via telomerase	IMP
		Biological process	protein localization to chromosome, telomeric region	IMP
		Biological process	mitotic spindle organization	TAS
		Biological process	spindle assembly	TAS
TNKS2	TNKS2 tankyrase, TRF1 interacting ankyrinrelated ADPribose polymerase 2	Component	cytoplasm	IDA
		Component	microsome	IDA
		Component	nuclear envelope	IDA
		Component	nucleus	IDA
		Component	pericentriolar material	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	NAD+ ADP-ribosyltransferase activity	IDA
		Function	protein binding	IPI
		Biological process	protein ADP-ribosylation	IDA
		Biological process	protein auto-ADP-ribosylation	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	positive regulation of canonical Wnt receptor signaling pathway	IMP
		Biological process	protein localization to chromosome, telomeric region	IMP
TNPO1	TNPO1 transportin 1	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	nuclear localization sequence binding	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	protein import into nucleus, translocation	TAS
		Biological process	RNA metabolic process	TAS

TNPO2	TNPO2 transportin 2	Function	protein binding	IPI
		Function	nuclear localization sequence binding	TAS
TNS3	TNS3 tensin 3	Function	protein binding	IPI
TOB1	TOB1 transducer of ERBB2, 1	Function	protein binding	IPI
		Function	SH3/SH2 adaptor activity	TAS
		Biological process	negative regulation of cell proliferation	TAS
TOB2	TOB2 transducer of ERBB2, 2	Component	nucleus	TAS
		Biological process	female gamete generation	TAS
		Biological process	negative regulation of cell proliferation	TAS
TOPORS	TOPORS topoisomerase I binding, arginine/serinerich, E3 ubiquitin protein ligase	Component	PML body	IDA
		Component	nuclear speck	IDA
		Component	nucleus	IDA
		Function	DNA binding	IDA
		Function	SUMO ligase activity	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Function	SUMO ligase activity	IMP
		Function	ubiquitin-protein ligase activity	IMP
		Function	DNA topoisomerase I binding	IPI
		Function	antigen binding	IPI
		Function	protein binding	IPI
		Biological process	DNA damage response, signal transduction resulting in induction of apoptosis	IDA
		Biological process	maintenance of protein location in nucleus	IDA
		Biological process	protein sumoylation	IDA
		Biological process	protein ubiquitination	IDA
		Biological process	response to DNA damage stimulus	IDA
		Biological process	proteasomal ubiquitin-dependent protein catabolic process	IMP
		Biological process	protein localization to nucleus	IMP
		Biological process	protein sumoylation	IMP
		Biological process	protein ubiquitination	IMP
		Biological process	ubiquitin-dependent protein catabolic process	IMP
TOX3	TOX3 TOX high mobility group box family member 3	Function	chromatin binding	IDA
		Function	estrogen response element binding	IDA

		Function	protein homodimerization activity	IDA
		Function	phosphoprotein binding	IPI
		Function	protein binding	IPI
		Biological process	negative regulation of neuron apoptosis	IDA
		Biological process	positive regulation of anti-apoptosis	IDA
TPPP	TPPP tubulin polymerization promoting protein	Component	cytoplasm	IDA
		Component	colocalizes_with microtubule	IDA
		Component	nucleus	IDA
		Component	perinuclear region of cytoplasm	IDA
		Function	tubulin binding	IDA
		Function	protein binding	IPI
		Biological process	microtubule bundle formation	IDA
		Biological process	microtubule polymerization	IDA
		Biological process	positive regulation of protein polymerization	IDA
TRAF4	TRAF4 TNF receptorassociated factor 4	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	WW domain binding	IPI
		Function	protein binding	IPI
		Function	DNA binding	TAS
		Biological process	positive regulation of JNK cascade	IDA
		Biological process	positive regulation of protein homodimerization activity	IDA
		Biological process	positive regulation of protein kinase activity	IDA
TRAF7	TRAF7 TNF receptorassociated factor 7	Component	ubiquitin ligase complex	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	activation of MAPKKK activity	IDA
		Biological process	apoptosis	IDA
		Biological process	positive regulation of MAPKKK cascade	IDA
		Biological process	protein ubiquitination	IDA
		Biological process	regulation of apoptosis	IMP
TRAK2	TRAK2 trafficking protein, kinesin binding 2	Function	protein binding	IPI
TRAM2	TRAM2 translocation associated membrane protein 2	Function	protein binding	IPI
		Biological process	collagen biosynthetic process	IMP

TRDN	TRDN triadin	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Biological process	muscle contraction	TAS
TREML2	TREML2 triggering receptor expressed on myeloid celllike 2	Component	cell surface	IDA
		Function	receptor activity	IDA
		Function	protein binding	IPI
		Biological process	T cell activation	IDA
TRHDE	TRHDE thyrotropinreleasing hormone degrading enzyme	Component	integral to plasma membrane	TAS
		Biological process	cell-cell signaling	TAS
		Biological process	signal transduction	TAS
TRIB2	TRIB2 tribbles homolog 2 (Drosophila)	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Biological process	negative regulation of interleukin-10 biosynthetic process	IMP
TRIB3	TRIB3 tribbles homolog 3 (Drosophila)	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Component	plasma membrane	TAS
		Function	NOT kinase activity	IDA
		Function	protein binding	IPI
		Function	protein kinase binding	IPI
		Biological process	negative regulation of protein kinase activity	IDA
		Biological process	regulation of MAP kinase activity	IDA
		Biological process	cellular lipid metabolic process	TAS
		Biological process	insulin receptor signaling pathway	TAS
		Biological process	nerve growth factor receptor signaling pathway	TAS
		Biological process	phosphatidylinositol-mediated signaling	TAS
TRIM16	TRIM16 tripartite motif containing 16	Component	PML body	IDA
		Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Function	DNA binding	IDA
		Function	NACHT domain binding	IPI

		Function	interleukin-1 binding	IPI
		Function	protein binding	IPI
		Biological process	histone H3 acetylation	IDA
		Biological process	histone H4 acetylation	IDA
		Biological process	positive regulation of keratinocyte differentiation	IDA
		Biological process	positive regulation of retinoic acid receptor signaling pathway	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
		Biological process	response to growth hormone stimulus	IDA
		Biological process	response to organophosphorus	IEP
		Biological process	response to retinoic acid	IEP
		Biological process	positive regulation of interleukin-1 beta secretion	IMP
TRIM2	TRIM2 tripartite motif containing 2	Component	cytoplasm	IDA
TRIM27	TRIM27 tripartite motif containing 27	Component	cytoplasm	IDA
		Component	nuclear membrane	IDA
		Component	nucleoplasm	IDA
		Component	nucleus	IDA
		Component	integral to plasma membrane	TAS
		Component	membrane fraction	TAS
		Function	protein binding	IPI
		Function	nucleic acid binding	TAS
		Function	transmembrane receptor protein tyrosine kinase activity	TAS
		Biological process	negative regulation of gene expression, epigenetic	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	protein trimerization	IDA
		Biological process	cell proliferation	TAS
		Biological process	spermatogenesis	TAS
TRIM44	TRIM44 tripartite motif containing 44	Function	protein binding	IPI
TRIOBP	TRIOBP TRIO and F-actin binding protein	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI
TRPC1	TRPC1 transient receptor potential cation channel,	Component	integral to plasma membrane	TAS

	subfamily C, member 1			
		Function	protein binding	IPI
		Function	calcium channel activity	TAS
		Function	store-operated calcium channel activity	TAS
		Biological process	cytosolic calcium ion homeostasis	IDA
		Biological process	positive regulation of release of sequestered calcium ion into cytosol	IDA
		Biological process	response to calcium ion	IDA
		Biological process	axon guidance	TAS
		Biological process	calcium ion transmembrane transport	TAS
		Biological process	calcium ion transport	TAS
TRPC6	TRPC6 transient receptor potential cation channel, subfamily C, member 6	Component	plasma membrane	IDA
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	positive regulation of calcium ion transport via store-operated calcium channel activity	IDA
		Biological process	positive regulation of ion transmembrane transporter activity	IDA
		Biological process	axon guidance	TAS
		Biological process	blood coagulation	TAS
		Biological process	cation transport	TAS
		Biological process	platelet activation	TAS
TRPS1	TRPS1 trichorhinophalangeal syndrome I	Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	NLS-bearing substrate import into nucleus	TAS
		Biological process	skeletal system development	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
TSC1	TSC1 tuberous sclerosis 1	Component	TSC1-TSC2 complex	IDA
		Component	colocalizes_with actin filament	IDA
		Component	cell cortex	IDA
		Component	cytoplasm	IDA
		Component	cytosol	IDA

		Component	lamellipodium	IDA
		Component	membrane fraction	IDA
		Component	protein complex	IDA
		Component	cytosol	TAS
		Function	chaperone binding	IPI
		Function	protein N-terminus binding	IPI
		Function	protein binding	IPI
		Biological process	activation of Rho GTPase activity	IDA
		Biological process	negative regulation of protein ubiquitination	IDA
		Biological process	positive regulation of focal adhesion assembly	IDA
		Biological process	regulation of stress fiber assembly	IDA
		Biological process	regulation of translation	IDA
		Biological process	response to insulin stimulus	IDA
		Biological process	cell-matrix adhesion	IMP
		Biological process	negative regulation of cell proliferation	IMP
		Biological process	negative regulation of TOR signaling cascade	IMP
		Biological process	negative regulation of translation	IMP
		Biological process	regulation of cell-matrix adhesion	IMP
		Biological process	regulation of phosphoprotein phosphatase activity	IMP
		Biological process	rRNA export from nucleus	IMP
		Biological process	cell cycle arrest	TAS
		Biological process	insulin receptor signaling pathway	TAS
TSG101	TSG101 tumor susceptibility gene 101	Component	cytoplasm	IDA
		Component	early endosome	IDA
		Component	nucleolus	IDA
		Component	plasma membrane	IDA
		Component	late endosome	IMP
		Component	endosome membrane	TAS
		Component	multivesicular body	TAS
		Function	calcium-dependent protein binding	IPI
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Function	DNA binding	TAS
		Function	ubiquitin binding	TAS
		Biological process	ubiquitin-dependent protein catabolic process via	IDA

			the multivesicular body sorting pathway	
		Biological process	non-lytic virus budding	IMP
		Biological process	endosome transport	TAS
TSGA14	TSGA14 testis specific, 14	Component	centrosome	IDA
		Biological process	G2/M transition of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
TSN	TSN translin	Function	DNA binding	TAS
		Biological process	DNA recombination	TAS
TSR2	TSR2 TSR2, 20S rRNA accumulation, homolog (S. cerevisiae)	Function	protein binding	IPI
TTYH1	TTYH1 tweety homolog 1 (Drosophila)	Component	integral to membrane	TAS
TTYH3	TTYH3 tweety homolog 3 (Drosophila)	Component	plasma membrane	IDA
		Function	chloride channel activity	IMP
		Biological process	chloride transport	IMP
TUB	TUB tubby homolog (mouse)	Component	intracellular membrane-bounded organelle	IDA
		Biological process	positive regulation of phagocytosis	IDA
TULP1	TULP1 tubby like protein 1	Component	cell projection	IDA
		Component	plasma membrane	IDA
		Function	actin filament binding	IDA
		Function	phosphatidylinositol-4,5-bisphosphate binding	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of phagocytosis	IDA
		Biological process	visual perception	TAS
TULP4	TULP4 tubby like protein 4	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Biological process	response to nutrient	TAS
TUSC2	TUSC2 tumor suppressor candidate 2	Function	protein binding	IPI
		Biological process	cell proliferation	TAS
		Biological process	cell-cell signaling	TAS
TWF1	TWF1 twinfilin, actinbinding protein, homolog 1 (Drosophila)	Component	cytoplasm	IDA
		Function	protein tyrosine kinase activity	IDA
		Biological process	protein phosphorylation	IDA
TXLNA	TXLNA taxilin alpha	Component	cytoplasm	IDA
		Function	protein binding	IPI

TXLNB	TXLNB taxilin beta	Component	cytoplasm	IDA
TXNIP	TXNIP thioredoxin interacting protein	Component	cytoplasm	IDA
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Biological process	keratinocyte differentiation	IDA
UBA2	UBA2 ubiquitinlike modifier activating enzyme 2	Function	SUMO activating enzyme activity	IDA
		Function	protein binding	IPI
		Function	protein heterodimerization activity	IPI
		Function	enzyme activator activity	TAS
		Biological process	protein sumoylation	IDA
		Biological process	positive regulation of catalytic activity	TAS
UBA6	UBA6 ubiquitinlike modifier activating enzyme 6	Component	cytoplasm	IDA
		Function	FAT10 activating enzyme activity	IMP
		Function	protein binding	IPI
		Biological process	protein ubiquitination	IMP
		Biological process	ubiquitin-dependent protein catabolic process	IMP
UBE2B	UBE2B ubiquitinconjugating enzyme E2B	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Component	replication fork	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Function	ubiquitin-protein ligase activity	IMP
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Biological process	negative regulation of cAMP-mediated signaling	IDA
		Biological process	postreplication repair	IDA
		Biological process	proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	protein autoubiquitination	IDA
		Biological process	protein K11-linked ubiquitination	IDA
		Biological process	protein K48-linked ubiquitination	IDA
		Biological process	protein K63-linked ubiquitination	IDA
		Biological process	protein ubiquitination	IDA
		Biological process	response to DNA damage stimulus	IDA
		Biological process	response to drug	IDA
		Biological process	ubiquitin-dependent protein catabolic process	IDA

		Biological process	DNA repair	IGI
		Biological process	response to UV	IGI
		Biological process	histone H2A ubiquitination	IMP
		Biological process	protein monoubiquitination	IMP
		Biological process	protein polyubiquitination	IMP
		Biological process	protein stabilization	IMP
		Biological process	spermatogenesis	TAS
UBE2D1	UBE2D1 ubiquitinconjugating enzyme E2D 1	Component	cytoplasm	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of protein ubiquitination	IDA
		Biological process	protein K48-linked ubiquitination	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	ubiquitin-dependent protein catabolic process	IDA
		Biological process	anaphase-promoting complex-dependent proteasomal ubiquitin-dependent protein catabolic process	TAS
		Biological process	cell cycle checkpoint	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic cell cycle spindle assembly checkpoint	TAS
		Biological process	regulation of ubiquitin-protein ligase activity involved in mitotic cell cycle	TAS
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
UBE2D3	UBE2D3 ubiquitinconjugating enzyme E2D 3	Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	proteasomal ubiquitin-dependent protein catabolic process	IDA
		Biological process	protein K11-linked ubiquitination	IDA
		Biological process	protein K48-linked ubiquitination	IDA
		Biological process	protein monoubiquitination	IDA
		Biological process	protein polyubiquitination	IDA
		Biological process	protein ubiquitination	IDA

		Biological process	negative regulation of type I interferon production	TAS
		Biological process	protein modification process	TAS
		Biological process	protein ubiquitination	TAS
		Biological process	transforming growth factor beta receptor signaling pathway	TAS
		Biological process	ubiquitin-dependent protein catabolic process	TAS
UBE2G1	UBE2G1 ubiquitinconjugating enzyme E2G 1	Function	ubiquitin-protein ligase activity	IDA
		Function	ubiquitin protein ligase binding	IPI
		Biological process	protein K48-linked ubiquitination	IDA
		Biological process	protein K63-linked ubiquitination	IDA
		Biological process	ubiquitin-dependent protein catabolic process	TAS
UBE2K	UBE2K ubiquitinconjugating enzyme E2K	Function	ubiquitin-protein ligase activity	IDA
		Function	ubiquitin-ubiquitin ligase activity	IDA
		Function	protein binding	IPI
		Function	ubiquitin protein ligase binding	IPI
		Biological process	protein K48-linked ubiquitination	IDA
		Biological process	protein ubiquitination	TAS
		Biological process	ubiquitin-dependent protein catabolic process	TAS
UBE2V2	UBE2V2 ubiquitinconjugating enzyme E2 variant 2	Component	UBC13-MMS2 complex	IDA
		Component	nucleus	IDA
		Component	cytoplasm	TAS
		Function	protein binding	IPI
		Biological process	DNA double-strand break processing	IMP
		Biological process	cell proliferation	TAS
		Biological process	protein polyubiquitination	TAS
		Biological process	protein ubiquitination	TAS
		Biological process	regulation of DNA repair	TAS
UBE2W	UBE2W ubiquitinconjugating enzyme E2W (putative)	Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	protein K11-linked ubiquitination	IDA
		Biological process	protein monoubiquitination	IDA
UBE3A	UBE3A ubiquitin protein ligase E3A	Function	ubiquitin-protein ligase activity	IDA
		Function	protein binding	IPI
		Biological process	protein K48-linked ubiquitination	IDA
		Biological process	brain development	TAS

		Biological process	proteolysis	TAS
		Biological process	ubiquitin-dependent protein catabolic process	TAS
UBE4A	UBE4A ubiquitination factor E4A	Function	protein binding	IPI
UBTF	UBTF upstream binding transcription factor, RNA polymerase I	Component	nucleolus	IDA
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	regulation of transcription from RNA polymerase I promoter	TAS
		Biological process	termination of RNA polymerase I transcription	TAS
		Biological process	transcription elongation from RNA polymerase I promoter	TAS
		Biological process	transcription from RNA polymerase I promoter	TAS
		Biological process	transcription initiation from RNA polymerase I promoter	TAS
UCN2	UCN2 urocortin 2	Function	hormone binding	IPI
		Function	receptor binding	IPI
		Biological process	cAMP biosynthetic process	IEP
UGP2	UGP2 UDPglucose pyrophosphorylase 2	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	UTP:glucose-1-phosphate uridylyltransferase activity	TAS
		Biological process	carbohydrate metabolic process	TAS
		Biological process	glucose metabolic process	TAS
		Biological process	glycogen biosynthetic process	TAS
		Biological process	xenobiotic metabolic process	TAS
UHRF1	UHRF1 ubiquitinlike with PHD and ring finger domains 1	Function	methyl-CpG binding	IDA
		Function	methylated histone residue binding	IDA
		Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	cell proliferation	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter	TAS

		Biological process	transcription, DNA-dependent	TAS
ULK2	ULK2 unc51like kinase 2 (C. elegans)	Function	protein binding	IPI
UNC5A	UNC5A unc5 homolog A (C. elegans)	Biological process	apoptosis	TAS
		Biological process	axon guidance	TAS
		Biological process	regulation of apoptosis	TAS
UQCRB	UQCRB ubiquinolcytochrome c reductase binding protein	Component	mitochondrial inner membrane	TAS
		Component	mitochondrial respiratory chain	TAS
		Biological process	aerobic respiration	TAS
		Biological process	oxidation-reduction process	TAS
		Biological process	oxidative phosphorylation	TAS
		Biological process	respiratory electron transport chain	TAS
URM1	URM1 ubiquitin related modifier 1	Function	contributes_to sulfurtransferase activity	IDA
		Function	protein binding	IPI
		Biological process	tRNA thio-modification	IMP
		Biological process	tRNA wobble uridine modification	IMP
USF2	USF2 upstream transcription factor 2, cfos interacting	Component	nucleus	IDA
		Function	sequence-specific DNA binding	IDA
		Function	sequence-specific enhancer binding RNA polymerase II transcription factor activity	IMP
		Function	bHLH transcription factor binding	IPI
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Function	protein heterodimerization activity	IPI
		Function	protein homodimerization activity	IPI
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IMP
		Biological process	positive regulation of transcription from RNA polymerase II promoter by glucose	IMP
		Biological process	transcription, DNA-dependent	TAS
USP25	USP25 ubiquitin specific peptidase 25	Function	ubiquitin-specific protease activity	TAS
		Biological process	protein modification process	TAS
		Biological process	proteolysis	TAS
USP28	USP28 ubiquitin specific peptidase 28	Component	nucleolus	IDA
		Component	NOT nucleolus	IDA

		Component	nucleoplasm	IDA
		Component	nucleus	IDA
		Function	ubiquitin-specific protease activity	IDA
		Function	ubiquitin thiolesterase activity	IMP
		Function	protein binding	IPI
		Biological process	DNA damage response, signal transduction by p53 class mediator resulting in induction of apoptosis	IDA
		Biological process	protein deubiquitination	IDA
		Biological process	response to ionizing radiation	IDA
		Biological process	cell proliferation	IMP
		Biological process	DNA damage checkpoint	IMP
USP9X	USP9X ubiquitin specific peptidase 9, Xlinked	Component	cytoplasm	IDA
		Function	co-SMAD binding	IPI
		Function	protein binding	IPI
		Function	cysteine-type endopeptidase activity	TAS
		Function	cysteine-type peptidase activity	TAS
		Biological process	BMP signaling pathway	IDA
		Biological process	protein deubiquitination	IDA
		Biological process	transforming growth factor beta receptor signaling pathway	IMP
		Biological process	female gamete generation	TAS
USP9Y	USP9Y ubiquitin specific peptidase 9, Ylinked	Function	ubiquitin-specific protease activity	TAS
		Biological process	spermatogenesis	TAS
UST	UST uronyl2sulfotransferase	Biological process	protein sulfation	TAS
UTRN	UTRN utrophin	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Component	membrane fraction	TAS
		Function	protein binding	IPI
		Biological process	positive regulation of cell-matrix adhesion	IMP
		Biological process	muscle contraction	TAS
		Biological process	muscle organ development	TAS
VAMP2	VAMP2 vesicleassociated membrane protein 2 (synaptobrevin 2)	Component	clathrin-coated vesicle	IDA

		Component	clathrin sculpted gamma-aminobutyric acid transport vesicle membrane	TAS
		Component	clathrin sculpted glutamate transport vesicle membrane	TAS
		Component	clathrin sculpted monoamine transport vesicle membrane	TAS
		Component	endocytic vesicle membrane	TAS
		Component	integral to plasma membrane	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	energy reserve metabolic process	TAS
		Biological process	glutamate secretion	TAS
		Biological process	neurotransmitter secretion	TAS
		Biological process	regulation of insulin secretion	TAS
		Biological process	synaptic transmission	TAS
VAMP4	VAMP4 vesicleassociated membrane protein 4	Component	Golgi membrane	TAS
		Component	endosome	TAS
		Component	lysosome	TAS
VANGL1	VANGL1 vanglike 1 (van gogh, Drosophila)	Function	protein binding	IPI
VAPB	VAPB VAMP (vesicleassociated membrane protein)associated protein B and C	Component	Golgi apparatus	IDA
		Component	endoplasmic reticulum	IDA
		Component	endoplasmic reticulum membrane	IDA
		Component	endoplasmic reticulum membrane	TAS
		Function	beta-tubulin binding	IDA
		Function	enzyme binding	IPI
		Function	protein binding	IPI
		Function	protein heterodimerization activity	IPI
		Function	protein homodimerization activity	IPI
		Biological process	virus-host interaction	IDA
		Biological process	endoplasmic reticulum unfolded protein response	IMP
		Biological process	positive regulation of viral genome replication	IMP
		Biological process	sphingolipid metabolic process	TAS
VDAC2	VDAC2 voltagedependent anion channel 2	Component	mitochondrial nucleoid	IDA
		Function	protein binding	IPI

		Function	voltage-gated anion channel activity	TAS
		Biological process	anion transport	TAS
		Biological process	regulation of anion transport	TAS
VDR	VDR vitamin D (1,25 dihydroxyvitamin D3) receptor	Component	nucleus	IDA
		Component	nucleoplasm	TAS
		Function	DNA binding	IDA
		Function	contributes_to sequence-specific DNA binding transcription factor activity	IDA
		Function	contributes_to vitamin D response element binding	IDA
		Function	vitamin D3 receptor activity	IDA
		Function	protein binding	IPI
		Function	retinoid X receptor binding	IPI
		Biological process	negative regulation of cell proliferation	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	positive regulation of vitamin D 24-hydroxylase activity	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	vitamin D receptor signaling pathway	IDA
		Biological process	decidualization	IEP
		Biological process	gene expression	TAS
		Biological process	regulation of transcription from RNA polymerase II promoter by nuclear hormone receptor	TAS
		Biological process	signal transduction	TAS
VEGFA	VEGFA vascular endothelial growth factor A	Component	cell surface	IDA
		Component	cytoplasm	IDA
		Component	extracellular space	IDA
		Component	stored secretory granule	IDA
		Component	extracellular region	TAS
		Component	platelet alpha granule lumen	TAS
		Function	cell surface binding	IDA
		Function	chemoattractant activity	IDA
		Function	fibronectin binding	IDA

	Function	growth factor activity	IDA
	Function	heparin binding	IDA
	Function	protein heterodimerization activity	IDA
	Function	heparin binding	IMP
	Function	platelet-derived growth factor receptor binding	IPI
	Function	protein binding	IPI
	Function	vascular endothelial growth factor receptor 1 binding	IPI
	Function	vascular endothelial growth factor receptor 2 binding	IPI
	Function	vascular endothelial growth factor receptor binding	IPI
	Biological process	angiogenesis	IDA
	Biological process	basophil chemotaxis	IDA
	Biological process	cellular response to hypoxia	IDA
	Biological process	induction of positive chemotaxis	IDA
	Biological process	platelet-derived growth factor receptor signaling pathway	IDA
	Biological process	positive chemotaxis	IDA
	Biological process	positive regulation of angiogenesis	IDA
	Biological process	positive regulation of blood vessel endothelial cell migration	IDA
	Biological process	positive regulation of cell adhesion	IDA
	Biological process	positive regulation of cell migration	IDA
	Biological process	positive regulation of cell proliferation	IDA
	Biological process	positive regulation of cellular component movement	IDA
	Biological process	positive regulation of endothelial cell migration	IDA
	Biological process	positive regulation of endothelial cell proliferation	IDA
	Biological process	positive regulation of mast cell chemotaxis	IDA
	Biological process	positive regulation of peptidyl-tyrosine phosphorylation	IDA
	Biological process	positive regulation of positive chemotaxis	IDA
	Biological process	positive regulation of vascular endothelial growth factor receptor signaling pathway	IDA
	Biological process	positive regulation of vascular permeability	IDA

		Biological process	regulation of cell shape	IDA
		Biological process	response to hypoxia	IDA
		Biological process	negative regulation of apoptosis	IMP
		Biological process	positive regulation of angiogenesis	IMP
		Biological process	blood coagulation	TAS
		Biological process	nervous system development	TAS
		Biological process	platelet activation	TAS
		Biological process	platelet degranulation	TAS
		Biological process	positive regulation of leukocyte migration	TAS
		Biological process	vascular endothelial growth factor receptor signaling pathway	TAS
		Biological process	vasculogenesis	TAS
VKORC1	VKORC1 vitamin K epoxide reductase complex, subunit 1	Biological process	cellular protein metabolic process	TAS
		Biological process	peptidyl-glutamic acid carboxylation	TAS
		Biological process	post-translational protein modification	TAS
VPS25	VPS25 vacuolar protein sorting 25 homolog (S. cerevisiae)	Component	cytosol	TAS
		Biological process	endosome transport	TAS
VPS36	VPS36 vacuolar protein sorting 36 homolog (S. cerevisiae)	Component	cytosol	TAS
		Biological process	endosome transport	TAS
VPS37C	VPS37C vacuolar protein sorting 37 homolog C (S. cerevisiae)	Component	endosome membrane	TAS
		Biological process	endosome transport	TAS
VPS41	VPS41 vacuolar protein sorting 41 homolog (S. cerevisiae)	Component	HOPS complex	IDA
		Component	cytosol	IDA
		Component	membrane fraction	IDA
		Component	Golgi-associated vesicle	IMP
		Function	protein binding	IPI
		Biological process	Golgi vesicle transport	IMP
VPS4A	VPS4A vacuolar protein sorting 4 homolog A (S. cerevisiae)	Component	colocalizes_with ESCRT III complex	IDA
		Component	cytoplasm	IDA

		Component	midbody	IDA
		Component	perinuclear region of cytoplasm	IDA
		Component	cytosol	TAS
		Function	protein C-terminus binding	IPI
		Function	protein binding	IPI
		Function	protein domain specific binding	IPI
		Biological process	cytokinesis	IDA
		Biological process	vesicle-mediated transport	IDA
		Biological process	endosome transport	IMP
		Biological process	endosome transport	TAS
VSX2	VSX2 visual system homeobox 2	Component	nucleolus	IDA
WAPAL	WAPAL wings apartlike homolog (Drosophila)	Component	chromatin	IDA
		Component	cohesin complex	IDA
		Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of chromatin binding	IMP
		Biological process	negative regulation of DNA replication	IMP
		Biological process	negative regulation of sister chromatid cohesion	IMP
		Biological process	protein localization to chromatin	IMP
		Biological process	regulation of cohesin localization to chromatin	IMP
WASF2	WASF2 WAS protein family, member 2	Component	intracellular	IDA
		Component	lamellipodium	IDA
		Component	actin cytoskeleton	TAS
		Function	protein binding	IPI
		Biological process	G-protein signaling, coupled to cAMP nucleotide second messenger	TAS
WASL	WASL WiskottAldrich syndromelike	Component	cytoplasm	IDA
		Component	nucleolus	IDA
		Component	cytosol	TAS
		Component	plasma membrane	TAS
		Function	protein binding	IPI
		Biological process	axon guidance	TAS
		Biological process	cellular component movement	TAS
		Biological process	nitric oxide metabolic process	TAS

		Biological process	regulation of nitric-oxide synthase activity	TAS
WDFY3	WDFY3 WD repeat and FYVE domain containing 3	Component	colocalizes_with autophagic vacuole	IDA
		Component	cytoplasmic part	IDA
		Component	extrinsic to membrane	IDA
		Component	nuclear envelope	IDA
		Function	1-phosphatidylinositol binding	IDA
		Function	protein binding	IPI
WDR26	WDR26 WD repeat domain 26	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
WDR82	WDR82 WD repeat domain 82	Component	PTW/PP1 phosphatase complex	IDA
		Component	Set1C/COMPASS complex	IDA
		Component	chromatin	IDA
		Component	histone methyltransferase complex	IDA
		Function	contributes_to histone methyltransferase activity (H3-K4 specific)	IDA
		Function	protein binding	IPI
		Biological process	histone H3-K4 methylation	IDA
WHSC1	WHSC1 WolfHirschhorn syndrome candidate 1	Component	nuclear membrane	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
		Biological process	anatomical structure morphogenesis	TAS
WNK1	WNK1 WNK lysine deficient protein kinase 1	Component	cytoplasm	IDA
		Function	ATP binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	protein binding	IPI
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	protein phosphorylation	IDA
WNK3	WNK3 WNK lysine deficient protein kinase 3	Function	protein kinase activity	IDA
		Function	rubidium ion transmembrane transporter activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of establishment of protein localization in plasma membrane	IDA
		Biological process	positive regulation of ion transmembrane transporter activity	IDA

		Biological process	positive regulation of peptidyl-threonine phosphorylation	IDA
		Biological process	positive regulation of rubidium ion transport	IDA
		Biological process	positive regulation of sodium ion transmembrane transporter activity	IDA
		Biological process	positive regulation of sodium ion transport	IDA
		Biological process	protein autophosphorylation	IDA
		Biological process	rubidium ion transport	IDA
WNT10B	WNT10B winglesstype MMTV integration site family, member 10B	Biological process	canonical Wnt receptor signaling pathway	IDA
		Biological process	hemopoietic stem cell proliferation	IDA
		Biological process	negative regulation of fat cell differentiation	IDA
		Biological process	protein stabilization	IDA
		Biological process	chondrocyte differentiation	IEP
		Biological process	positive regulation of apoptosis	IMP
		Biological process	Wnt receptor signaling pathway	IMP
WTAP	WTAP Wilms tumor 1 associated protein	Component	nuclear membrane	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
WWOX	WWOX WW domain containing oxidoreductase	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	cytoplasm	TAS
		Function	protein binding	IPI
		Function	coenzyme binding	TAS
		Function	cofactor binding	TAS
		Function	oxidoreductase activity	TAS
		Function	protein dimerization activity	TAS
		Biological process	negative regulation of Wnt receptor signaling pathway	IDA
		Biological process	oxidation-reduction process	TAS
		Biological process	steroid metabolic process	TAS
XPNPEP2	XPNPEP2 Xprolyl aminopeptidase (aminopeptidase P) 2, membranebound	Component	membrane	TAS
XPO1	XPO1 exportin 1 (CRM1 homolog, yeast)	Component	annulate lamellae	IDA
		Component	kinetochore	IDA

		Component	ribonucleoprotein complex	IDA
		Component	cytosol	TAS
		Component	nuclear envelope	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	M phase of mitotic cell cycle	TAS
		Biological process	mitotic cell cycle	TAS
		Biological process	mitotic prometaphase	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	RNA metabolic process	TAS
		Biological process	viral genome transport in host cell	TAS
		Biological process	viral infectious cycle	TAS
		Biological process	viral reproduction	TAS
XPO5	XPO5 exportin 5	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	cytosol	TAS
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Function	RNA binding	TAS
XPR1	XPR1 xenotropic and polytropic retrovirus receptor 1	Component	integral to plasma membrane	TAS
		Function	G-protein coupled receptor activity	TAS
		Function	receptor activity	TAS
		Function	transmembrane receptor activity	TAS
		Biological process	G-protein coupled receptor protein signaling pathway	TAS
XRN1	XRN1 5'3' exoribonuclease 1	Component	Golgi apparatus	IDA
		Component	cytoplasm	IDA
		Component	intermediate filament cytoskeleton	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Function	protein binding	IPI
		Biological process	histone mRNA catabolic process	IMP
		Biological process	nuclear mRNA surveillance	IMP
		Biological process	nuclear-transcribed mRNA catabolic process	IMP

		Biological process	rRNA catabolic process	IMP
		Biological process	exonucleolytic nuclear-transcribed mRNA catabolic process involved in deadenylation-dependent decay	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	nuclear-transcribed mRNA catabolic process, deadenylation-dependent decay	TAS
		Biological process	RNA metabolic process	TAS
XYLT1	XYLT1 xylosyltransferase I	Function	protein xylosyltransferase activity	TAS
		Biological process	glycosaminoglycan biosynthetic process	TAS
YAF2	YAF2 YY1 associated factor 2	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	transcription coactivator activity	IDA
		Function	transcription corepressor activity	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	positive regulation of transcription, DNA-dependent	IDA
YES1	YES1 vyes1 Yamaguchi sarcoma viral oncogene homolog 1	Component	cytoplasm	IDA
		Component	plasma membrane	IDA
		Component	cytosol	TAS
		Function	ion channel binding	IPI
		Function	protein binding	IPI
		Function	non-membrane spanning protein tyrosine kinase activity	TAS
		Function	protein tyrosine kinase activity	TAS
		Biological process	blood coagulation	TAS
		Biological process	leukocyte migration	TAS
		Biological process	protein modification process	TAS
		Biological process	regulation of vascular permeability	TAS
		Biological process	T cell costimulation	TAS
YOD1	YOD1 YOD1 OTU deubiquinating enzyme 1 homolog	Function	ubiquitin-specific protease activity	IDA

	(S. cerevisiae)			
		Function	protein binding	IPI
		Biological process	protein K48-linked deubiquitination	IDA
		Biological process	protein K63-linked deubiquitination	IDA
		Biological process	endoplasmic reticulum unfolded protein response	IMP
		Biological process	ER-associated protein catabolic process	IMP
YTHDF2	YTHDF2 YTH domain family, member 2	Biological process	humoral immune response	TAS
YWHAZ	YWHAZ tyrosine 3monooxygenase/tryptophan 5monooxygenase activation protein, zeta polypeptide	Component	cytosol	TAS
		Function	protein binding	IPI
		Function	transcription factor binding	IPI
		Biological process	anti-apoptosis	TAS
		Biological process	blood coagulation	TAS
		Biological process	mRNA metabolic process	TAS
		Biological process	platelet activation	TAS
		Biological process	RNA metabolic process	TAS
		Biological process	signal transduction	TAS
ZAK	ZAK sterile alpha motif and leucine zipper containing kinase AZK	Component	cytoplasm	IDA
		Function	ATP binding	IDA
		Function	MAP kinase kinase kinase activity	IDA
		Function	magnesium ion binding	IDA
		Function	protein serine/threonine kinase activity	IDA
		Function	identical protein binding	IPI
		Function	protein binding	IPI
		Biological process	activation of JUN kinase activity	IDA
		Biological process	cell cycle checkpoint	IDA
		Biological process	intracellular protein kinase cascade	IDA
		Biological process	positive regulation of apoptosis	IDA
		Biological process	protein phosphorylation	IDA
		Biological process	response to radiation	IDA
		Biological process	cell cycle arrest	IMP
		Biological process	DNA damage checkpoint	IMP
		Biological process	activation of MAPKK activity	TAS
ZBTB20	ZBTB20 zinc finger and BTB domain containing 20	Component	NOT nucleolus	IDA

		Component	nucleus	IDA
ZBTB38	ZBTB38 zinc finger and BTB domain containing 38	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
ZC3H11A	ZC3H11A zinc finger CCCHtype containing 11A	Function	protein binding	IPI
ZC3H14	ZC3H14 zinc finger CCCHtype containing 14	Component	cytoplasm	IDA
		Component	nucleus	IDA
		Function	protein binding	IPI
ZDHHC21	ZDHHC21 zinc finger, DHHtype containing 21	Component	Golgi membrane	TAS
		Function	palmitoyltransferase activity	TAS
		Biological process	nitric oxide metabolic process	TAS
		Biological process	regulation of nitric-oxide synthase activity	TAS
ZEB2	ZEB2 zinc finger Ebox binding homeobox 2	Component	cytoplasm	IDA
		Component	nucleolus	IDA
		Component	nucleus	IDA
ZFHX3	ZFHX3 zinc finger homeobox 3	Component	transcription factor complex	IDA
		Component	nucleus	TAS
		Function	enzyme binding	IPI
		Function	sequence-specific enhancer binding RNA polymerase II transcription factor activity	TAS
		Biological process	negative regulation of myoblast differentiation	IDA
		Biological process	positive regulation of myoblast differentiation	IDA
		Biological process	negative regulation of transcription from RNA polymerase II promoter	IGI
		Biological process	regulation of transcription, DNA-dependent	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
ZFP36L2	ZFP36L2 zinc finger protein 36, C3H typelike 2	Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	cell proliferation	TAS
		Biological process	transcription, DNA-dependent	TAS
ZFP91	ZFP91 zinc finger protein 91 homolog (mouse)	Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	ubiquitin-protein ligase activity	IDA
		Biological process	activation of NF-kappaB-inducing kinase activity	IDA
		Biological process	protein K63-linked ubiquitination	IDA

ZFYVE16	ZFYVE16 zinc finger, FYVE domain containing 16	Component	early endosome	IDA
		Component	early endosome membrane	TAS
		Function	1-phosphatidylinositol binding	IDA
		Function	phosphatidylinositol-3,4,5-trisphosphate binding	IDA
		Function	protein transporter activity	IMP
		Function	protein binding	IPI
		Biological process	endosome transport	IMP
		Biological process	protein targeting to lysosome	IMP
		Biological process	regulation of endocytosis	TAS
ZFYVE20	ZFYVE20 zinc finger, FYVE domain containing 20	Function	protein binding	IPI
		Biological process	blood coagulation	TAS
ZFYVE26	ZFYVE26 zinc finger, FYVE domain containing 26	Component	centrosome	IDA
		Component	midbody	IDA
		Function	phosphatidylinositol-3-phosphate binding	IDA
		Function	protein binding	IPI
		Biological process	cytokinesis	IMP
		Biological process	double-strand break repair via homologous recombination	IMP
ZHX2	ZHX2 zinc fingers and homeoboxes 2	Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Component	plasma membrane	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of transcription, DNA-dependent	IDA
		Biological process	transcription, DNA-dependent	IDA
ZIC1	ZIC1 Zic family member 1	Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	brain development	IDA
		Biological process	transcription, DNA-dependent	TAS
ZIC2	ZIC2 Zic family member 2	Biological process	brain development	TAS

ZIC3	ZIC3 Zic family member 3	Function	sequence-specific DNA binding	IDA
		Function	sequence-specific DNA binding transcription factor activity	IDA
		Function	protein binding	IPI
		Biological process	positive regulation of transcription from RNA polymerase II promoter	IDA
		Biological process	transcription, DNA-dependent	IDA
		Biological process	determination of left/right symmetry	TAS
ZKSCAN1	ZKSCAN1 zinc finger with KRAB and SCAN domains 1	Component	mitochondrion	IDA
		Component	nucleus	IDA
ZMAT5	ZMAT5 zinc finger, matrintype 5	Component	U12-type spliceosomal complex	IDA
		Component	cytoplasm	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
ZMYM4	ZMYM4 zinc finger, MYMtype 4	Function	DNA binding	TAS
		Biological process	multicellular organismal development	TAS
ZMYND11	ZMYND11 zinc finger, MYNDtype containing 11	Component	intracellular membrane-bounded organelle	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Biological process	cell proliferation	TAS
		Biological process	negative regulation of transcription from RNA polymerase II promoter	TAS
ZNF148	ZNF148 zinc finger protein 148	Component	Golgi apparatus	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	sequence-specific DNA binding	IDA
		Function	protein binding	IPI
		Biological process	negative regulation of gene expression	IDA
		Biological process	cellular defense response	TAS
ZNF295	ZNF295 zinc finger protein 295	Component	nucleus	IDA
		Function	methyl-CpG binding	IDA
		Function	protein binding	IPI
ZNF354A	ZNF354A zinc finger protein 354A	Biological process	regulation of transcription from RNA polymerase II promoter	TAS

		Biological process	sensory perception of sound	TAS
ZNF473	ZNF473 zinc finger protein 473	Component	Cajal body	IDA
		Component	nucleoplasm	TAS
		Function	protein binding	IPI
		Biological process	histone mRNA 3'-end processing	IDA
		Biological process	gene expression	TAS
		Biological process	histone mRNA metabolic process	TAS
		Biological process	mRNA processing	TAS
		Biological process	termination of RNA polymerase II transcription	TAS
		Biological process	transcription from RNA polymerase II promoter	TAS
ZNF629	ZNF629 zinc finger protein 629	Component	nucleus	IDA
ZNF664	ZNF664 zinc finger protein 664	Component	nucleus	IDA
ZNRF1	ZNRF1 zinc and ring finger 1	Component	endosome	IDA
		Function	protein binding	IPI
ZRANB1	ZRANB1 zinc finger, RANbinding domain containing 1	Component	aggresome	IDA
		Component	centrosome	IDA
		Component	cytoplasm	IDA
		Component	intermediate filament cytoskeleton	IDA
		Component	nucleolus	IDA
		Component	NOT nucleolus	IDA
		Component	nucleus	IDA
		Function	ubiquitin thiolesterase activity	IMP
		Function	protein binding	IPI
		Biological process	positive regulation of Wnt receptor signaling pathway	IMP
		Biological process	protein K63-linked deubiquitination	IMP
ZRANB2	ZRANB2 zinc finger, RANbinding domain containing 2	Function	protein binding	IPI
		Function	sequence-specific DNA binding transcription factor activity	TAS
		Biological process	transcription, DNA-dependent	TAS
ZXDC	ZXDC ZXD family zinc finger C	Function	sequence-specific DNA binding transcription factor activity	IMP
		Function	C2H2 zinc finger domain binding	IPI
		Function	LRR domain binding	IPI
		Function	identical protein binding	IPI

		Function	protein binding	IPI
		Biological process	positive regulation of transcription, DNA-dependent	IMP
		Biological process	transcription, DNA-dependent	IMP

B. Genes não encontrados por meio das fontes de informação consideradas.

7A5	ATP9A	C17orf63	C6orf65	CGNL1	DNAJC13	FAM163A	FLRT2	HERPUD2	KIAA0232	LDOC1L	MDS1
ABCF3	B3GALNT1	C17orf85	C6orf97	CHD6	DNAJC16	FAM168B	FMNL2	HES7	KIAA0256	LEAP2	MEGF11
ABHD2	B3GALT2	C18orf1	C7orf23	CHIC1	DNAJC5G	FAM19A5	FNDC5	HIAT1	KIAA0323	LHFPL1	MEGF8
ACPP	B3GALTL	C18orf25	C7orf41	CHSY3	DSC2	FAM46C	FOXQ1	HIF3A	KIAA0355	LHFPL2	MEOX1
ADAMTS17	BACH2	C18orf34	C7orf42	CLDN11	DTNB	FAM53C	FRAG1	HLA-DOA	KIAA0430	LIMD2	METT10D
ADAMTSL1	BAGE2	C18orf54	C7orf60	CLDN2	DTX4	FAM57A	FRAS1	HMGB3	KIAA0494	LIX1	METT10
ADAT2	BAGE3	C1orf130	C8orf44	CLIP2	EBF1	FAM62B	FRMD4A	HMX2	KIAA0515	LMBR1	METT18
ADIPOR2	BAHCC1	C1orf144	C9orf58	CLUU1	EFHA2	FAM69A	FSTL4	HN1L	KIAA0831	LMO3	MEX3A
ADO	BARHL2	C1orf161	C9orf97	CMTM4	EFR3A	FAM70A	GALNT13	HPS5	KIAA0999	LMX1A	MFAP3L
AHCYL2	BARX1	C1orf2	CA7	CNGA2	EHHADH	FAM80A	GALNT17	HRBL	KIAA1045	LOC162073	MFHAS1
AHI1	BCL2L15	C1orf21	CACNG6	CNNM1	EIF4E3	FAM80B	Gcom1	HS6ST3	KIAA1109	LOC26010	MGC16169
AJAP1	BCL7A	C1orf63	CALM2	CNTD1	ELFN2	FAM81A	GDAP1	HSF5	KIAA1128	LOC283514	MGC21874
ALPK1	BICC1	C1orf71	CALML4	CNTLN	ELL2	FAM86B1	GDPD5	IBSP	KIAA1161	LOC285636	MICAL3
ALS2CR13	BRP44L	C1orf83	CALN1	CNTN3	EN2	FAM86C	GJB7	ICHTHYIN	KIAA1219	LPAL2	MID1IP1
ALS2CR4	BRUNOL4	C1orf96	CAMK1	COL24A1	ENPP5	FAM8A1	GK5	IER2	KIAA1324L	LPCAT3	MIER3
ALX3	BTBD11	C1QTNF2	CAMPN7	CPEB2	EPHB6	FAM91A1	GLCCI1	IER5	KIAA1394	LPPR4	MITF
AMMECR1	BTBD12	C20orf194	CASC4	CPEB3	ERGIC2	FAT3	GLIS3	IGSF11	KIAA1429	LRIT1	MLXIP
ANGPT2	BTBD7	C21orf91	CASD1	CREBL1	FAIM2	FBXO21	GLT8D3	IGSF9B	KIAA1632	LRRC15	MMD2
ANKRD12	BTBD9	C22orf13	CASKIN2	CROP	FAM102B	FBXO24	GNB5	IKZF2	KIAA1787	LRRC41	MOBKL2C
ANKRD13A	C10orf104	C22orf29	CBLN4	CRTAP	FAM105B	FBXO33	GNPDA2	IL20RA	KIAA1804	LRRC57	MON2
ANKRD34A	C10orf11	C2orf13	CC2D1B	CSMD3	FAM116A	FCHO2	GOLGA1	IQWD1	KIAA1853	LRRC8B	MORN4
ANKRD42	C10orf118	C2orf60	CCDC100	CTNND2	FAM119B	FCRL4	GOLGA8A	IRX5	KIAA2018	LRRTM2	MOSPD1
ANKRD50	C10orf129	C2orf67	CCDC103	CTTNBP2	FAM120A	FEM1C	GPATCH8	ISL2	KIAA2022	LRRTM3	MOSPD3
ANKS1B	C10orf30	C2orf68	CCDC117	CUGBP2	FAM120C	FGD1	GPM6B	JARID1A	KLF17	LRTM2	MSL-1
AOF1	C10orf76	C2orf69	CCDC68	CUX2	FAM126A	FHDC1	GPR107	JARID1B	KLHDC8A	LSM14B	MST150
ARC	C11orf58	C3orf21	CCDC73	CXorf36	FAM130A1	FIBIN	GPR137C	JMJD2A	KLHL14	LUZP1	MTCH2
ARHGEF10	C11orf61	C3orf59	CCDC93	CYB5D1	FAM131A	FIGN	GPR155	JOSD1	KLHL18	LYNX1	MTF2
ARHGEF15	C12orf23	C4orf30	CCNJ	DACT1	FAM131B	FIGNL2	GPR158	KANK4	KLHL28	LYPLA2	MTMR4
ARMC10	C12orf4	C4orf8	CCNL1	DBN1	FAM134A	FILIPIL	GPR162	KCMF1	KLHL6	LYRM2	MTMR8
ARMC8	C13orf1	C5orf23	CCPG1	DCLRE1A	FAM134C	FLG2	GREM1	KCNA6	KNCN	LYRM4	MTX3
ARMCX3	C13orf23	C5orf25	CDC2L5	DCP1A	FAM135A	FLJ12529	GSG1L	KCNC1	KRT77	LYZL1	MXA7
ARPP-21	C13orf30	C5orf29	CDH20	DDEFL1	FAM135B	FLJ20309	GTDC1	KCND1	KSR2	LYZL2	MYO5C
ASAH3L	C13orf31	C5orf33	CDRT4	DENND2D	FAM150B	FLJ30851	GTPBP2	KCNE4	KY	MAGIX	MYT1L
ASB12	C14orf101	C5orf4	CDS2	DEXI	FAM152A	FLJ37543	HCN1	KCNK2	LARP2	MAPKBP1	N4BP1
ASB6	C14orf126	C6orf120	CENTG1	DHX40	FAM155B	FLJ43582	HECA	KCTD20	LARP4	MARK4	NAALADL2
ASXL1	C14orf83	C6orf168	CENTG2	DIP2B	FAM160B1	FLJ44815	HEG1	KERA	LBA1	MBTD1	NAPEPLD
ATG2B	C15orf17	C6orf35	CENTG3	DMRTC2	FAM160B2	FLJ44838	HELZ	KIAA0152	LCORL	MCART6	NARG2

NAV1	OSGIN2	PLCXD3	RAB23	RMND5A	SFRS10	SP7	TFAP2D	TMEM63C	USP45	ZC3H12B	ZNF516
NAV3	OTP	PLEKHG3	RAB27A	RNASE11	SFRS12IP1	SPINK4	TFAP2E	TMEM65	USP49	ZC3H12C	ZNF518A
NCDN	OTUD3	POGK	RAB2B	RNF121	SFRS2	SPOPL	THEX1	TMEM79	UTX	ZC3H18	ZNF532
NCOA1	OTUD6B	POLM	RAB40B	RNF141	SFRS2IP	SPRED1	THNSL1	TMEM87A	VAX1	ZC3H6	ZNF544
NECAP1	OXR1	POMT2	RAB43	RNF145	SFRS3	SPRY3	THRB	TMIE	VGLL3	ZCCHC14	ZNF594
NEGR1	PADI2	PPAPDC2	RAB6IP1	RNF165	SFRS7	SR140	TIGD5	TMPRSS5	VPS54	ZCCHC24	ZNF607
NFATC2IP	PALM2-	PPIL6	RAG1AP1	RNF169	SFRS9	SRrp35	TLE4	TMSL3	WBP2	ZDHHC16	ZNF609
NHS	AKAP2	PPP1R12C	RAI1	RNF180	SFTPH	ST7L	TLL2	TMTC1	WDR21A	ZFAND5	ZNF618
NIPA1	PAP2D	PPP1R3F	RALGPS1	RNF207	SFXN5	STEAP4	TLX1	TNRC4	WDR22	ZFAT	ZNF654
NLGN2	PAPOLB	PPP2R2D	RANBP10	RNF38	SGEF	STK35	TMC7	TNRC6B	WDR23	ZFHX4	ZNF697
NOPE	PAQR9	PPP3CB	RAP2B	RP11-	SGK269	STMN4	TMCC1	TOX	WDR32	ZIC4	ZNF701
NOTUM	PCDH11Y	PRDM8	RAP2C	68I18.1	SGK3	STXBP4	TMEM104	TP53INP2	WDR37	ZNF131	ZNF706
N-PAC	PCLO	PRNT	RBJ	RP3-	SGTB	STXBP5L	TMEM106A	TPRG1	WDR40A	ZNF181	ZNF763
NPAL3	PCMTD2	PRR3	RBM23	402G11.5	SH3TC2	STXBP6	TMEM119	TRIM46	WDR47	ZNF19	ZNF781
NPAS4	PCTK1	PRRC1	RBM24	RP5-	SHE	STYX	TMEM128	TRIM62	WIPF2	ZNF2	ZNF793
NPNT	PCTK3	PRRT2	RBM35A	1000E10.4	SHF	SV2B	TMEM132D	TRMT5	WIPI2	ZNF25	ZNF800
NRIP3	PDIK1L	PSCD1	RBM47	RSBN1	SIPA1L2	SYT7	TMEM133	TSC22D2	WWC2	ZNF250	ZNF804A
NRK	PDRG1	PSCDBP	RBM9	RSPO4	SKIP	SYT9	TMEM135	TSEN34	WWC3	ZNF275	ZNF827
NRP1	PDZD4	PSD3	REEP3	RTKN2	SLAIN2	TBC1D1	TMEM155	TTC13	XKR5	ZNF280C	ZNRF3
NRXN2	PFTK1	PTAR1	RELN	SAMD12	SLAMF8	TBC1D13	TMEM161B	TTLL2	XKR6	ZNF292	ZSWIM4
NSUN7	PGBD5	PTHR1	RELT	SAMD5	SLC10A3	TBKBP1	TMEM170B	TTPAL	YIPF5	ZNF302	
NUDT10	PHACTR4	PTPDC1	RFXDC2	SCD5	SLC10A7	TC2N	TMEM182	UBE2J1	YPEL1	ZNF362	
NUS1	PHC3	PUNC	RGAG1	SCML4	SLC35E4	tcag7.1177	TMEM184A	UBXD2	YTHDC1	ZNF37A	
NXPH1	PHF14	PURB	RHBDL3	SEC14L5	SLC35F1	tcag7.1228	TMEM188	UCRC	ZAR1	ZNF385B	
NXT2	PHLPPL	PVALB	RIC3	SEMA3G	SLC37A3	TDRD9	TMEM194A	UNC119B	ZBTB11	ZNF440	
ODZ2	PI15	QSER1	RIMBP2	SEMA4G	SLITRK2	TEDDM1	TMEM200B	UNC13C	ZBTB41	ZNF449	
ODZ4	PIK3AP1	QSOX2	RIMS3	SEN5	SOBP	TEX2	TMEM218	UQCC	ZBTB44	ZNF507	
OSBPL7	PIP5K3	RAB15	RIPK4	SFRS1	SORCS3	TEX261	TMEM35	USP24	ZBTB5	ZNF514	