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(54) **Title:** COMPOSITIONS AND METHODS OF MODULATING IMMUNE RESPONSE

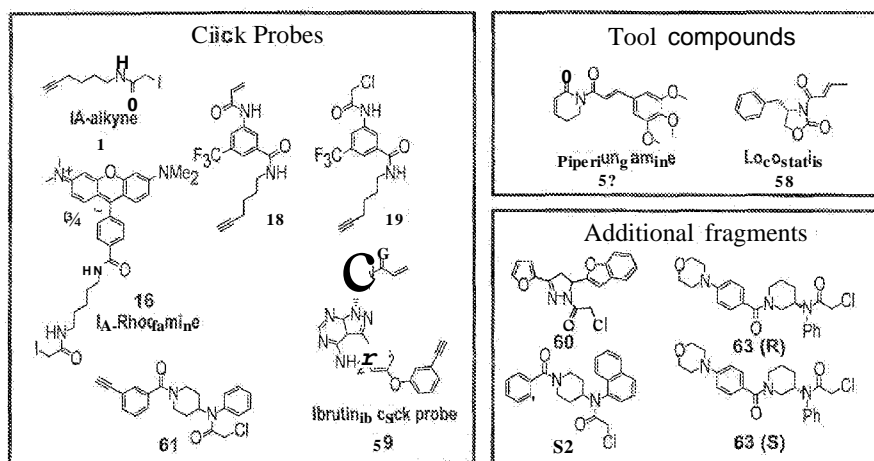


FIG. 1B

(57) **Abstract:** Disclosed herein are methods, pharmaceutical compositions, and vaccines for modulating an immune response. Also disclosed, herein are methods, pharmaceutical compositions, and vaccines for inducing an immune response.

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COMPOSITIONS AND METHODS OF MODULATING IMMUNE RESPONSE**CROSS-REFERENCE**

[0001] This application claims the benefit of US Provisional Application No. 62/345,715, filed on June 3, 2016, which is incorporated herein by reference in its entirety.

SEQUENCE LISTING

[0002] The instant application contains a Sequence Listing which has been submitted electronically in ASCII format and is hereby incorporated by reference in its entirety. Said ASCII copy, created on May 31, 2017, is named 48054-705_601_SL.txt and is 3,856,317 bytes in size.

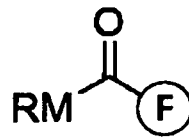
BACKGROUND OF THE DISCLOSURE

[0003] The immune system is a complex network of responses and processes that protects an organism and enables the organism to fight against a foreign agent. In some instances, there are two types of immune response when presented with a foreign agent. In one instance, the immune system responds with a B cell-mediated response (e.g., humoral response or antibody-mediated response) when foreign agents (e.g., antigens and/or pathogens) are present in the lymph or blood. In another instance, the immune system responds with a T cell-mediated response (e.g., a cell-mediated response) when cells that display aberrant MHC markers are present. In some instances, both humoral response and cell-mediated response are triggered by a foreign agent when, e.g., both antigens and cells containing aberrant MHC markers are present.

SUMMARY OF THE DISCLOSURE

[0004] In certain embodiments, disclosed herein include methods, pharmaceutical compositions, and vaccines for modulating an immune response. In some embodiments, included herein are methods of administering a small molecule fragment described herein for modulating an immune response. In additional embodiments, described herein are pharmaceutical compositions and vaccines which comprise a small molecule fragment described herein for modulating an immune response.

[0005] Disclosed herein, in certain embodiments, is a method of modulating an immune response in a subject in need thereof, comprising administering to the subject a therapeutically effective amount of a small molecule fragment of Formula (I):



Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and

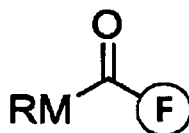
F is a small molecule fragment moiety.

[0006] In some embodiments, the small molecule fragment interacts with an endogenous cysteine-containing polypeptide expressed in the subject to form a cysteine-containing polypeptide-small molecule fragment adduct. In some embodiments, the small molecule fragment is covalently bound to a cysteine residue of the cysteine-containing polypeptide. In some embodiments, the cysteine-containing polypeptide-small molecule fragment adduct induces an immune response. In some embodiments, the cysteine-containing polypeptide-small molecule fragment adduct induces a humoral immune response. In some embodiments, the cysteine-containing polypeptide-small molecule fragment adduct induces a cell-mediated immune response. In some embodiments, the cysteine-containing polypeptide-small molecule fragment adduct increases an immune response relative to a control. In some embodiments, the cysteine-containing polypeptide-small molecule fragment adduct increases a humoral immune response relative to a control. In some embodiments, the cysteine-containing polypeptide-small molecule fragment adduct increases a cell-mediated immune response relative to a control. In some embodiments, the control is the level of an immune response in the subject prior to administration of the small molecule fragment. In some embodiments, the control is the level of an immune response in a subject who has not been exposed to the small molecule fragment. In some embodiments, the control is the level of a humoral immune response or a cell-mediated immune response in the subject prior to administration of the small molecule fragment. In some embodiments, the control is the level of a humoral immune response or a cell-mediated immune response in a subject who has not been exposed to the small molecule fragment. In some embodiments, the cysteine-containing polypeptide is overexpressed in a disease or condition. In some embodiments, the cysteine-containing polypeptide comprises one or more mutations. In some embodiments, the cysteine-containing polypeptide comprising one or more mutations is overexpressed in a disease or condition. In some embodiments, the disease or condition is cancer. In some embodiments, the cysteine-containing polypeptide is a cancer-associated protein. In some embodiments, the cysteine-containing polypeptide is overexpressed in a cancer. In some embodiments, the cysteine-containing polypeptide comprising one or more mutations is overexpressed in a cancer. In some embodiments, the

cysteine-containing polypeptide is a non-denatured form of the polypeptide. In some embodiments, the cysteine-containing polypeptide comprises a biologically active cysteine site. In some embodiments, the biologically active cysteine site is a cysteine residue that is located about 10Å or less to an active-site ligand or residue. In some embodiments, the cysteine residue that is located about 10Å or less to the active-site ligand or residue is an active site cysteine. In some embodiments, the biologically active cysteine site is an active site cysteine. In some embodiments, the biologically active cysteine site is a cysteine residue that is located greater than 10Å from an active-site ligand or residue. In some embodiments, the cysteine residue that is located greater than 10Å from the active-site ligand or residue is a non-active site cysteine. In some embodiments, the biologically active cysteine site is a non-active site cysteine. In some embodiments, the cysteine-containing polypeptide is an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, a plasma protein, transcription related protein, translation related protein, mitochondrial protein, or cytoskeleton related protein. In some embodiments, the cysteine-containing polypeptide is an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, transcription related protein, or translation related protein. In some embodiments, the enzyme comprises kinases, proteases, or deubiquitinating enzymes. In some embodiments, the protease is a cysteine protease. In some embodiments, the cysteine protease comprises caspases. In some embodiments, the signaling protein comprises vascular endothelial growth factor. In some embodiments, the signaling protein comprises a redox signaling protein. In some embodiments, the cysteine-containing polypeptide is about 20, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100 amino acid residues in length or more. In some embodiments, the cysteine-containing polypeptide comprises a protein illustrated in Tables 1-5. In some embodiments, the Michael acceptor moiety comprises an alkene or an alkyne moiety. In some embodiments, the covalent bond is formed between a portion of the Michael acceptor moiety on the small molecule fragment and a portion of a cysteine residue of the cysteine-containing polypeptide. In some embodiments, F is obtained from a compound library. In some embodiments, the compound library comprises ChemBridge fragment library, Pyramid Platform Fragment-Based Drug Discovery, Maybridge fragment library, FRGx from AnalytiCon, TCI-Frag from AnCoreX, Bio Building Blocks from ASINEX, BioFocus 3D from Charles River, Fragments of Life (FOL) from Emerald Bio, Enamine Fragment Library, IOTA Diverse 1500, BIONET fragments library, Life Chemicals Fragments Collection, OTAVA fragment library, Prestwick fragment library, Selcia fragment library, TimTec fragment-based library, Allium from Vitas-M Laboratory, or Zenobia fragment library. In some embodiments, F is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In some embodiments, F further comprises a linker moiety that connects F to the carbonyl moiety. In some embodiments, the small molecule fragment is a small molecule fragment illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In

some embodiments, the small molecule fragment has a molecular weight of about 150 Dalton or higher. In some embodiments, the small molecular fragment has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of the small molecular fragment is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, the small molecular fragment of Formula (I) has a molecular weight of about 150, 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the method further comprises administering a cysteine-containing polypeptide-small molecule fragment adduct. In some embodiments, the cysteine-containing polypeptide is at most 50 amino acid residues in length. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, or 99% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, the method further comprises administration of an adjuvant. In some embodiments, the small molecule fragment is formulated for parenteral, oral, or intranasal administration. In some embodiments, the subject is a human.

[0007] Disclosed herein, in certain embodiments, is a vaccine comprising a small molecule fragment of Formula (I):



Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and

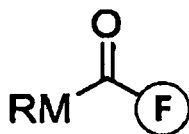
F is a small molecule fragment moiety.

[0008] In some embodiments, the small molecule fragment interacts with a cysteine-containing polypeptide to form a cysteine-containing polypeptide-small molecule fragment adduct. In some embodiments, the small molecule fragment is covalently bond to a cysteine residue of the cysteine-containing polypeptide. In some embodiments, the cysteine-containing polypeptide is an endogenous cysteine-containing polypeptide expressed in a subject. In some embodiments, administration of the small molecule fragment induces an immune response. In some embodiments, administration of the small molecule fragment induces a humoral immune response. In some embodiments, administration of the small molecule fragment induces a cell-mediated immune response. In some embodiments, administration

of the small molecule fragment increases an immune response relative to a control. In some embodiments, administration of the small molecule fragment increases a humoral immune response relative to a control. In some embodiments, administration of the small molecule fragment increases a cell-mediated immune response relative to a control. In some embodiments, the control is the level of an immune response in the subject prior to administration of the small molecule fragment. In some embodiments, the control is the level of an immune response in a subject who has not been exposed to the small molecule fragment. In some embodiments, the control is the level of a humoral immune response or a cell-mediated immune response in the subject prior to administration of the small molecule fragment. In some embodiments, the control is the level of a humoral immune response or a cell-mediated immune response in a subject who has not been exposed to the small molecule fragment. In some embodiments, the cysteine-containing polypeptide is overexpressed in a disease or condition. In some embodiments, the cysteine-containing polypeptide comprises one or more mutations. In some embodiments, the cysteine-containing polypeptide comprising one or more mutations is overexpressed in a disease or condition. In some embodiments, the disease or condition is cancer. In some embodiments, the cysteine-containing polypeptide is a cancer-associated protein. In some embodiments, the cysteine-containing polypeptide is overexpressed in a cancer. In some embodiments, the cysteine-containing polypeptide comprising one or more mutations is overexpressed in a cancer. In some embodiments, the cysteine-containing polypeptide is a non-denatured form of the polypeptide. In some embodiments, the cysteine-containing polypeptide is an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, a plasma protein, transcription related protein, translation related protein, mitochondrial protein, or cytoskeleton related protein. In some embodiments, the cysteine-containing polypeptide comprises a protein illustrated in Tables 1-5. In some embodiments, the Michael acceptor moiety comprises an alkene or an alkyne moiety. In some embodiments, the covalent bond is formed between a portion of the Michael acceptor moiety on the small molecule fragment and a portion of a cysteine residue of the cysteine-containing polypeptide. In some embodiments, F is obtained from a compound library. In some embodiments, the compound library comprises ChemBridge fragment library, Pyramid Platform Fragment-Based Drug Discovery, Maybridge fragment library, FRGx from AnalytiCon, TCI-Frag from AnCoreX, Bio Building Blocks from ASINEX, BioFocus 3D from Charles River, Fragments of Life (FOL) from Emerald Bio, Enamine Fragment Library, IOTA Diverse 1500, BIONET fragments library, Life Chemicals Fragments Collection, OTAVA fragment library, Prestwick fragment library, Selcia fragment library, TimTec fragment-based library, Allium from Vitas-M Laboratory, or Zenobia fragment library. In some embodiments, F is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In some embodiments, F further comprises a linker moiety that connects F to the carbonyl moiety. In some embodiments, the small molecule fragment is a small molecule fragment illustrated in Fig. 1 (e.g., Fig.

1A and/or Fig. 1B). In some embodiments, the small molecule fragment has a molecular weight of about 150 Dalton or higher. In some embodiments, the small molecular fragment has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of the small molecular fragment is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, the small molecular fragment of Formula (I) has a molecular weight of about 150, 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the vaccine further comprises a cysteine-containing polypeptide-small molecule fragment adduct. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, or 99% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, the vaccine further comprises an adjuvant. In some embodiments, the vaccine is formulated for parenteral, oral, or intranasal administration.

- [0009]** Disclosed herein, in certain embodiments, is a pharmaceutical composition comprising:
- a) a cysteine-containing polypeptide covalently bonded to a small molecule fragment, wherein the small molecule fragment is a small molecule fragment of Formula (I):



Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and

F is a small molecule fragment moiety; and

wherein the small molecule fragment is covalently bonded to a cysteine residue of the cysteine-containing polypeptide; and

- b) an excipient.

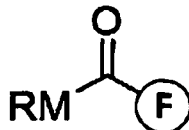
[0010] In some embodiments, the cysteine-containing polypeptide is a non-denatured form of the polypeptide. In some embodiments, the cysteine-containing polypeptide comprises a biologically active cysteine site. In some embodiments, the biologically active cysteine site is a cysteine residue that is located about 10Å or less to an active-site ligand or residue. In some embodiments, the cysteine residue that is located about 10Å or less to the active-site ligand or residue is an active site cysteine. In some

embodiments, the biologically active cysteine site is an active site cysteine. In some embodiments, the biologically active cysteine site is a cysteine residue that is located greater than 10A from an active-site ligand or residue. In some embodiments, the cysteine residue that is located greater than 10A from the active-site ligand or residue is a non-active site cysteine. In some embodiments, the biologically active cysteine site is a non-active site cysteine. In some embodiments, the cysteine-containing polypeptide is an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, a plasma protein, transcription related protein, translation related protein, mitochondrial protein, or cytoskeleton related protein. In some embodiments, the cysteine-containing polypeptide is an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, transcription related protein, or translation related protein. In some embodiments, the enzyme comprises kinases, proteases, or deubiquitinating enzymes. In some embodiments, the protease is a cysteine protease. In some embodiments, the cysteine protease comprises caspases. In some embodiments, the signaling protein comprises vascular endothelial growth factor. In some embodiments, the signaling protein comprises a redox signaling protein. In some embodiments, the cysteine-containing polypeptide is about 20, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100 amino acid residues in length or more. In some embodiments, the cysteine-containing polypeptide comprises a protein illustrated in Tables 1-5. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified protein. In some embodiments, the isolated and purified protein is a protein illustrated in Tables 1-5. In some embodiments, the cysteine-containing polypeptide is at most 50 amino acid residues in length. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 85% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 90% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 95% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 96% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 97% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some

embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 98% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-96SS. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 99% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-96SS. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising 100% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-96SS. In some embodiments, the cysteine-containing polypeptide comprises an isolated and purified polypeptide consisting of 100% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-96SS. In some embodiments, the Michael acceptor moiety comprises an alkene or an alkyne moiety. In some embodiments, the covalent bond is formed between a portion of the Michael acceptor moiety on the small molecule fragment and a portion of a cysteine residue of the cysteine-containing polypeptide. In some embodiments, F is obtained from a compound library. In some embodiments, the compound library comprises ChemBridge fragment library, Pyramid Platform Fragment-Based Drug Discovery, Maybridge fragment library, FRGx from AnalytiCon, TCI-Frag from AnCoreX, Bio Building Blocks from ASINEX, BioFocus 3D from Charles River, Fragments of Life (FOL) from Emerald Bio, Enamine Fragment Library, IOTA Diverse 1500, BIONET fragments library, Life Chemicals Fragments Collection, OTAVA fragment library, Prestwick fragment library, Selcia fragment library, TimTec fragment-based library, Allium from Vitas-M Laboratory, or Zenobia fragment library. In some embodiments, F is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In some embodiments, F further comprises a linker moiety that connects F to the carbonyl moiety. In some embodiments, the small molecule fragment is a small molecule fragment illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In some embodiments, the small molecule fragment has a molecular weight of about 150 Dalton or higher. In some embodiments, the small molecule fragment has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of the small molecule fragment is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, the small molecule fragment of Formula (I) has a molecular weight of about 150, 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the pharmaceutical composition is formulated for parenteral, oral, or intranasal administration.

[0011] Disclosed herein, in certain embodiments, is a vaccine comprising a pharmaceutical composition disclosed above. In some embodiments, the vaccine further comprises an adjuvant. In some embodiments, the vaccine is formulated for parenteral, oral, or intranasal administration.

[0012] Disclosed herein, in certain embodiments, is an isolated and purified antibody or its binding fragment thereof comprising a heavy chain CDRI, CDR2 and CDR3 sequence and a light chain CDRI, CDR2, and CDR3 sequence, wherein the heavy chain and light chain CDRs interact with a cysteine-containing polypeptide that is covalently bond to a small molecule fragment, wherein the small molecule fragment is a small molecule fragment of Formula (I):



Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and wherein the small molecule fragment is covalently bond to a cysteine residue of the cysteine-containing polypeptide.

[0013] In some embodiments, the antibody or its binding fragment thereof comprises a humanized antibody or binding fragment thereof, chimeric antibody or binding fragment thereof, monoclonal antibody or binding fragment thereof, monovalent Fab', divalent Fab2, single-chain variable fragment (scFv), diabody, rninibody, nanobody, single-domain antibody (sdAb), camelid antibody, or binding fragment thereof.

[0014] Disclosed herein, in certain embodiments, is a kit comprising a pharmaceutical composition described above.

[0015] Disclosed herein, in certain embodiments, is a kit comprising an isolated and purified antibody or its binding fragment thereof disclosed above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Various aspects of the disclosure are set forth with particularity in the appended claims. A better understanding of the features and advantages of the present disclosure will be obtained by reference to the following detailed description that sets forth illustrative embodiments, in which the principles of the disclosure are utilized, and the accompanying drawings of which:

[0017] Fig. IA-Fig. IB illustrate exemplary small molecule fragments described herein.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0018] Cysteine containing proteins encompass a large repertoire of proteins that participate in numerous cellular functions such as mitogenesis, proliferation, apoptosis, gene regulation, and proteolysis. These proteins include enzymes, transporters, receptors, channel proteins, adaptor proteins, chaperones, signaling proteins, plasma proteins, transcription related proteins, translation related proteins, mitochondrial proteins, or cytoskeleton related proteins. Dysregulated expression of a cysteine containing protein, in many cases, is associated with or modulates a disease, for example, such as cancer.

[0019] In some instances, small molecule compounds are capable of eliciting an immune response. In some instances, these small molecule compounds are referred to as haptens. In some cases, a hapten is a non-immunogenic compound but becomes immunogenic when it interacts with a carrier molecule such as a protein. For example, upon administration of a small molecule hapten, the hapten forms an adduct with a protein of interest in a process refers to as haptization. In some cases, the protein-hapten adduct becomes antigenically active and enables priming of T cells and B cells, thereby directing immune response to a cell that expresses the protein of interest.

[0020] In some embodiments, disclosed herein are small molecule fragments that elicit an immune response upon interaction with cysteine-containing proteins (or cysteine-containing polypeptides). In some instances, also disclosed herein includes use of a small molecule fragment described herein to elicit or modulate an immune response in a subject. In such instances, the small molecule fragment forms an adduct with an endogenous cysteine-containing protein, and subsequently directs immune response to the cell that expresses the endogenous cysteine-containing protein. In some instances, the cell that expresses the endogenous cysteine-containing protein is a disease cell (e.g., a cancerous cell). In some instances, the endogenous cysteine-containing protein is present only in a diseased cell (e.g., a cancerous cell). In other instances, the endogenous cysteine-containing protein is overexpressed in a diseased cell (e.g., a cancerous cell) and/or comprises one or more mutations in a diseased cell (e.g., a cancerous cell).

[0021] In some embodiments, also disclosed herein are vaccines and pharmaceutical compositions that comprise one or more small molecule fragments described herein. In some instances, additionally described herein are vaccines and pharmaceutical compositions that comprise one or more cysteine-containing polypeptide-small molecule fragment adducts or antibodies that recognize a cysteine-containing polypeptide-small molecule fragment adduct described herein.

[0022] In additional embodiments, described herein include kits for use with any of the methods, vaccines, and pharmaceutical compositions disclosed herein.

Small Molecule Fragments

[0023] In some embodiments, described herein include pharmaceutical compositions, vaccines, and methods of use of a small molecule fragment. In some embodiments, a small molecule fragment described herein comprises a non-naturally occurring molecule. In some instances, the non-naturally occurring molecule does not include a natural and/or non-natural peptide fragment, or a small molecule that is produced naturally within the body of a mammal.

[0024] In some embodiments, a small molecule fragment described herein comprises a molecular weight of about 100 Dalton or higher. In some embodiments, a small molecule fragment comprises a molecular weight of about 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some instances, the molecular weight of a small molecule fragment is between about 150 and about 500, about 150 and about 450, about 150 and about 440, about 150 and about 430, about 150 and about 400, about 150 and about 350, about 150 and about 300, about 150 and about 250, about 170 and about 500, about 180 and about 450, about 190 and about 400, about 200 and about 350, about 130 and about 300, or about 120 and about 250 Dalton.

[0025] In some embodiments, the molecular weight of a small molecule fragment described herein is the molecular weight prior to enrichment with one or more elements selected from a halogen, a nonmetal, a transition metal, or a combination thereof. In some embodiments, the molecular weight of a small molecule fragment described herein is the molecular weight prior to enrichment with a halogen. In some embodiments, the molecular weight of a small molecule fragment described herein is the molecular weight prior to enrichment with a nonmetal. In some embodiments, the molecular weight of a small molecule fragment described herein is the molecular weight prior to enrichment with a transition metal.

[0026] In some embodiments, a small molecule fragment described herein comprises micromolar or millimolar binding affinity. In some instances, a small molecule fragment comprises a binding affinity of about 1 μ M, 10 μ M, 100 μ M, 500 μ M, 1mM, 10mM, or higher.

[0027] In some embodiments, a small molecule fragment described herein has a high ligand efficiency (LE). Ligand efficiency is the measurement of the binding energy per atom of a ligand to its binding partner. In some instances, the ligand efficiency is defined as the ratio of the Gibbs free energy (AG) to the number of non-hydrogen atoms of the compound (N):

$$LE = (AG)/N.$$

[0028] In some cases, LE is also arranged as:

$$LE = 1.4 (-\log IC_{50})/N.$$

[0029] In some instances, the LE score is about 0.3 kcal mol⁻¹HA⁻¹, about 0.35 kcal mol⁻¹HA⁻¹, about 0.4 kcal mol⁻¹HA⁻¹, or higher.

[0030J] In some embodiments, a small molecule fragment described herein is designed based on the Rule of 3. In some embodiments, the Rule of 3 comprises a non-polar solvent-polar solvent (e.g. octanol-water) partition coefficient log P of about 3 or less, a molecular mass of about 300 Daltons or less, about 3 hydrogen bond donors or less, about 3 hydrogen bond acceptors or less, and about 3 rotatable bonds or less.

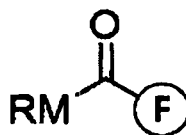
[0031] In some embodiments, a small molecule fragment described herein comprises three cyclic rings or less.

[0032] In some embodiments, a small molecule fragment described herein binds to a cysteine residue of a polypeptide that is about 20 amino acid residues in length or more. In some instances, a small molecule fragment described herein binds to a cysteine residue of a polypeptide that is about 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100 amino acid residues in length or more.

[0033] In some embodiments, a small molecule fragment described herein further comprises pharmacokinetic parameters that are unsuitable as a therapeutic agent for administration without further optimization of the small molecule fragments. In some instances, the pharmacokinetic parameters that are suitable as a therapeutic agent comprise parameters in accordance with FDA guideline, or in accordance with a guideline from an equivalent Food and Drug Administration outside of the United States. In some instances, the pharmacokinetic parameters comprise the peak plasma concentration (C_{max}), the lowest concentration of a therapeutic agent (C_{min}), volume of distribution, time to reach C_{max}, elimination half-life, clearance, and the life. In some embodiments, the pharmacokinetic parameters of the small molecule fragments are outside of the parameters set by the FDA guideline, or by an equivalent Food and Drug Administration outside of the United States. In some instances, a skilled artisan understands, in view of the pharmacokinetic parameters of the small molecule fragments described herein, that these small molecule fragments are unsuited as therapeutic agents without further optimization.

[0034] In some embodiments, a small molecule fragment described herein comprises a reactive moiety which forms a covalent interaction with the thiol group of a cysteine residue of a cysteine-containing protein, and an affinity handle moiety.

[0035] In some instances, a small molecule fragment described herein is a small molecule fragment of Formula (I):



Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and F is a small molecule fragment moiety.

[0036] In some instances, the Michael acceptor moiety comprises an alkene or an alkyne moiety. In some cases, F is obtained from a compound library. In some cases, the compound library comprises ChemBridge fragment library, Pyramid Platform Fragment-Based Drug Discovery, Maybridge fragment library, FRGx from AnalytiCon, TCI-Frag from AnCoreX, Bio Building Blocks from ASINEX, BioFocus 3D from Charles River, Fragments of Life (FOL) from Emerald Bio, Enamine Fragment Library, IOTA Diverse 1500, BIONET fragments library, Life Chemicals Fragments Collection, OTAVA fragment library, Prestwick fragment library, Selcia fragment library, TimTec fragment-based library, Allium from Vitas-M Laboratory, or Zenobia fragment library.

[0037] In some embodiments, a small molecule fragment of Formula (I) selectively interact with one or more protein variants. In some instances for example, a small molecule fragment of Formula (I) interacts or binds to the wild-type protein but does not bind to a mutant form of the protein. Conversely, in some instances, a small molecule fragment of Formula (I) interacts or binds to one specific protein mutant but does not interact with either the wild-type or the same protein comprising a different mutation. As used herein, the term "variant" comprises mutations within the protein sequence, additions or deletions of the protein sequence, and/or termini truncations. As used herein, the term "variant" comprises a protein having different conformations, for example, an active conformation or an inactive conformation. In some instances, a small molecule fragment of Formula (I) interacts with about 1, 2, 3, 4, 5, or more different variants of a protein of interest. In additional instances, a small molecule fragment of Formula (I) interacts with about 1 variant of a protein of interest. In additional instances, a small molecule fragment of Formula (I) interacts with about 2 variants of a protein of interest. In additional instances, a small molecule fragment of Formula (I) interacts with about 3 variants of a protein of interest. In additional instances, a small molecule fragment of Formula (I) interacts with about 4 variants of a protein of interest. In additional instances, a small molecule fragment of Formula (I) interacts with about 5 variants of a protein of interest.

[0038] In some embodiments, a small molecule fragment of Formula (I) does not contain a second binding site. In some instances, a small molecule fragment moiety does not bind to the protein. In some cases, a small molecule fragment moiety does not covalently bind to the protein. In some instances, a small molecule fragment moiety does not interact with a secondary binding site on the protein. In some instances, the secondary binding site is an active site such as an ATP binding site. In some cases, the active site is at least about 10, 15, 20, 25, 35, 40A, or more away from the biologically

active cysteine residue. In some instances, the small molecule fragment moiety does not interact with an active site such as an ATP binding site.

[0039] In some instances, F is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In some instances, F is a small molecule fragment moiety illustrated in Fig. 1A. In some cases, F further comprises a linker moiety that connects F to the carbonyl moiety. In some cases, the small molecule fragment is a small molecule fragment illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0040] In some instances, F is a small molecule fragment moiety selected from: *N*-(4-bromophenyl)-*N*-phenylacrylamide, *N*-(1-benzoylpiperidin-4-yl)-2-cUoro-*N*-phenylacetamide, 1-(4-benzylpiperidin-1-yl)-2-chloroethan-1-one, *N*-(2-(1*H*-indol-3-yl)ethyl)-2-chloroacetamide, *N*-(3,5-bis(trifluoromethyl)phenyl)acrylamide, *N*-(4-phenoxy-3-(trifluoromethyl)phenyl)-*N*-(pyridin-3-ylmethyl)acrylamide, *N*-(3,5-bis(trifluoromethyl)phenyl)acetamide, 2-chloro-1-(4-(hydroxydiphenylmethyl)piperidin-1-yl)ethan-1-one, (E)-3-(3,5-bis(trifluoromethyl)phenyl)-2-cyanoacrylamide, *N*-(3,5-bis(trifluoromethyl)phenyl)-2-bromopropanamide, *N*-(3,5-bis(trifluoromethyl)phenyl)-2-chloropropanamide, *N*-(3,5-bis(trifluoromethyl)phenyl)-*N*-(pyridin-3-ylmethyl)acrylamide, 3-(2-cUoroacetamido)-5-(trifluoromethyl)benzoic acid, 1-(4-(5-fluorobenzisoxazol-3-yl)piperidin-1-yl)prop-2-en-1-one, tert-butyl 4-(4-acrylamido-2,6-difluorophenyl)piperazine-1-carboxylate, *N*-(4-bromo-2,5-dimethylphenyl)acrylamide, 2-chloroacetamido-2-deoxy- α -D-glucopyranose, 2-chloro-1-(2-methyl-3,4-dihydroquinolin-1(2*H*)-yl)ethan-1-one, *N*-cyclohexyl-*N*-phenylacrylamide, 1-(5-bromoindolin-1-yl)prop-2-en-1-one, *N*-(1-benzylpiperidin-4-yl)-*N*-phenylacrylamide, 2-chloro-*N*-(2-methyl-5-(trifluoromethyl)phenyl)acetamide, 1-(5-bromoindolin-1-yl)-2-chloroethan-1-one, 2-cUoro-*N*-(quinolin-5-yl)acetamide, 1-(4-benzylpiperidin-1-yl)prop-2-en-1-one, 2-cUoro-*N*-((3-hydroxy-5-(hydroxymethyl)-2-methylpyridin-4-yl)methyl)acetamide, or 1-(6,7-dimethoxy-3,4-dihydroisoquinolin-2(1*H*)-yl)prop-2-en-1-one.

[0041] In some embodiments, the small molecule fragment of Formula (I) comprise a molecular weight of about 100, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some instances, the molecular weight of the small molecule fragment of Formula (I) is between about 150 and about 500, about 150 and about 450, about 150 and about 440, about 150 and about 430, about 150 and about 400, about 150 and about 350, about 150 and about 300, about 150 and about 250, about 170 and about 500, about 180 and about 450, about 190 and about 400, about 200 and about 350, about 130 and about 300, or about 120 and about 250 Dalton.

[0042] In some embodiments, the molecular weight of the small molecule fragment of Formula (I) is the molecular weight prior to enrichment with one or more elements selected from a halogen, a

nonmetal, a transition metal, or a combination thereof. In some embodiments, the molecular weight of the small molecule fragment of Formula (I) is the molecular weight prior to enrichment with a halogen. In some embodiments, the molecular weight of the small molecule fragment of Formula (I) is the molecular weight prior to enrichment with a nonmetal. In some embodiments, the molecular weight of the small molecule fragment of Formula (I) is the molecular weight prior to enrichment with a transition metal.

[0043] In some instances, the small molecule fragment of Formula (I) comprises micromolar or millimolar binding affinity. In some instances, the small molecule fragment of Formula (I) comprises a binding affinity of about 1 μ M, 10 μ M, 100 μ M, 500 μ M, 1 mM, 10 mM, or higher.

[0044] In some cases, the small molecule fragment of Formula (I) has a LE score about 0.3 kcal mol⁻¹HA⁻¹, about 0.35 kcal mol⁻¹HA⁻¹, about 0.4 kcal mol⁻¹HA⁻¹, or higher

[0045] In some embodiments, the small molecule fragment of Formula (I) follows the design parameters of Rule of 3. In some instances, the small molecule fragment of Formula (I) has a non-polar solvent-polar solvent (e.g. octanol-water) partition coefficient log P of about 3 or less, a molecular mass of about 300 Daltons or less, about 3 hydrogen bond donors or less, about 3 hydrogen bond acceptors or less, and about 3 rotatable bonds or less.

[0046] In some embodiments, the small molecule fragment of Formula (I) comprises three cyclic rings or less.

[0047] In some embodiments, the small molecule fragment of Formula (I) binds to a cysteine residue of a polypeptide (e.g., a cysteine-containing protein) that is about 20 amino acid residues in length or more. In some instances, the small molecule fragments described herein binds to a cysteine residue of a polypeptide (e.g., a cysteine-containing protein) that is about 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100 amino acid residues in length or more.

[0048] In some instances, the small molecule fragment of Formula (I) has pharmacokinetic parameters outside of the parameters set by the FDA guideline, or by an equivalent Food and Drug Administration outside of the United States. In some instances, a skilled artisan understands in view of the pharmacokinetic parameters of the small molecule fragment of Formula (I) described herein that these small molecule fragment is unsuited as a therapeutic agent without further optimization.

Cysteine-Containing Proteins

[0049] In some embodiments, disclosed herein include a cysteine-containing polypeptide. In some instances, the cysteine-containing polypeptide is about 20, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100 amino acid residues in length or more. In some instances, the cysteine-containing polypeptide is a cysteine-containing protein or its fragment thereof. In some instances, the cysteine-

containing protein is a soluble protein or its fragment thereof, or a membrane protein or its fragment thereof. In some instances, the cysteine-containing protein is involved in one or more of a biological process such as protein transport, lipid metabolism, apoptosis, transcription, electron transport, mRNA processing, or host-virus interaction. In some instances, the cysteine-containing protein is associated with one or more of diseases such as cancer or one or more disorders or conditions such as immune, metabolic, developmental, reproductive, neurological, psychiatric, renal, cardiovascular, or hematological disorders or conditions.

[0050] In some embodiments, the cysteine-containing protein comprises a biologically active cysteine residue. In some embodiments, the cysteine-containing protein comprises one or more cysteines in which at least one cysteine is a biologically active cysteine residue. In some cases, the biologically active cysteine site is a cysteine residue that is located about **10A** or less to an active-site ligand or residue. In some cases, the cysteine residue that is located about **10A** or less to the active-site ligand or residue is an active site cysteine. In other cases, the biologically active cysteine site is a cysteine residue that is located greater than **10A** from an active-site ligand or residue. In some instances, the cysteine residue is located greater than **12A, 15A, 20A, 25A, 30A, 35A, 40A, 45A**, or greater than **50A** from an active-site ligand or residue. In some cases, the cysteine residue that is located greater than **10A** from the active-site ligand or residue is a non-active site cysteine. In additional cases, the cysteine-containing protein exists in an active form, or in a pro-active form.

[0051] In some embodiments, the cysteine-containing protein comprises one or more functions of an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, a plasma protein, transcription related protein, translation related protein, mitochondrial protein, or cytoskeleton related protein. In some embodiments, the cysteine-containing protein is an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, a plasma protein, transcription related protein, translation related protein, mitochondrial protein, or cytoskeleton related protein. In some instances, the cysteine-containing protein has an uncategorized function.

[0052] In some embodiments, the cysteine-containing protein is an enzyme. An enzyme is a protein molecule that accelerates or catalyzes chemical reaction. In some embodiments, non-limiting examples of enzymes include kinases, proteases, or deubiquitinating enzymes.

[0053] In some instances, exemplary kinases include tyrosine kinases such as the TEC family of kinases such as Tec, Bruton's tyrosine kinase (Btk), interleukin-2-inducible T-cell kinase (Itk) (or EmtATsk), Bmx, and Txk/Rlk; spleen tyrosine kinase (Syk) family such as SYK and Zeta-chain-associated protein kinase **70 (ZAP-70)**; Src kinases such as Src, Yes, Fyn, Fgr, Lck, Hck, Blk, Lyn, and Frk; JAK kinases such as Janus kinase **1 (JAK1)**, Janus kinase **2 (JAK2)**, Janus kinase **3 (JAK3)**, and Tyrosine

kinase 2 (TYK2); or ErbB family of kinases such as Her1 (EGFR, ErbB1), Her2 (Neu, ErbB2), Her3 (ErbB3), and Her4 (ErbB4).

[0054] In some embodiments, the cysteine-containing protein is a protease. In some embodiments, the protease is a cysteine protease. In some cases, the cysteine protease is a caspase. In some instances, the caspase is an initiator (apical) caspase. In some instances, the caspase is an effector (executioner) caspase. Exemplary caspase includes CASP2, CASP8, CASP9, CASP10, CASP3, CASP6, CASP7, CASP4, and CASP5. In some instances, the cysteine protease is a cathepsin. Exemplary cathepsin includes Cathepsin B, Cathepsin C, CathepsinF, Cathepsin H, Cathepsin K, Cathepsin LI, Cathepsin L2, Cathepsin O, Cathepsin S, Cathepsin W, or Cathepsin Z.

[0055] In some embodiments, the cysteine-containing protein is a deubiquitinating enzyme (DUB). In some embodiments, exemplary deubiquitinating enzymes include cysteine proteases DUBs or metalloproteases. Exemplary cysteine protease DUBs include ubiquitin-specific protease (USP/UBP) such as USP1, USP2, USP3, USP4, USP5, USP6, USP7, USP8, USP9X, USP9Y, USP10, USP11, USP12, USP13, USP14, USP15, USP16, USP17, USP17L2, USP17L3, USP17L4, USP17L5, USP17L7, USP17L8, USP18, USP19, USP20, USP21, USP22, USP23, USP24, USP25, USP26, USP27X, USP28, USP29, USP30, USP31, USP32, USP33, USP34, USP35, USP36, USP37, USP38, USP39, USP40, USP41, USP42, USP43, USP44, USP45, or USP46; ovarian tumor (OTU) proteases such as OTUB1 and OTUB2; Machado-Josephin domain (MJD) proteases such as ATXN3 and ATXN3L; and ubiquitin C-terminal hydrolase (UCH) proteases such as BAP1, UCHL1, UCHL3, and UCHL5. Exemplary metalloproteases include the Jab1/Mov34/Mpr1 Pad1 N-terminal+ (MPN+) (JAMM) domain proteases.

[0056] In some embodiments, exemplary cysteine-containing proteins as enzymes include, but are not limited to, Glyceraldehyde-3-phosphate dehydrogenase (GAPDH), Protein arginine N-methyltransferase 1 (PRMT1), Peptidyl-prolyl cis-trans isomerase NIMA-interaction (PIN1), Acetyl-CoA acetyltransferase (mitochondrial) (ACAT1), Glutathione S-transferase P (GSTP1), Elongation factor 2 (EEF2), Glutathione S-transferase omega-1 (GSTO1), Acetyl-CoA acetyltransferase (mitochondrial) (ACAT1), Protein disulfide-isomerase A4 (PDIA4), Prostaglandin E synthase 3 (PTGES3), Adenosine kinase (ADK), Elongation factor 2 (EEF2), Isoamyl acetate-hydrolyzing esterase 1 homolog (IAH1), Peroxiredoxin-5 (mitochondrial) (PRDX5), Inosine-5-monophosphate dehydrogenase 2 (IMPDH2), 3-hydroxyacyl-CoA dehydrogenase type-2 (HSD17B10), Omega-amidase NIT2 (NIT2), Aldose reductase (AKR1B1), Monofunctional C1-tetrahydrofolate synthase (mitochondrial) (MTHFD1L), Protein disulfide-isomerase A6 (PDIA6), Pyruvate kinase isozymes M1/M2 (PKM), 6-phosphogluconolactonase (PGLS), Acetyl-CoA acetyltransferase (mitochondrial) (ACAT1), EROI-like protein alpha (EROIL), Thioredoxin domain-containing protein 17 (TXNDC17), Protein disulfide-isomerase A4 (PDIA4), Protein disulfide-isomerase A3 (PDIA3), 3-ketoacyl-CoA thiolase (mitochondrial) (ACAA2), Dynamin-2

(DNM2), DNA replication licensing factor MCM3 (MCM3), Serine-tRNA ligase (cytoplasmic) (SARS), Fatty acid synthase (FASN), Acetyl-CoA acetyltransferase (mitochondrial) (ACAT1), Protein disulfide-isomerase (P4HB), Deoxycytidine kinase (DCK), Eukaryotic translation initiation factor 3 subunit (EIF3F), Protein disulfide-isomerase A6 (PDIA6), UDP-N-acetylglucosamine-peptide N-acetylglucosamine (OGT), Ketosamine-3-kinase (FN3KRP), Protein DJ-1 (PARK7), Phosphoglycolate phosphatase (PGP), DNA replication licensing factor MCM6 (MCM6), Fructose-2,6-bisphosphatase TIGAR (TIGAR), Cleavage and polyadenylation specificity factor subunit (CPSF3), Ubiquitin-conjugating enzyme E2 L3 (UBE2L3), Alanine-tRNA ligase, cytoplasmic (AARS), Mannose-1-phosphate guanyltransferase alpha (GMPPA), C-1-tetrahydrofolate synthase (cytoplasmic) (MTHFD1), Dynamin-1-like protein (DNMIL), Protein disulfide-isomerase A3 (PDIA3), Aspartyl aminopeptidase (DNPEP), Acetyl-CoA acetyltransferase (cytosolic) (ACAT2), Thioredoxin domain-containing protein 5 (TXNDC5), Thymidine kinase (cytosolic) (TK1), Inosine-5-monophosphate dehydrogenase 2 (IMPDH2), Ubiquitin carboxyl-terminal hydrolase isozyme L3 (UCHL3), Integrin-linked protein kinase (ILK), Cyclin-dependent kinase 2 (CDK2), Histone acetyltransferase type B catalytic subunit (HAT1), Enoyl-CoA delta isomerase 2 (mitochondrial) (ECI2), C-1-tetrahydrofolate synthase (cytoplasmic) (MTHFD1), Deoxycytidine kinase (DCK), Ubiquitin-like modifier-activating enzyme 6 (UBA6), Protein-L-isoaspartate(D-aspartate) O-methyltransferase (PCMT1), Monofunctional C1-tetrahydrofolate synthase (mitochondrial) (MTHFD1 L), Thymidylate kinase (DTYMK), Protein ETHE1 (mitochondrial) (ETHE1), Arginine-tRNA ligase (cytoplasmic) (RARS), NEDD8-activating enzyme E1 catalytic subunit (UBA3), Dual specificity mitogen-activated protein kinase (MAP2K3), Ubiquitin-conjugating enzyme E2S (UBE2S), Amidophosphoribosyltransferase (PPAT), Succinate-semialdehyde dehydrogenase (mitochondrial) (ALDH5A1), CAD, Phosphoenolpyruvate carboxykinase (PCK2), 6-phosphofructokinase type C (PFKP), Acyl-CoA synthetase family member 2 (mitochondrial) (ACSF2), Multifunctional protein ADE2 (PAICS), Desumoylating isopeptidase 1 (DESI1), 6-phosphofructokinase type C (PFKP), V-type proton ATPase catalytic subunit A (ATP6V1 A), 3-ketoacyl-CoA thiolase (peroxisomal) (ACAA1), Galactokinase (GALK1), Thymidine kinase (cytosolic) (TK1), ATPase WRNIP1 (WRNIP1), Phosphoribosylformylglycinamide synthase (PFAS), V-type proton ATPase catalytic subunit A (ATP6V1 A), Thioredoxin domain-containing protein 5 (TXNDC5), 4-trimethylaminobutyraldehyde dehydrogenase (ALDH9A1), Dual specificity mitogen-activated protein kinase (MAP2K4), Calcineurin-like phosphoesterase domain-containing (CPPED1), Dual specificity protein phosphatase 12 (DUSP12), Phosphoribosylformylglycinamide synthase (PFAS), Diphosphomevalonate decarboxylase (MVD), D-3-phosphoglycerate dehydrogenase (PHGDH), Cell cycle checkpoint control protein RAD9A (RAD9A), Peroxiredoxin-1 (PRDX1), Sorbitol dehydrogenase (SORD), Peroxiredoxin-4 (PRDX4), AMP deaminase 2 (AMPD2), Isocitrate dehydrogenase (DDH1), Pyruvate carboxylase (mitochondrial) (PC), Integrin-

linked kinase-associated serine/threonine (ILKAP), Methylmalonate-semialdehyde dehydrogenase (ALDH6A1), 26S proteasome non-ATPase regulatory subunit 14 (PSMD14), Thymidylate kinase (DTYMK), 6-phosphofructo-2-kinase/fructose-2,6-bisphosphata (PFKFB2), Peroxiredoxin-5 (mitochondrial) (PRDX5), PDP1, Cathepsin B (CTSB), Transmembrane protease serine 12 (TMPRSS12), UDP-glucose 6-dehydrogenase (UGDH), Histidine triad nucleotide-binding protein 1 (HINT1), E3 ubiquitin-protein ligase UBR5 (UBR5), SAM domain and HD domain-containing protein 1 (SAMHD1), Probable tRNA threonylcarbamoyladenine biosynthesis (OSGEP), Methylated-DNA-protein-cysteine methyltransferase (MGMT), Fatty acid synthase (FASN), Adenosine deaminase (ADA), Cyclin-dependent kinase 19 (CDK19), Serine/threonine-protein kinase 38 (STK38), Mitogen-activated protein kinase 9 (MAPK9), tRNA (adenine(58)-N(1))-methyltransferase catalytic (TRMT61A), Glyoxylate reductase/hydroxypyruvate reductase (GRHPR), Aldehyde dehydrogenase (mitochondrial) (ALDH2), Mitochondrial-processing peptidase subunit beta (PMPCB), 3-ketoacyl-CoA thiolase, peroxisomal (ACAA1), Lysophosphatidic acid phosphatase type 6 (ACP6), Ubiquitin/ISG1 5-conjugating enzyme E2 L6 (UBE2L6), Caspase-8 (CASP8), 2,5-phosphodiesterase 12 (PDE12), Thioredoxin domain-containing protein 12 (TXNDC12), Nitrilase homolog 1 (NIT1), EROI-like protein alpha (EROIL), SUMO-activating enzyme subunit 1 (SAE1), Leucine-tRNA ligase (cytoplasmic) (LARS), Protein-glutamine gamma-glutamyltransferase 2 (TGM2), Probable DNA dC- dU-editing enzyme APOBEC-3C (APOBEC3C), Double-stranded RNA-specific adenosine deaminase (ADAR), Isocitrate dehydrogenase (IDH2), Methylcrotonoyl-CoA carboxylase beta chain (mitochondrial) (MCCC2), Uridine phosphorylase 1 (UPP1), Glycogen phosphorylase (brain form) (PYGB), E3 ubiquitin-protein ligase UBR5 (UBR5), Procollagen-lysine,2-oxoglutarate 5-dioxygenase 1 (PLOD1), Ubiquitin carboxyl-terminal hydrolase 48 (USP48), Aconitate hydratase (mitochondrial) (AC02), GMP reductase 2 (GMPR2), Pyrroline-5-carboxylate reductase 1 (mitochondrial) (PYCR1), Cathepsin Z (CTSZ), E3 ubiquitin-protein ligase UBR2 (UBR2), Cysteine protease ATG4B (ATG4B), Serine/threonine-protein kinase Nek9 (NEK9), Lysine-specific demethylase 4B (KDM4B), Insulin-degrading enzyme (IDE), Dipeptidyl peptidase 9 (DPP9), Decaprenyl-diphosphate synthase subunit 2 (PDSS2), TFIIH basal transcription factor complex helicase (ERCC3), MetMonine-R-sulfoxide reductase B2 (mitochondrial) (MSRB2), E3 ubiquitin-protein ligase BREIB (RNF40), Thymidylate synthase (TYMS), Cyclin-dependent kinase 5 (CDK5), Bifunctional 3-phosphoadenosine 5-phosphosulfate (PAPSS2), Short/branched chain specific acyl-CoA dehydrogenase (ACADSB), Cathepsin D (CTSD), E3 ubiquitin-protein ligase HUWE1 (HUWE1), Calpain-2 catalytic subunit (CAPN2), Dual specificity mitogen-activated protein kinase (MAP2K7), Mitogen-activated protein kinase kinase kinase MLT (MLTK), Bleomycin hydrolase (BLMH), Probable ATP-dependent RNA helicase DDX59 (DDX59), Cystathionine gamma-lyase (CTH), S-adenosylmethionine synthase isoform type-2 (MAT2A), 6-phosphofructokinase type C (PFKP), Cytidine

deaminase (CDA), DNA-directed RNA polymerase II subunit RPB2 (POLR2B), Protein disulfide-isomerase (P4HB), Procollagen-lysine,2-oxoglutarate 5-dioxygenase 3 (PLOD3), Nucleoside diphosphate-linked moiety X motif 8 (mitochondrial) (NUDT8), E3 ubiquitin-protein ligase HUWE1 (HUWE1), Methylated-DNA-protein-cysteine methyltransferase (MGMT), Nitrilase homolog 1 (NIT1), Interferon regulatory factor 2-binding protein 1 (IRF2BP1), Ubiquitin carboxyl-terminal hydrolase 16 (USP16), Glycylpeptide N-tetradecanoyltransferase 2 (NMT2), Cyclin-dependent kinase inhibitor 3 (CDKN3), Hydroxysteroid dehydrogenase-like protein 2 (HSDL2), Serine/threonine-protein kinase VRK1 (VRK1), Serine/threonine-protein kinase A-Raf (ARAF), ATP-citrate synthase (ACLY), Probable ribonuclease ZC3H12D (ZC3H12D), Peripheral plasma membrane protein CASK (CASK), DNA polymerase epsilon subunit 3 (POLE3), Aldehyde dehydrogenase X (mitochondrial) (ALDH1B1), UDP-N-acetylglucosamine transferase subunit ALG13 (ALG13), Protein disulfide-isomerase A4 (PDIA4), DNA polymerase alpha catalytic subunit (POLA1), Ethylmalonyl-CoA decarboxylase (ECHDC1), Protein-tyrosine kinase 2-beta (PTK2B), E3 SUMO-protein ligase RanBP2 (RANBP2), Legumain (LGMN), Non-specific lipid-transfer protein (SCP2), Long-chain-fatty-acid—CoA ligase 4 (ACSL4), Dual specificity protein phosphatase 12 (DUSP12), Oxidoreductase HTATIP2 (HTATIP2), Serine/threonine-protein kinase MRCK beta (CDC42BPB), Histone-lysine N-methyltransferase EZH2 (EZH2), Non-specific lipid-transfer protein (SCP2), Dual specificity mitogen-activated protein kinase (MAP2K7), Ubiquitin carboxyl-terminal hydrolase 28 (USP28), 6-phosphofructokinase (liver type) (PFKL), SWI/SNF-related matrix-associated actin-dependent (SMARCA1), Protein phosphatase methylesterase 1 (PPME1), DNA replication licensing factor MCM5 (MCM5), 6-phosphofructo-2-kinase/fructose-2,6-bisphosphata (PFKFB4), Dehydrogenase/reductase SDR family member 11 (DHRS1 1), Pyroglutamyl-peptidase 1 (PGPEPI), Probable E3 ubiquitin-protein ligase (MYCBP2), DNA fragmentation factor subunit beta (DFFB), Deubiquitinating protein VCIP135 (VCPIP1), Putative transferase CAF17 (mitochondrial) (IBA57), Calpain-7 (CAPN7), GDP-L-fucose synthase (TSTA3), Protein disulfide-isomerase A4 (PDIA4, Probable ATP-dependent RNA helicase (DDX59), RNA exonuclease 4 (REX04), PDK1, E3 SUMO-protein ligase (PIAS4), DNA (cytosine-5)-methyltransferase 1 (DNMT1), Alpha-amino adipic semialdehyde dehydrogenase (ALDH7A1), Hydroxymethylglutaryl-CoA synthase (cytoplasmic) (HMGCS1), E3 ubiquitin-protein ligase (SMURF2), Aldehyde dehydrogenase X (mitochondrial) (ALDH1B1), Tyrosine-protein kinase (BTK), DNA repair protein RAD50 (RAD50), ATP-binding domain-containing protein 4 (ATPBD4), Nucleoside diphosphate kinase 3 (NME3), Interleukin-1 receptor-associated kinase 1 (IRAK1), Ribonuclease P/MRP protein subunit POP5 (POP5), Peptide-N(4)-(N-acyl-beta-D-glucosaminyl)asparagin (NGLY1), Caspase-2 (CASP2), Ribosomal protein S6 kinase alpha-3 (RPS6KA3), E3 ubiquitin-protein ligase UBR1 (UBR1), Serine/threonine-protein kinase Chk2 (CHEK2), Phosphatidylinositol 3,4,5-trisphosphate 5-phospha

(INPPL1), Histone acetyltransferase p300 (EP300), Creatine kinase U-type (mitochondrial) (CKMT1B), E3 ubiquitin-protein ligase TRIM33 (TRIM33), Cancer-related nucleoside-triphosphatase (NTPCR), Aconitate hydratase (mitochondrial) (AC02), Ubiquitin carboxyl-terminal hydrolase 34 (USP34), Probable E3 ubiquitin-protein ligase HERC4 (HERC4), E3 ubiquitin-protein ligase HECTD1 (HECTD1), Peroxisomal 2,4-dienoyl-CoA reductase (DECR2), Helicase ARIP4 (RAD54L2), Ubiquitin-like modifier-activating enzyme 7 (UBA7), ER degradation-enhancing alpha-mannosidase-like 3 (EDE3), Ubiquitin-conjugating enzyme E20 (UBE20), Dual specificity mitogen-activated protein kinase (MAP2K7), Myotubularin-related protein 1 (MTMR1), Calcium-dependent phospholipase A2 (PLA2G5), Mitotic checkpoint serine/threonine-protein kinase (BUB1B), Putative transferase CAF17 (mitochondrial) (IBA57), Tyrosine-protein kinase ZAP-70 (ZAP70), E3 ubiquitin-protein ligase pellino homolog 1 (PELI1), Neuropathy target esterase (PNPLA6), Ribosomal protein S6 kinase alpha-3 (RPS6KA3), N6-adenosine-methyltransferase 70 kDa subunit (METTL3), Fructosamine-3-kinase (FN3K), Ubiquitin carboxyl-terminal hydrolase 22 (USP22), Rab3 GTPase-activating protein catalytic subunit (RAB3GAP1), Caspase-5 (CASP5), L-2-hydroxyglutarate dehydrogenase (mitochondrial) (L2HGDH), Saccharopine dehydrogenase-like oxidoreductase (SCCPDH), FLAD1 FAD synthase, Lysine-specific demethylase 3A (KDM3A), or Ubiquitin carboxyl-terminal hydrolase 34 (USP34).

[0057] In some embodiments, the cysteine-containing protein is a signaling protein. In some instances, exemplary signaling protein includes vascular endothelial growth factor (VEGF) proteins or proteins involved in redox signaling. Exemplary VEGF proteins include VEGF-A, VEGF-B, VEGF-C, VEGF-D, and PGF. Exemplary proteins involved in redox signaling include redox-regulatory protein FAM213A.

[0058] In some embodiments, the cysteine-containing protein is a transcription factor or regulator. Exemplary cysteine-containing proteins as transcription factors and regulators include, but are not limited to, 40S ribosomal protein S3 (RPS3), Basic leucine zipper and W2 domain-containing protein (BZW1), Poly(rC)-binding protein 1 (PCBP1), 40S ribosomal protein SI 1 (RPSI 1), 40S ribosomal protein S4, X isoform (RPS4X), Signal recognition particle 9 kDa protein (SRP9), Non-POU domain-containing octamer-binding protein (NONO), N-alpha-acetyltransferase 15, NatA auxiliary subunit (NAA15), Cleavage stimulation factor subunit 2 (CSTF2), Lamina-associated polypeptide 2, isoform alpha (TMPO), Heterogeneous nuclear ribonucleoprotein R (HNRNPR), MMS19 nucleotide excision repair protein homolog (MMS19), SWI/SNF complex subunit SMARCC2 (SMARCC2), Enhancer of mRNA-decapping protein 3 (EDC3), H/ACA ribonucleoprotein complex subunit 2 (NHP2), WW domain-containing adapter protein with coiled-c (WAC), N-alpha-acetyltransferase 15 NatA auxiliary subunit (NAA15), 40S ribosomal protein SI 1 (RPSI 1), Signal transducer and activator of transcription 1 (STAT1), Mediator of RNA polymerase II transcription subunit (MED15), Lamina-associated

polypeptide 2 (isoform alpha) (TMPO), MMS19 nucleotide excision repair protein homolog (MMS19), DNA mismatch repair protein Msh2 (MSH2), Recombining binding protein suppressor of hairless (RBPJ), Mediator of RNA polymerase II transcription subunit (MED 17), Heterogeneous nuclear ribonucleoprotein U (HNRNPU), Transcription initiation factor IIA subunit 2 (GTF2A2), Chromatin accessibility complex protein 1 (CHRAC1), CDKN2A-interacting protein (CDKN2AIP), Zinc finger protein 217 (ZNF217), Signal transducer and activator of transcription 3 (STAT3), WD repeat and HMG-box DNA-binding protein 1 (WDHD1), lamina-associated polypeptide 2 (isoform alpha) (TMPO), Lamina-associated polypeptide 2 (isoforms beta/gam) (TMPO), Interferon regulatory factor 4 (IRF4), Protein flightless-1 homolog (FLIT), Heterogeneous nuclear ribonucleoprotein F (HNRNPF), Nucleus accumbens-associated protein 1 (NACC1), Transcription elongation regulator 1 (TCERG1), Protein HEXIM1 (HEXIM1), Enhancer of mRNA-decapping protein (EDC3), Zinc finger protein Aiolos (IKZF3), Transcription elongation factor SPT5 (SUPT5H), Forkhead box protein K1 (FOXK1), LIM domain-containing protein 1 (LIMD1), MMS19 nucleotide excision repair protein homolog (MMS19), Elongator complex protein 4 (ELP4), Ankyrin repeat and KH domain-containing protein 1 (ANKHD1), PML, Nuclear factor NF-kappa-B p100 subunit (NFKB2), Heterogeneous nuclear ribonucleoprotein L-like (HNRPLL), CCR4-NOT transcription complex subunit 3 (CNOT3), Constitutive coactivator of PPAR-gamma-like protein (FAM120A), Mediator of RNA polymerase II transcription subunit (MED 15), 60S ribosomal protein L7 (RPL7), Interferon regulatory factor 8 (IRF8), COUP transcription factor 2 (NR2F2), Mediator of RNA polymerase II transcription subunit (MED1), tRNA (uracil-5)-methyltransferase homolog A (TRMT2A), Transcription factor p65 (RELA), Exosome complex component RRP42 (EXOSC7), General transcription factor 3C polypeptide 1 (GTF3C1), Mothers against decapentaplegic homolog 2 (SMAD2), Ankyrin repeat domain-containing protein 17 (ANKRD17), MMS19 nucleotide excision repair protein homolog (MMS19), Death domain-associated protein 6 (DAXX), Zinc finger protein 318 (ZNF318), Thioredoxin-interacting protein (TXNIP), Glucocorticoid receptor (NR3C1), Iron-responsive element-binding protein 2 (IREB2), Zinc finger protein 295 (ZNF295), Polycomb protein SUZ12 (SUZ12), Cleavage stimulation factor subunit 2 tau variant (CSTF2T), C-myc promoter-binding protein (DENND4A), Pinin (PNN), Mediator of RNA polymerase II transcription subunit (MED9), POU domain, class 2, transcription factor 2 (POU2F2), Enhancer of mRNA-decapping protein 3 (EDC3), A-kinase anchor protein 1 (mitochondrial) (AKAP1), Transcription factor RelB (RELB), RNA polymerase II-associated protein 1 (RPAP1), Zinc finger protein 346 (ZNF346), Chromosome-associated kinesin KIF4A (KIF4A), Mediator of RNA polymerase II transcription subunit (MED12), Protein NPAT (NPAT), Leucine-rich PPR motif-containing protein (mitochondrial) (LRPPRC), AT-hook DNA-binding motif-containing protein 1 (AHDC1), Mediator of RNA polymerase II transcription subunit (MED12), Bromodomain-containing protein 8 (BRD8),

Trinucleotide repeat-containing gene 6B protein (TNRC6B), Aryl hydrocarbon receptor nuclear translocator (ARNT), Activating transcription factor 7-interacting protein (ATF7IP), Glucocorticoid receptor (NR3C1), Chromosome transmission fidelity protein 18 homolog (CHTF18), or C-myc promoter-binding protein (DENND4A).

[00S9] In some embodiments, the cysteine-containing protein is a channel, transporter, or receptor. Exemplary cysteine-containing proteins as channels, transporters, or receptors include, but are not limited to, Chloride intracellular channel protein 4 (CLIC4), Exportin-1 (XPO1), Thioredoxin (TXN), Protein SEC13 homolog (SEC13), Chloride intracellular channel protein 1 (CLIC1), Guanine nucleotide-binding protein subunit beta-2 (GNB2L1), Sorting nexin-6 (SNX6), Conserved oligomeric Golgi complex subunit 3 (COG3), Nuclear cap-binding protein subunit 1 (NCBP1), Cytoplasmic dynein 1 light intermediate chain 1 (DYNC1LI1), MOB-like protein phosphoinositide-binding protein (MOB4), Programmed cell death 6-interacting protein (PDCD6IP), Glutaredoxin-1 (GLRX), ATP synthase subunit alpha (mitochondrial) (ATP5A1), Treacle protein (TCOF1), Dynactin subunit 1 (DCTN1), Importin-7 (IP07), Exportin-2 (CSE1L), ATP synthase subunit gamma (mitochondrial) (ATP5C1), Trafficking protein particle complex subunit 5 (TRAPPC5), Thioredoxin mitochondrial (TXN2), THO complex subunit 6 homolog (THOC6), Exportin-1 (XPO1), Nuclear pore complex protein Nup50 (NUP50), Treacle protein (TCOF1), Nuclear pore complex protein Nup93 (NUP93), Nuclear pore glycoprotein p62 (NUP62), Cytoplasmic dynein 1 heavy chain 1 (DYNC1H1), Thioredoxin-like protein 1 (TXNLI), Nuclear pore complex protein Nup214 (NUP214), Protein lin-7 homolog C (LIN7C), ADP-ribosylation factor-binding protein GGA2 (GGA2), Trafficking protein particle complex subunit 4 (TRAPPC4), Protein quaking (QKI), Perilipin-3 (PLIN3), Copper transport protein ATOX1 (ATOX1), Unconventional myosin-Ic (MYOIC), Nucleoporin NUP53 (NUP35), Vacuolar protein sorting-associated protein 18 homolog (VPS18), Dedicator of cytokinesis protein 7 (DOCK7), Nucleoporin p54 (NUP54), Ras-related GTP-binding protein C (RRAGC), Arf-GAP with Rho-GAP domain (ANK repeat and PH domain) (ARAP1), Exportin-5 (XP05), Kinectin (KTNI), Chloride intracellular channel protein 6 (CLIC6), Voltage-gated potassium channel subunit beta-2 (KCNAB2), Exportin-5 (XP05), Ras-related GTP-binding protein C (RRAGC), Ribosome-binding protein 1 (RRBP1), Acyl-CoA-binding domain-containing protein 6 (ACBD6), Chloride intracellular channel protein 5 (CLIC5), Pleckstrin homology domain-containing family A member (PLEKHA2), ADP-ribosylation factor-like protein 3 (ARL3), Protein transport protein Sec24C (SEC24C), Voltage-dependent anion-selective channel protein (VDAC3), Programmed cell death 6-interacting protein (PDCD6IP), Chloride intracellular channel protein 3 (CLIC3), Multivesicular body subunit 12A (FAM125A), Eukaryotic translation initiation factor 4E transporter (EBF4ENIF1), NmrA-like family domain-containing protein 1 (NMRAL1), Nuclear pore complex protein Nup98-Nup96 (NUP98), Conserved oligomeric Golgi complex subunit 1 (COG1), Importin-4 (IP04), Pleckstrin homology

domain-containing family A member (PLEKHA2), Cytoplasmic dynein 1 heavy chain 1 (DYNC1H1), DENN domain-containing protein 1C (DENND1C), Cytoplasmic dynein 1 heavy chain 1 (DYNC1H1), Protein ELYS (AHCTF1), Trafficking protein particle complex subunit 1 (TRAPPC1), Guanine nucleotide-binding protein-like 3 (GNL3), or Importin-13 (IPO13).

[0060] In some embodiments, the cysteine-containing protein is a chaperone. Exemplary cysteine-containing proteins as chaperones include, but are not limited to, 60 kDa heat shock protein (mitochondrial) (HSPD1), T-complex protein 1 subunit eta (CCT7), T-complex protein 1 subunit epsilon (CCT5), Heat shock 70 kDa protein 4 (HSPA4), GrpE protein homolog 1 (mitochondrial) (GRPEL1), Tubulin-specific chaperone E (TBCE), Protein unc-45 homolog A (UNC45A), Serpin HI (SERPINH1), Tubulin-specific chaperone D (TBCD), Peroxisomal biogenesis factor 19 (PEX19), BAG family molecular chaperone regulator 5 (BAG5), T-complex protein 1 subunit theta (CCT8), Protein canopy homolog 3 (CNPY3), DnaJ homolog subfamily C member 10 (DNAJC10), ATP-dependent Clp protease ATP-binding subunit clp (CLPX), or Midasin (MDN1).

[0061] In some embodiments, the cysteine-containing protein is an adapter, scaffolding, or modulator protein. Exemplary cysteine-containing proteins as adapter, scaffolding, or modulator proteins include, but are not limited to, Proteasome activator complex subunit 1 (PSME1), TIP41-like protein (TIPRL), Crk-like protein (CRKL), Cofilin-1 (CFL1), Condensin complex subunit 1 (NCAPD2), Translational activator GCN1 (GCN1L1), Serine/threonine-protein phosphatase 2A 56 kDa regulatory (PPP2R5D), UPF0539 protein C7orf59 (C7orf59), Protein diaphanous homolog 1 (DIAPH1), Protein asunder homolog (Asun), Ras GTPase-activating-like protein IQGAP1 (IQGAP1), Sister chromatid cohesion protein PDS5 homolog A (PDS5A), Reticulon-4 (RTN4), Proteasome activator complex subunit 4 (PSME4), Condensin complex subunit 2 (NCAPH), Sister chromatid cohesion protein PDS5 homolog A (PDS5A), cAMP-dependent protein kinase type I-alpha regulatory (PRKAR1A), Host cell factor 1 (HCFC1), Serine/threonine-protein phosphatase 4 regulatory (PPP4R2), Apoptotic chromatin condensation inducer in the nucleus (ACINI), BRISC and BRCA1-A complex member 1 (BABAM1), Interferon-induced protein with tetratricopeptide (IFIT3), Ras association domain-containing protein 2 (RASSF2), Hsp70-binding protein 1 (HSPBP1), TBC1 domain family member 15 (TBC1D15), Dynamamin-binding protein (DNMBP), Condensin complex subunit 1 (NCAPD2), Beta-2-syntrophin (SNTB2), Disks large homolog 1 (DLG1), TBC1 domain family member 13 (TBC1D13), Formin-binding protein 1-like (FNBPI1), Translational activator GCN1 (GCN1L1), GRB2-related adapter protein (GRAP), G2/mitotic-specific cyclin-B1 (CCNBI), Myotubularin-related protein 12 (MTMR12), Protein FADD (FADD), Translational activator GCN1 (GCN1L1), Wings apart-like protein homolog (WAPAL), cAMP-dependent protein kinase type II-beta regulatory (PRKAR2B), Malcavernin (CCM2), MPP1 55 kDa erythrocyte membrane protein, Actin filament-associated protein 1 (AFAP1), Tensin-3 (TNS3), tRNA

methyltransferase 112 homolog (TRMT112), Symplekin (SYMPK), TBC1 domain family member 2A (TBC1D2), ATR-interacting protein (ATRIP), Ataxin-10 (ATXN10), Succinate dehydrogenase assembly factor 2 (mitochondrial) (SDHAF2), Formin-binding protein 1 (FNBPI), Myotubularin-related protein 12 (MTMR12), Interferon-induced protein with tetratricopeptide (IFIT3), Protein CBFA2T2 (CBFA2T2), Neutrophil cytosol factor 1 (NCF1), or Protein syndesmos (NUDT16L1).

[0062] In some embodiments, a cysteine-containing polypeptide comprises a protein illustrated in Tables 1-5. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 1. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 2. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 3. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 4. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 5.

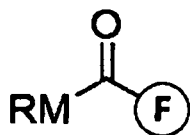
[0063] In some embodiments, a cysteine-containing polypeptide comprises a protein illustrated in Tables 6A-6E. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 6A. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 6B. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 6C. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 6D. In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Table 6E.

[0064] In some embodiments, a cysteine-containing polypeptide comprises cereblon. Cereblon is a substrate receptor that interacts with the protein adaptor damaged DNA binding protein 1 (DDB1), scaffold Cullin-4A (CUL4A), and regulator of cullins 1 (ROC1) to form an E3 ubiquitin ligase complex. The cereblon-E3 ligase complex is involved in targeting a plurality of substrates for ubiquitination, which are then subsequently degraded by proteasomes. In some instances, thalidomide and related immunomodulatory (HvliD) compounds such as lenalidomide and pomalidomide promote and modulate cereblon recruitment of neosubstrates. For example, a cereblon modulator CC-220 has been shown to improve degradation of Dcaros and Aiolos, two zinc finger transcription factors that have been implicated in lymphoid development and differentiation (Matyskiela, *et al.*, "A cereblon modulator (CC-220) with improved degradation of Ikaros and Aiolos," *J Med Chem.* April 20, 2017). Further, dBET1, a bifunctional phthalimide-conjugated ligand which is a substrate for cereblon, also selectively targets BRD4, a transcriptional coactivator, for degradation.

[0065] In some instances, cereblon is a eukaryotic protein ranging from 400-600 residues in length. The human cereblon (SEQ ID NO: 9665), which is about 442 residues in length, is encoded by the *CRBN* gene. The cereblon protein comprises a central LON domain (residues 80-317) followed by a C-terminal CULT domain. The LON domain is further subdivided into an N-terminal LON-N subdomain, a four helix bundle, and a C-terminal LON-C subdomain.

[0066] In some embodiments, a small molecule fragment described herein binds to a cysteine residue within cereblon. In some cases, a small molecule fragment described herein binds to a cysteine residue in the LON domain of cereblon. In some cases, a small molecule fragment described herein binds to a cysteine residue in the LON-N domain of cereblon. In some cases, a small molecule fragment described herein binds to a cysteine residue in the LON-C domain of cereblon. In other cases, a small molecule fragment described herein binds to a cysteine residue in the CULT domain of cereblon. In some instances, a small molecule fragment described herein binds to cysteine residue 188 of cereblon, wherein residue position 188 corresponds to position 188 of SEQ ID NO: 9665. In some instances, a small molecule fragment described herein binds to cysteine residue 287 of cereblon, wherein residue position 287 corresponds to position 287 of SEQ ED NO: 9665.

[0067] In some embodiments, described herein is a method of modulating cereblon activity, which comprises contacting a cell expressing cereblon with a small molecule fragment of Formula



(1): , wherein RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of cysteine residue; and F is a small molecule fragment moiety; wherein the small molecule fragment of Formula (I) covalently binds to residue 187 or residue 288 of cereblon; and wherein residue positions 187 and 288 correspond to positions 187 and 288 of SEQ ID NO: 9665. In some instances, F is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In some instances, F optionally comprises a second reactive moiety. In some cases, the cell is a mammalian cell. In some cases, the method is an *in vivo* method.

Polypeptides comprising a cysteine interacting site

[0068] In some embodiments, a cysteine-containing polypeptide comprises a polypeptide that is at most 50 amino acid residues in length. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 70% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 75% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80% sequence identity to at least seven

[0069] In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 70% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 75% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 85% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 90% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 91% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 92% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 93% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 94% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 95% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 96% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 97% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 98% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 99% sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising 100 % sequence identity to at least seven contiguous amino acids of SEQ ED NO: 1607.

[0070] In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to SEQ ID NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising 100% sequence identity to SEQ ID NO: 1607. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide consisting of 100% sequence identity to SEQ ID NO: 1607.

[0071] In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 631 1. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 70% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 75% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 85% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 90% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 91% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 92% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 93% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 631 1. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 94% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 631 1. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 95% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 631 1. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 96% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 631 1. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 97% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide

comprising at least 98% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 631 1. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 99% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 631 1. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising 100% sequence identity to at least seven contiguous amino acids of SEQ ID NO: 63 11.

[0072] In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity to SEQ ID NO: 631 1. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising 100% sequence identity to SEQ ID NO: 63 11. In some embodiments, a cysteine-containing polypeptide comprises an isolated and purified polypeptide consisting of 100% sequence identity to SEQ ID NO: 63 11.

[0073] As used herein, a polypeptide includes natural amino acids, unnatural amino acids, or a combination thereof. In some instances, an amino acid residue refers to a molecule containing both an amino group and a carboxyl group. Suitable amino acids include, without limitation, both the D- and L-isomers of the naturally-occurring amino acids, as well as non-naturally occurring amino acids prepared by organic synthesis or other metabolic routes. The term amino acid, as used herein, includes, without limitation, α -amino acids, natural amino acids, non-natural amino acids, and amino acid analogs.

[0074] The term " α -amino acid" refers to a molecule containing both an amino group and a carboxyl group bound to a carbon which is designated the α -carbon.

[0075] The term " β -amino acid" refers to a molecule containing both an amino group and a carboxyl group in a β configuration.

[0076] "Naturally occurring amino acid" refers to any one of the twenty amino acids commonly found in peptides synthesized in nature, and known by the one letter abbreviations A, R, N, C, D, Q, E, G, H, I, L, K, M, F, P, S, T, W, Y, and V.

[0077] "hydrophobic amino acids" include small hydrophobic amino acids and large hydrophobic amino acids. "Small hydrophobic amino acid" are glycine, alanine, proline, and analogs thereof. "Large hydrophobic amino acids" are valine, leucine, isoleucine, phenylalanine, methionine, tryptophan, and analogs thereof. "Polar amino acids" are serine, threonine, asparagine, glutamine, cysteine, tyrosine, and analogs thereof. "Charged amino acids" are lysine, arginine, histidine, aspartate, glutamate, and analogs thereof.

[0078] The term "amino acid analog" refers to a molecule which is structurally similar to an amino acid and which is substituted for an amino acid in the formation of a peptidomimetic macrocycle. Amino acid analogs include, without limitation, β -amino acids and amino acids where the amino or

carboxy group is substituted by a similarly reactive group (e.g., substitution of the primary amine with a secondary or tertiary amine, or substitution of the carboxy group with an ester).

[0079] The term "non-natural amino acid" refers to an amino acid which is not one of the twenty amino acids commonly found in peptides synthesized in nature, and known by the one letter abbreviations A, R, N, C, D, Q, E, G, H, I, L, K, M, F, P, S, T, W, Y, and V.

[0080] In some instances, amino acid analogs include β -amino acid analogs. Examples of β -amino acid analogs include, but are not limited to, the following: cyclic β -amino acid analogs; β -alanine; (R) β -phenylalanine; (R)-1,2,3,4-tetrahydro-isoquinoline-3-acetic acid; (R)-3-amino-4-(1-naphthyl)-butyric acid; (R)-3-amino-4-(2,4-dichlorophenyl)butyric acid; (R)-3-amino-4-(2-chlorophenyl)-butyric acid; (R)-3-amino-4-(2-cyanophenyl)-butyric acid; (R)-3-amino-4-(2-fluorophenyl)-butyric acid; (R)-3-amino-4-(2-furyl)-butyric acid; (R)-3-amino-4-(2-methylphenyl)-butyric acid; (R)-3-amino-4-(2-naphthyl)-butyric acid; (R)-3-amino-4-(2-thienyl)-butyric acid; (R)-3-amino-4-(2-trifluoromethylphenyl)-butyric acid; (R)-3-amino-4-(3,4-dichlorophenyl)butyric acid; (R)-3-amino-4-(3,4-difluorophenyl)butyric acid; (R)-3-amino-4-(3-benzothienyl)-butyric acid; (R)-3-amino-4-(3-chlorophenyl)-butyric acid; (R)-3-amino-4-(3-cyanophenyl)-butyric acid; (R)-3-amino-4-(3-fluorophenyl)-butyric acid; (R)-3-amino-4-(3-methylphenyl)-butyric acid; (R)-3-amino-4-(3-pyridyl)-butyric acid; (R)-3-amino-4-(3-thienyl)-butyric acid; (R)-3-amino-4-(3-trifluoromethylphenyl)-butyric acid; (R)-3-amino-4-(4-bromophenyl)-butyric acid; (R)-3-amino-4-(4-chlorophenyl)-butyric acid; (R)-3-amino-4-(4-cyanophenyl)-butyric acid; (R)-3-amino-4-(4-fluorophenyl)-butyric acid; (R)-3-amino-4-(4-iodophenyl)-butyric acid; (R)-3-amino-4-(4-methylphenyl)-butyric acid; (R)-3-amino-4-(4-nitrophenyl)-butyric acid; (R)-3-amino-4-(4-pyridyl)-butyric acid; (R)-3-amino-4-(4-trifluoromethylphenyl)-butyric acid; (R)-3-amino-4-pentafluorophenylbutyric acid; (R)-3-amino-5-hexenoic acid; (R)-3-amino-5-hexynoic acid; (R)-3-amino-5-phenylpentanoic acid; (R)-3-amino-6-phenyl-5-hexenoic acid; (S)-1,2,3,4-tetrahydro-isoquinoline-3-acetic acid; (S)-3-amino-4-(1-naphthyl)-butyric acid; (S)-3-amino-4-(2,4-dichlorophenyl)butyric acid; (S)-3-amino-4-(2-chlorophenyl)-butyric acid; (S)-3-amino-4-(2-cyanophenyl)-butyric acid; (S)-3-amino-4-(2-fluorophenyl)-butyric acid; (S)-3-amino-4-(2-furyl)-butyric acid; (S)-3-amino-4-(2-methylphenyl)-butyric acid; (S)-3-amino-4-(2-naphthyl)-butyric acid; (S)-3-amino-4-(2-thienyl)-butyric acid; (S)-3-amino-4-(2-trifluoromethylphenyl)-butyric acid; (S)-3-amino-4-(3,4-dichlorophenyl)butyric acid; (S)-3-amino-4-(3,4-difluorophenyl)butyric acid; (S)-3-amino-4-(3-benzothienyl)-butyric acid; (S)-3-amino-4-(3-chlorophenyl)-butyric acid; (S)-3-amino-4-(3-cyanophenyl)-butyric acid; (S)-3-amino-4-(3-fluorophenyl)-butyric acid; (S)-3-amino-4-(3-methylphenyl)-butyric acid; (S)-3-amino-4-(3-pyridyl)-butyric acid; (S)-3-amino-4-(3-thienyl)-butyric acid; (S)-3-amino-4-(3-trifluoromethylphenyl)-butyric acid; (S)-3-amino-4-(4-bromophenyl)-butyric acid; (S)-3-amino-4-(4-chlorophenyl) butyric acid; (S)-3-amino-4-(4-cyanophenyl)-butyric acid; (S)-3-amino-4-(4-fluorophenyl) butyric acid; (S)-3-amino-4-(4-

iodophenyl)-butyric acid; (S)-3-amino-4-(4-methylphenyl)-butyric acid; (S)-3-amino-4-(4-nitrophenyl)-butyric acid; (S)-3-amino-4-(4-pyridyl)-butyric acid; (S)-3-amino-4-(4-t**fluoromethylphenyl)-butyric acid; (S)-3-amino-4-pentafluoro-phenylbutyric acid; (S)-3-amino-5-hexenoic acid; (S)-3-amino-5-hexynoic acid; (S)-3-amino-5-phenylpentanoic acid; (S)-3-amino-6-phenyl-5-hexenoic acid; 1,2,5,6-tetrahydropyridine-3-carboxylic acid; 1,2,5,6-tetrahydropyridine-4-carboxylic acid; 3-amino-3-(2-chlorophenyl)-propionic acid; 3-amino-3-(2-thienyl)-propionic acid; 3-amino-3-(3-bromophenyl)-propionic acid; 3-amino-3-(4-chlorophenyl)-propionic acid; 3-amino-3-(4-methoxyphenyl)-propionic acid; 3-amino-4,4,4-trifluoro-butylbutyric acid; 3-aminoadipic acid; D-**P**-phenylalanine; β -leucine; L-**p**-homoalanine; L-**P**-homoaspartic acid γ -benzyl ester; L-**p**-homoglutamic acid δ -benzyl ester; L-**P**-homoleucine; L-**p**-homoleucine; L-**P**-homomethionine; L-**p**-homophenylalanine; L-**P**-homoproline; L-**p**-homotryptophan; L-**p**-homovaline; L-N ω -benzyloxycarbonyl-**p**-homolysine; N ω -L-**p**-homoarginine; O-benzyl-L- β -homohydroxyproline; O-benzyl-L-**P**-homoserine; O-benzyl-L-**P**-homothreonine; O-benzyl-L- β -homotyrosine; γ -trityl-L-**p**-homoasparagine; (R)-**P**-phenylalanine; L-**p**-homoaspartic acid γ -t-butyl ester; L-**P**-homoglutamic acid δ -t-butyl ester; L-Nta-**P**-homolysine; N δ -trityl-L- β -homoglutamine; N ω -2,2,4,6,7-pentamethyl-dihydrobenzofuran-5-sulfonyl-L-**P**-homoarginine; O-t-butyl-L-**p**-homohydroxy-proline; O-t-butyl-L-**P**-homoserine; O-t-butyl-L-**p**-homothreonine; O-t-butyl-L-**P**-homotyrosine; 2-aminocyclopentane carboxylic acid; and 2-aminocyclohexane carboxylic acid.**

[0081] In some instances, amino acid analogs include analogs of alanine, valine, glycine, or leucine. Examples of amino acid analogs of alanine, valine, glycine, and leucine include, but are not limited to, the following: *o*-methoxyglycine; *o*-allyl-L-alanine; *o*-aminoisobutyric acid; *o*-methyl-leucine; **P**(1-naphthyl)-D-alanine; **P**(1-naphthyl)-L-alanine; **P**(2-naphthyl)-D-alanine; **p**(2-naphthyl)-L-alanine; **P**(2-pyridyl)-D-alanine; **p**(2-pyridyl)-L-alanine; **P**(2-thienyl)-D-alanine; **p**(2-thienyl)-L-alanine; **P**(3-benzothienyl)-D-alanine; **p**(3-benzothienyl)-L-alanine; **P**(3-pyridyl)-D-alanine; **p**(3-pyridyl)-L-alanine; **P**(4-pyridyl)-D-alanine; **P**(4-pyridyl)-L-alanine; **p**-chloro-L-alanine; **P**-cyano-L-alanine; **p**-cyclohexyl-D-alanine; **p**-cyclohexyl-L-alanine; β -cyclopenten-1-yl-alanine; **p**-cyclopentyl-alanine; **P**-cyclopropyl-L-Ala-OH.dicyclohexylammonium salt; **P**-t-butyl-D-alanine; **p**-t-butyl-L-alanine; γ -arjainobutyric acid; L- α ,**P**-diaminopropionic acid; 2,4-dinitro-phenylglycine; 2,5-dihydro-D-phenylglycine; 2-amino-4,4,4-trifluorobutyric acid; 2-fluoro-phenylglycine; 3-amino-4,4,4-trifluoro-butylbutyric acid; 3-fluoro-valine; 4,4,4-trifluoro-valine; 4,5-dehydro-L-leu-OH.dicyclohexylammonium salt; 4-fluoro-D-phenylglycine; 4-fluoro-L-phenylglycine; 4-hydroxy-D-phenylglycine; 5,5,5-trifluoro-leucine; 6-aminohexanoic acid; cyclopentyl-D-Gly-OH.dicyclohexylammonium salt; cyclopentyl-Gly-OH.dicyclohexylammomum salt; D- α ,**P**-diaminopropionic acid; D- α -aminobutyric acid; D- α -t-butylglycine; D-(2-thienyl)glycine; D-(3-thienyl)glycine; D-2-aminocaproic acid; D-2-indanylglycine; D-allylglycine-dicyclohexylarnmonium salt; D-cyclohexylglycine; D-norvaline; D-phenylglycine; **p**-aminobutyric acid; **P**-aminoisobutyric acid; (2-

bromophenyl)glycine; (2-methoxyphenyl)glycine; (2-methylphenyl)glycine; (2-thiazoyl)glycine; (2-thienyl)glycine; 2-amino-3-(dimethylamino)-propionic acid; L- α -diaminopropionic acid; L- α -aminobutyric acid; L- α -t-butylglycine; L-(3-thienyl)glycine; L-2-amino-3-(dimethylamino)-propionic acid; L-2-aminocaproic acid dicyclohexyl-ammonium salt; L-2-indanylglycine; L-allylglycine dicyclohexyl ammonium salt; L-cyclohexylglycine; L-phenylglycine; L-propargylglycine; L-norvaline; N- α -aminomethyl-L-alanine; D- α , γ -diaminobutyric acid; L- α , γ -diaminobutyric acid; β -cyclopropyl-L-alanine; (N-P-(2,4-dimethylphenyl))-L- α , β -diaminopropionic acid; (N-p-1-(4,4-dimethyl-2,6-dioxocyclohex-1-ylidene)ethyl)-D- α , β -diaminopropionic acid; (N- β -1-(4,4-dimethyl-2,6-dioxocyclohex-1-ylidene)ethyl)-L- α , β -diaminopropionic acid; (N-P-4-methyltrityl)-L- α , β -diaminopropionic acid; (N-P-dilyloxycarbonyl)-L- α , β -diaminopropionic acid; (N- γ -1-(4,4-dimethyl-2,6-dioxocyclohex-1-ylidene)ethyl)-D- α , γ -diaminobutyric acid; (N- γ -1-(4,4-dimethyl-2,6-dioxocyclohex-1-ylidene)ethyl)-L- α , γ -diaminobutyric acid; (N- γ -4-methyltrityl)-D- α , γ -diaminobutyric acid; (N- γ -4-methyltrityl)-L- α , γ -diaminobutyric acid; (N- γ -allyloxycarbonyl)-L- α , γ -diaminobutyric acid; D- α , γ -diaminobutyric acid; 4,5-dehydro-L-leucine; cyclopentyl-D-Gly-OH; cyclopentyl-Gly-OH; D-allylglycine; D-homocyclohexylalanine; L-1-pyrenylalanine; L-2-aminocaproic acid; L-allylglycine; L-homocyclohexylalanine; and N-(2-hydroxy-4-methoxy-Bzl)-Gly-OH.

[0082] In some instances, amino acid analogs include analogs of arginine or lysine. Examples of amino acid analogs of arginine and lysine include, but are not limited to, the following: citrulline; L-2-amino-3-guanidinopropionic acid; L-2-amino-3-ureidopropionic acid; L-citrulline; Lys(Me)₂-OH; Lys(N₃)-OH; N δ -benzyloxycarbonyl-L-ornithine; N ω -nitro-D-arginine; N ω -nitro-L-arginine; α -methylornithine; 2,6-diaminoheptanedioic acid; L-ornithine; (N δ -1-(4,4-dimethyl-2,6-dioxo-cyclohex-1-ylidene)ethyl)-D-ornithine; (N δ -1-(4,4-dimethyl-2,6-dioxo-cyclohex-1-ylidene)ethyl)-L-ornithine; (N δ -4-methyltrityl)-D-ornithine; (N δ -4-methyltrityl)-L-ornithine; D-ornithine; L-ornithine; Arg(Me)(Pbf)-OH; Arg(Me)₂-OH (asymmetrical); Arg(Me)₂-OH (symmetrical); Lys(ivDde)-OH; Lys(Me)₂-OH.HCl; Lys(Me)₃-OH chloride; N ω -nitro-D-arginine; and N ω -nitro-L-arginine.

[0083] In some instances, amino acid analogs include analogs of aspartic or glutamic acids. Examples of amino acid analogs of aspartic and glutamic acids include, but are not limited to, the following: α -methyl-D-aspartic acid; α -methyl-glutamic acid; α -methyl-L-aspartic acid; γ -methylene-glutamic acid; (N-7-ethyl)-L-glutamine; tN- α -(4-aminobenzoyl)-L-glutamic acid; 2,6-diaminopimelic acid; L- α -aminosuberic acid; D-2-aminoadipic acid; D- α -aminosuberic acid; α -aminopimelic acid; iminodiacetic acid; L-2-aminoadipic acid; threo-p-methyl-aspartic acid; γ -carboxy-D-glutamic acid γ , γ -di-t-butyl ester; γ -carboxy-L-glutamic acid γ , γ -di-t-butyl ester; Glu(OAll)-OH; L-Asu(OtBu)-OH; and pyroglutamic acid.

[0084] In some instances, amino acid analogs include analogs of cysteine and methionine. Examples of amino acid analogs of cysteine and methionine include, but are not limited to, Cys(farnesyl)-OH, Cys(farnesyl)-OMe, α -methyl-methionine, Cys(2-hydroxyethyl)-OH, Cys(3-aminopropyl)-OH, 2-amino-4-(ethylthio)butyric acid, buthionine, buthioninesulfoximine, ethionine, methionine methylsulfonium chloride, selenomethionine, cysteic acid, [2-(4-pyridyl)ethyl]-DL-penicillamine, [2-(4-pyridyl)ethyl]-L-cysteine, 4-methoxybenzyl-D-penicillamine, 4-methoxybenzyl-L-penicillamine, 4-methylbenzyl-D-penicillamine, 4-methylbenzyl-L-penicillamine, benzyl-D-cysteine, benzyl-L-cysteine, benzyl-DL-homocysteine, carbamoyl-L-cysteine, carboxyethyl-L-cysteine, carboxymethyl-L-cysteine, diphenylmethyl-L-cysteine, ethyl-L-cysteine, methyl-L-cysteine, t-butyl-D-cysteine, trityl-L-homocysteine, trityl-D-penicillamine, cystathionine, homocystine, L-homocystine, (2-aminoethyl)-L-cysteine, seleno-L-cystine, cystathionine, Cys(StBu)—OH, and acetamidomethyl-D-penicillamine.

[0085] In some instances, amino acid analogs include analogs of phenylalanine and tyrosine. Examples of amino acid analogs of phenylalanine and tyrosine include β -methyl-phenylalanine, β -hydroxyphenylalanine, α -methyl-3-methoxy-DL-phenylalanine, α -methyl-D-phenylalanine, α -methyl-L-phenylalanine, 1,2,3,4-tetrahydroisoquinoline-3-carboxylic acid, 2,4-dichloro-phenylalanine, 2-(trifluoromethyl)-D-phenylalanine, 2-(trifluoromethyl)-L-phenylalanine, 2-bromo-D-phenylalanine, 2-bromo-L-phenylalanine, 2-chloro-D-phenylalanine, 2-chloro-L-phenylalanine, 2-cyano-D-phenylalanine, 2-cyano-L-phenylalanine, 2-fluoro-D-phenylalanine, 2-fluoro-L-phenylalanine, 2-methyl-D-phenylalanine, 2-methyl-L-phenylalanine, 2-nitro-D-phenylalanine, 2-nitro-L-phenylalanine, 2,4,5-trihydroxy-phenylalanine, 3,4,5-trifluoro-D-phenylalanine, 3,4,5-trifluoro-L-phenylalanine, 3,4-dichloro-D-phenylalanine, 3,4-dichloro-L-phenylalanine, 3,4-difluoro-D-phenylalanine, 3,4-difluoro-L-phenylalanine, 3,4-dihydroxy-L-phenylalanine, 3,4-dimethoxy-L-phenylalanine, 3,5,3'-triiodo-L-thyronine, 3,5-diiodo-D-tyrosine, 3,5-diiodo-L-tyrosine, 3,5-diiodo-L-thyronine, 3-(trifluoromethyl)-D-phenylalanine, 3-(trifluoromethyl)-L-phenylalanine, 3-amino-L-tyrosine, 3-bromo-D-phenylalanine, 3-bromo-L-phenylalanine, 3-chloro-D-phenylalanine, 3-chloro-L-phenylalanine, 3-chloro-L-tyrosine, 3-cyano-D-phenylalanine, 3-cyano-L-phenylalanine, 3-fluoro-D-phenylalanine, 3-fluoro-L-phenylalanine, 3-fluoro-tyrosine, 3-iodo-D-phenylalanine, 3-iodo-L-phenylalanine, 3-iodo-L-tyrosine, 3-methoxy-L-tyrosine, 3-methyl-D-phenylalanine, 3-methyl-L-phenylalanine, 3-nitro-D-phenylalanine, 3-nitro-L-phenylalanine, 3-nitro-L-tyrosine, 4-(trifluoromethyl)-D-phenylalanine, 4-(trifluoromethyl)-L-phenylalanine, 4-amino-D-phenylalanine, 4-amino-L-phenylalanine, 4-benzoyl-D-phenylalanine, 4-benzoyl-L-phenylalanine, 4-bis(2-chloroethyl)amino-L-phenylalanine, 4-bromo-D-phenylalanine, 4-bromo-L-phenylalanine, 4-chloro-D-phenylalanine, 4-chloro-L-phenylalanine, 4-cyano-D-phenylalanine, 4-cyano-L-phenylalanine, 4-fluoro-D-phenylalanine, 4-fluoro-L-phenylalanine, 4-iodo-D-phenylalanine,

4-iodo-L-phenylalanine, homophenylalanine, thyroxine, 3,3-diphenylalanine, thyronine, ethyl-tyrosine, and methyl-tyrosine.

[0086] In some instances, amino acid analogs include analogs of proline. Examples of amino acid analogs of proline include, but are not limited to, 3,4-dehydro-proline, 4-fluoro-proline, cis-4-hydroxy-proline, thiazolidine-2-carboxylic acid, and trans-4-fluoro-proline.

[0087] In some instances, amino acid analogs include analogs of serine and threonine. Examples of amino acid analogs of serine and threonine include, but are not limited to, 3-amino-2-hydroxy-5-methylhexanoic acid, 2-amino-3-hydroxy-4-methylpentanoic acid, 2-amino-3-ethoxybutanoic acid, 2-amino-3-methoxybutanoic acid, 4-amino-3-hydroxy-6-methylheptanoic acid, 2-amino-3-benzyloxypropionic acid, 2-amino-3-benzyloxypropionic acid, 2-amino-3-ethoxypropionic acid, 4-amino-3-hydroxybutanoic acid, and α -methylserine.

[0088] In some instances, amino acid analogs include analogs of tryptophan. Examples of amino acid analogs of tryptophan include, but are not limited to, the following: α -methyl-tryptophan; β -(3-benzothienyl)-D-alanine; β -(3-benzothienyl)-L-alanine; 1-methyl-tryptophan; 4-methyl-tryptophan; 5-benzyloxy-tryptophan; 5-bromo-tryptophan; 5-chloro-tryptophan; 5-fluoro-tryptophan; 5-hydroxy-tryptophan; 5-hydroxy-L-tryptophan; 5-methoxy-tryptophan; 5-methoxy-L-tryptophan; 5-methyl-tryptophan; 6-bromo-tryptophan; 6-chloro-D-tryptophan; 6-chloro-tryptophan; 6-fluoro-tryptophan; 6-methyl-tryptophan; 7-benzyloxy-tryptophan; 7-bromo-tryptophan; 7-methyl-tryptophan; D-1,2,3,4-tetrahydro-norharman-3-carboxylic acid; 6-methoxy-1,2,3,4-tetrahydronorharman-1-carboxylic acid; 7-azatriptophan; L-1,2,3,4-tetrahydro-norharman-3-carboxylic acid; 5-methoxy-2-methyl-tryptophan; and 6-chloro-L-tryptophan.

[0089] In some instances, amino acid analogs are racemic. In some instances, the D isomer of the amino acid analog is used. In some cases, the L isomer of the amino acid analog is used. In some instances, the amino acid analog comprises chiral centers that are in the R or S configuration. Sometimes, the amino group(s) of a β -amino acid analog is substituted with a protecting group, e.g., tert-butylloxycarbonyl (BOC group), 9-fluorenylmethyloxycarbonyl (Fmoc), tosyl, and the like. Sometimes, the carboxylic acid functional group of a β -amino acid analog is protected, e.g., as its ester derivative. In some cases, the salt of the amino acid analog is used.

Cysteine-containing polypeptide production

[0090] In some embodiments, a cysteine-containing polypeptide described above is generated recombinantly or is synthesized chemically. In some instances, a cysteine-containing polypeptide described above is generated recombinantly, for example, by a host cell system or in a cell-free system. In some instances, a cysteine-containing polypeptide described above is synthesized chemically.

[0091] In some embodiments, a cysteine-containing polypeptide described above is generated recombinantly by a host cell system. Exemplary host cell systems include a eukaryotic cell system (e.g., mammalian cell, insect cell, yeast cell or plant cell) or a prokaryotic cell system (e.g., gram-positive bacterium or a gram-negative bacterium).

[0092] In some embodiments, a eukaryotic host cell is a mammalian host cell. In some cases, a mammalian host cell is a stable cell line, or a cell line that has incorporated a genetic material of interest into its own genome and has the capability to express the product of the genetic material after many generations of cell division. In other cases, a mammalian host cell is a transient cell line, or a cell line that has not incorporated a genetic material of interest into its own genome and does not have the capability to express the product of the genetic material after many generations of cell division.

[0093] Exemplary mammalian host cells include 293T cell line, 293A cell line, 293FT cell line, 293F cells, 293 H cells, A549 cells, MDCK cells, CHO DG44 cells, CHO-S cells, CHO-K1 cells, Expi293FTM cells, Flp-InTM T-RExTM 293 cell line, Flp-InTM-293 cell line, Flp-InTM-3T3 cell line, Flp-InTM-BHK cell line, Flp-InTM-CHO cell line, Flp-InTM-CV-1 cell line, Flp-InTM-Jurkat cell line, FreeStyleTM 293-F cells, FreeStyleTM CHO-S cells, GripTiteTM 293 MSR cell line, GS-CHO cell line, HepaRGTM cells, T-RExTM Jurkat cell line, Per.C6 cells, T-RExTM-293 cell line, T-RExTM-CHO cell line, and T-RExTM-HeLa cell line.

[0094] In some embodiments, a eukaryotic host cell is an insect host cell. Exemplary insect host cell include *Drosophila* S2 cells, Sf9 cells, Sf21 cells, High FiveTM cells, and expresSF+® cells.

[0095] In some embodiments, a eukaryotic host cell is a yeast host cell. Exemplary yeast host cells include *Pichia pastoris* yeast strains such as GS1 15, KM71H, SMD1 168, SMD1 168H, and X-33, and *Saccharomyces cerevisiae* yeast strains such as INVSc1.

[0096] In some embodiments, a eukaryotic host cell is a plant host cell. In some instances, the plant cells comprises a cell from algae. Exemplary plant cell lines include strains from *Chlamydomonas reinhardtii* 137c, or *Synechococcus elongatus* PPC 7942.

[0097] In some embodiments, a host cell is a prokaryotic host cell. Exemplary prokaryotic host cells include BL21, Mach1TM, DH10BTM, TOP10, DH5a, DH10BacTM, OmniMaxTM, MegaXTM, DH12STM, INV 110, TOP10F', INVof, TOP10/P3, ccdB Survival, PIR1, PIR2, Stb12TM, Stb13TM, or Stb14TM.

[0098] In some instances, suitable vectors for the production of a cysteine-containing polypeptide include any suitable vectors derived from either a eukaryotic or prokaryotic sources. Exemplary vectors include vectors from bacteria (e.g., *E. coli*), insects, yeast (e.g., *Pichia pastoris*), algae, or mammalian source. Bacterial vectors include, for example, pACYC177, pASK75, pBAD vector series, pBADM vector series, pET vector series, pETM vector series, pGEX vector series, pHAT, pHAT2, pMal-

c2, pMal-p2, pQE vector series, pRSET A, pRSET B, pRSET C, pTrcHis2 series, pZA31-Luc, pZE21-MCS-1, pFLAG ATS, pFLAG CTS, pFLAG MAC, pFLAG Shift-12c, pTAC-MAT-1, pFLAG CTC, or pTAC-MAT-2.

[0099] Insect vectors include, for example, pFastBacI, pFastBac DUAL, pFastBac ET, pFastBac HTa, pFastBac HTb, pFastBac HTc, pFastBac M30a, pFastfiact M30b, pFastBac, M30c, pVL1392, pVL1393, pVL1393 M10, pVL1393 Mil, pVL1393 M12, FLAG vectors such as pPolh-FLAGI or pPolh-MAT 2, or MAT vectors such as pPolh-MAT1, or pPolh-MAT2.

[0100] Yeast vectors include, for example, Gateway* pDEST™ 14 vector, Gateway®pDEST™ 15 vector, Gateway®pDEST™ 17 vector, Gateway®pDEST™ 24 vector, Gateway®pYES-DEST52 vector, pBAD-DEST49 Gateway®destination vector, pA0815 *Pichia* vector, pFLDI *Pichipastoris* vector, pGAPZA, B, & C *Pichiapastoris* vector, pPIC3.5K *Pichia* vector, pPIC6 A, B, & C *Pichia* vector, pPIC9K *Pichia* vector, pTEF1/Zeo, pYES2 yeast vector, pYES2/CT yeast vector, pYES2/NT A, B, & C yeast vector, or pYES3/CT yeast vector.

[0101] Algae vectors include, for example, pChlamy-4 vector or MCS vector.

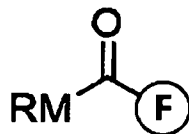
[0102] Mammalian vectors include, for example, transient expression vectors or stable expression vectors. Exemplary mammalian transient expression vectors include p3xFLAG-CMV 8, pFLAG-Myc-CMV 19, pFLAG-Myc-CMV 23, pFLAG-CMV 2, pFLAG-CMV 6a,b,c, pFLAG-CMV 5.1, pFLAG-CMV 5a,b,c, p3xFLAG-CMV 7.1, pFLAG-CMV 20, p3xFLAG-Myc-CMV 24, pCMV-FLAG-MAT1, pCMV-FLAG-MAT2, pBICEP-CMV 3, or pBICEP-CMV 4. Exemplary mammalian stable expression vectors include pFLAG-CMV 3, p3xFLAG-CMV 9, p3xFLAG-CMV 13, pFLAG-Myc-CMV 21, p3xFLAG-Myc-CMV 25, pFLAG-CMV 4, p3xFLAG-CMV 10, p3xFLAG-CMV 14, pFLAG-Myc-CMV 22, p3xFLAG-Myc-CMV 26, pBICEP-CMV 1, or pBICEP-CMV 2.

[0103] In some instances, a cell-free system is used for the production of a cysteine-containing polypeptide. In some cases, a cell-free system comprises a mixture of cytoplasmic and/or nuclear components from a cell and is suitable for in vitro nucleic acid synthesis. In some instances, a cell-free system utilizes prokaryotic cell components. In other instances, a cell-free system utilizes eukaryotic cell components. Nucleic acid synthesis is obtained in a cell-free system based on, for example, *Drosophila* cell, *Xenopus* egg, or HeLa cells. Exemplary cell-free systems include *E. coli* S30 Extract system, *E. coli* T7 S30 system, or PURExpress®.

Methods of Use

[0104] In some embodiments, disclosed herein include methods of modulating an immune response in a subject. In some embodiments, disclosed herein is a method of modulating an immune

response in a subject, which comprises administering to the subject a therapeutically effective amount of a small molecule fragment of Formula (I):



Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and

F is a small molecule fragment moiety.

[0105] In some embodiments, the small molecule fragment interacts with an endogenous cysteine-containing polypeptide expressed in the subject to form a cysteine-containing polypeptide-small molecule fragment adduct. In some instances, the cysteine-containing polypeptide-small molecule fragment adduct comprises a covalent bonding. In some cases, the cysteine-containing polypeptide-small molecule fragment adduct comprises an irreversible bonding. In other cases, the cysteine-containing polypeptide-small molecule fragment adduct comprises a reversible bonding. In some instances, an endogenous cysteine-containing polypeptide is a polypeptide that is expressed or present in a cell of interest (e.g., a diseased cell such as a cancerous cell). In some instances, an endogenous cysteine-containing polypeptide is a polypeptide that is overexpressed in a cell of interest (e.g., a diseased cell such as a cancerous cell). In some instances, an endogenous cysteine-containing polypeptide is a polypeptide that harbors one or more mutations in a cell of interest (e.g., a diseased cell such as a cancerous cell). In some instances, a mutation comprises a missense mutation, an insertion, or a deletion. In some instances, a mutation comprises a truncation, for example, a truncation at the N-terminus or the C-terminus of the polypeptide. In additional instances, an endogenous cysteine-containing polypeptide is a polypeptide that has an altered conformation in a cell of interest (e.g., a diseased cell such as a cancerous cell) relative to the conformation of the wild-type polypeptide.

[0106] In some instances, a cysteine-containing polypeptide-small molecule fragment adduct induces an immune response. In some cases, the immune response is a humoral immune response. In other cases, the immune response is a cell-mediated immune response. In some instances, the cysteine-containing polypeptide-small molecule fragment adduct induces a humoral immune response. In some instances, a cysteine-containing polypeptide-small molecule fragment adduct induces a cell-mediated immune response. In additional instances, a cysteine-containing polypeptide-small molecule fragment

adduct induces a humoral immune response and a cell-mediated immune response. In some instances, humoral immunity (or antibody-mediated beta cellularis immune system) is the production of antibody and its accessory processes such as Th2 activation, cytokine production, germinal center formation, isotype switching, affinity maturation, and memory cell generation. In some instances, humoral immunity is mediated by macromolecules in the extracellular fluids. In some cases, cell-mediated immunity comprises activation of phagocytes, antigen-specific cytotoxic T-lymphocytes, and release of cytokines in response to an antigen. In some cases, cell-mediated immunity differs from humoral immunity in that it does not involve production of antibody.

[0107J] In some embodiments, a cysteine-containing polypeptide-small molecule fragment adduct increases an immune response relative to a control. In some cases, a cysteine-containing polypeptide-small molecule fragment adduct increases a humoral immune response relative to a control. In additional cases, a cysteine-containing polypeptide-small molecule fragment adduct increases a cell-mediated immune response relative to a control. In additional cases, a cysteine-containing polypeptide-small molecule fragment adduct increases a humoral immune response and a cell-mediated immune response relative to a control.

[0108] In some cases, a control is the level of an immune response in the subject prior to administration of the small molecule fragment or is the level of an immune response in a subject who has not been exposed to the small molecule fragment. In some cases, a control is the level of a humoral immune response or a cell-mediated immune response in the subject prior to administration of the small molecule fragment or is the level of a humoral immune response or a cell-mediated immune response in a subject who has not been exposed to the small molecule fragment.

[0109] In some instances, a cysteine-containing polypeptide-small molecule fragment adduct modulates an immune response. In some cases, the immune response is a humoral immune response. In other cases, the immune response is a cell-mediated immune response. In some instances, the cysteine-containing polypeptide-small molecule fragment adduct modulates a humoral immune response. In some instances, a cysteine-containing polypeptide-small molecule fragment adduct modulates a cell-mediated immune response. In additional instances, a cysteine-containing polypeptide-small molecule fragment adduct modulates a humoral immune response and a cell-mediated immune response.

[0110] In some instances, a cysteine-containing polypeptide is a non-denatured form of the polypeptide.

[0111] In some instances, a cysteine-containing polypeptide comprises a biologically active cysteine site. As described above and elsewhere herein, in some cases, a biologically active cysteine site is a cysteine residue that is located about 10Å or less to an active-site ligand or residue. In other cases, a biologically active cysteine site is a cysteine residue that is located greater than 10Å from an active-site ligand or

residue. In some cases, the cysteine residue that is located greater than 10A from the active-site ligand or residue is a non-active site cysteine.

[0112] Further as described elsewhere herein, a cysteine-containing polypeptide comprises, in some instances, an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, a plasma protein, transcription related protein, translation related protein, mitochondrial protein, or cytoskeleton related protein. In some cases, the cysteine-containing polypeptide comprises an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, transcription related protein, or translation related protein.

[0113] In some embodiments, a cysteine-containing polypeptide is about 20, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1500, 2000, 2100, 2200, 2500 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 20 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 60 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 70 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 80 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 90 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 100 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 150 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 200 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 300 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 400 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 500 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 800 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 1000 amino acid residues in length or more. In some cases, a cysteine-containing polypeptide is about 1500 amino acid residues in length or more.

[0114] In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Tables 1-5. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 1. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 2. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 3. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 4. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 5. In some instances, the cysteine residue of interest is denoted by a (*) in Tables 1-5.

[0115] In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Tables 6A-6E. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 6A. In some

cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 6B. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 6C. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 6D. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 6E.

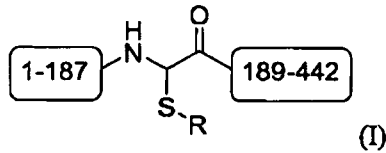
[0116] In some embodiments, as described above, a small molecule fragment comprises a Michael acceptor moiety which comprises an alkene or an alkyne moiety, in some instances, a covalent bond is formed between a portion of the Michael acceptor moiety on the small molecule fragment and a portion of a cysteine residue of the cysteine-containing polypeptide.

[0117] In some instances, a small molecule fragment comprises a small molecule fragment moiety F which is obtained from a compound library. In some instances, the compound library comprises ChemBridge fragment library, Pyramid Platform Fragment-Based Drug Discovery, Maybridge fragment library, FRGx from AnalytiCon, TCI-Frag from AnCoreX, Bio Building Blocks from ASINEX, BioFocus 3D from Charles River, Fragments of Life (FOL) from Emerald Bio, Enamine Fragment Library, IOTA Diverse 1500, BIONET fragments library, Life Chemicals Fragments Collection, OTAVA fragment library, Prestwick fragment library, Selcia fragment library, TimTec fragment-based library, Allium from Vitas-M Laboratory, or Zenobia fragment library. In some cases, F is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In some cases, the small molecule fragment is a small molecule fragment illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0118] In some instances, a small molecule fragment has a molecular weight of about 150 Dalton or higher. In some cases, a small molecular fragment has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some cases, a molecular weight of the small molecular fragment is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some cases, a small molecular fragment of Formula (I) has a molecular weight of about 150, 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher.

[0119] In some instances, the method further comprises administration of a cysteine-containing polypeptide-small molecule fragment adduct. In some instances, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, or 99% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some cases, the cysteine-containing polypeptide-small molecule fragment adduct further enhances or increases an immune response. In some instances, an enhancement or an increase of the immune response is relative to a level of the immune response prior to administration of the cysteine-containing polypeptide-small molecule fragment adduct.

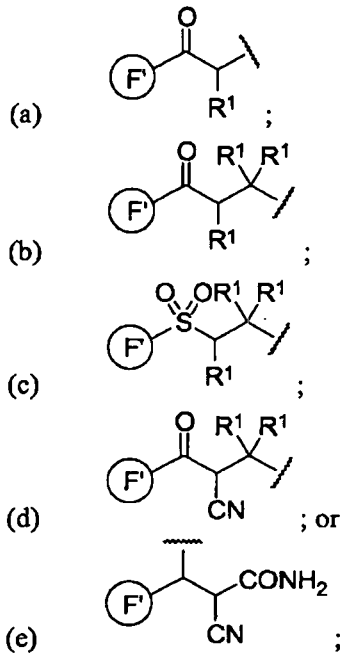
[0120] In some embodiments, disclosed herein is a derivative of cereblon protein having the structure of Formula (I),



wherein,

the derivation occurs at cereblon cysteine residue position 188 based on SEQ ID NO: 9665;

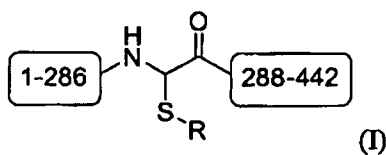
R is selected from:



wherein R¹ is H, C1-C3 alkyl, or aryl; and F' is a small molecule fragment moiety.

[0121] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

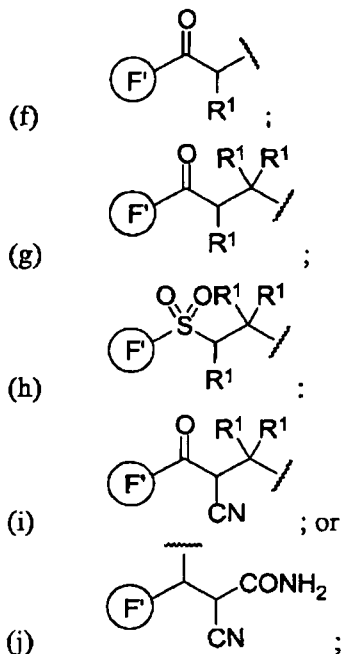
[0122] In some embodiments, disclosed herein is a derivative of cereblon protein having the structure of Formula (I),



wherein,

the derivation occurs at cereblon cysteine residue position 287 based on SEQ ID NO: 9665;

R is selected from:



wherein R¹ is H, C1-C3 alkyl, or aryl; and

P is a small molecule fragment moiety.

[01231] In some embodiments, P has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of P is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, P is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0124] In some cases, the method further comprises administration of an adjuvant.

[0125] In some cases, the small molecule fragment is formulated for parenteral, oral, or intranasal administration.

Diseases or Indications

[0126] In some embodiments, disclosed herein include a method of administering a small molecule fragment to a subject in which the small molecule fragment interacts with an endogenous cysteine-containing polypeptide expressed in the subject to form a cysteine-containing polypeptide-small molecule fragment adduct. In some embodiments, the cysteine-containing polypeptide is overexpressed in a disease or condition. In some cases, the overexpressed cysteine-containing polypeptide comprises one or more mutations. In some cases, the cysteine-containing polypeptide comprising one or more mutations is overexpressed in a disease or condition.

[0127] In some instances, the disease or condition is cancer. In some cases, the cysteine-containing polypeptide is a cancer-associated protein. In some cases, the cysteine-containing polypeptide is overexpressed in a cancer. In some cases, the cysteine-containing polypeptide comprising one or more mutations is overexpressed in a cancer. In some instances, a mutation comprises a missense mutation, an insertion, or a deletion. In some instances, a mutation comprises a truncation at a terminus of a protein. In some instances, a mutation alters the conformation of a protein relative to the conformation of its wild-type protein. In additional instances, a mutation does not alter the conformation of a protein.

[0128] In some instances, a cancer is a solid tumor. In some instances, a cancer is a hematologic malignancy. In some instances, a cancer is a relapsed or refractory cancer, or a metastatic cancer. In some instances, a solid tumor is a relapsed or refractory solid tumor, or a metastatic solid tumor. In some cases, a hematologic malignancy is a relapsed or refractory hematologic malignancy, or a metastatic hematologic malignancy.

[0129] In some embodiments, a cancer is a solid tumor. Exemplary solid tumor includes, but is not limited to, anal cancer, appendix cancer, bile duct cancer (i.e., cholangiocarcinoma), bladder cancer, brain tumor, breast cancer, cervical cancer, colon cancer, cancer of Unknown Primary (CUP), esophageal cancer, eye cancer, fallopian tube cancer, gastroenterological cancer, kidney cancer, liver cancer, lung cancer, medulloblastoma, melanoma, oral cancer, ovarian cancer, pancreatic cancer, parathyroid disease, penile cancer, pituitary tumor, prostate cancer, rectal cancer, skin cancer, stomach cancer, testicular cancer, throat cancer, thyroid cancer, uterine cancer, vaginal cancer or vulvar cancer.

[0130] In some embodiments, a cysteine-containing polypeptide described herein that is overexpressed and/or comprises one or more mutations is present in a solid tumor. In some cases, a cysteine-containing polypeptide described herein that is overexpressed and/or comprises one or more mutations is present in metastatic solid tumor. In some cases, a cysteine-containing polypeptide described herein that is overexpressed and/or comprises one or more mutations is present in a relapsed or refractory solid tumor. In some instances, a small molecule fragment described herein interacts with a cysteine-containing polypeptide that is present, overexpressed, and/or comprises a mutation in a solid tumor.

[0131] In some instances, a cancer is a hematologic malignancy. In some instances, a hematologic malignancy is a leukemia, a lymphoma, a myeloma, a non-Hodgkin's lymphoma, or a Hodgkin's lymphoma. In some instances, a hematologic malignancy comprises chronic lymphocytic leukemia (CLL), small lymphocytic lymphoma (SLL), high risk CLL, a non-CLL/SLL lymphoma, prolymphocytic leukemia (PLL), follicular lymphoma (FL), diffuse large B-cell lymphoma (DLBCL), mantle cell lymphoma (MCL), Waldenstrom's macroglobulinemia, multiple myeloma, extranodal marginal zone B cell lymphoma, nodal marginal zone B cell lymphoma, Burkitt's lymphoma, non-Burkitt high grade B cell lymphoma, primary mediastinal B-cell lymphoma (PMBL), immunoblastic large cell lymphoma,

precursor B-lymphoblastic lymphoma, B cell prolymphocytic leukemia, lymphoplasmacytic lymphoma, splenic marginal zone lymphoma, plasma cell myeloma, plasmacytoma, mediastinal (thymic) large B cell lymphoma, intravascular large B cell lymphoma, primary effusion lymphoma, or lymphomatoid granulomatosis.

[0132] In some embodiments, a cysteine-containing polypeptide described herein that is overexpressed and/or comprises one or more mutations is present in a hematologic malignancy. In some cases, a cysteine-containing polypeptide described herein that is overexpressed and/or comprises one or more mutations is present in metastatic hematologic malignancy. In some cases, a cysteine-containing polypeptide described herein that is overexpressed and/or comprises one or more mutations is present in a relapsed or refractory hematologic malignancy. In some instances, a small molecule fragment described herein interacts with a cysteine-containing polypeptide that is present, overexpressed, and/or comprises a mutation in a hematologic malignancy.

Vaccines

[0133] In some embodiments, disclosed herein include vaccines and vaccine formulations that comprises a small molecule fragment described herein, an antibody that recognizes a cysteine-containing polypeptide-small molecule fragment adduct described herein, or a cysteine-containing polypeptide-small molecule fragment adduct described herein. In some embodiments, disclosed herein is a vaccine that comprises a small molecule fragment described herein. In some embodiments, disclosed herein is a vaccine that comprises an antibody that recognizes a cysteine-containing polypeptide-small molecule fragment adduct described herein. In some embodiments, disclosed herein is a vaccine that comprises a cysteine-containing polypeptide-small molecule fragment adduct described herein.

[0134] In some instances, a cysteine-containing polypeptide is an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, a plasma protein, transcription related protein, translation related protein, mitochondrial protein, or cytoskeleton related protein. In some cases, the cysteine-containing polypeptide is an enzyme, a transporter, a receptor, a channel protein, an adaptor protein, a chaperone, a signaling protein, transcription related protein, or translation related protein.

[0135] In some instances, a cysteine-containing polypeptide comprises a protein illustrated in Tables 1-6. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 1. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 2. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 3. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 4. In some cases, a cysteine-containing

polypeptide comprises a protein illustrated in Table 5. In some cases, a cysteine-containing polypeptide comprises a protein illustrated in Table 6 (e.g., Tables 6A-6E).

[0136] In some embodiments, a small molecule fragment comprises a Michael acceptor moiety which comprises an alkene or an alkyne moiety. In some instances, a covalent bond is formed between a portion of the Michael acceptor moiety on the small molecule fragment and a portion of a cysteine residue of the cysteine-containing polypeptide.

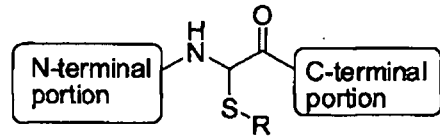
[0137] In some instances, a small molecule fragment comprises a small molecule fragment moiety F which is obtained from a compound library. In some instances; the compound library comprises ChemBridge fragment library, Pyramid Platform Fragment-Based Drug Discovery, Maybridge fragment library, FRGx from AnalytiCon, TCI-Frag from AnCoreX, Bio Building Blocks from ASINEX, BioFocus 3D from Charles River, Fragments of Life (FOL) from Emerald Bio, Enamine Fragment Library, IOTA Diverse 1500, BIONET fragments library, Life Chemicals Fragments Collection, OTAVA fragment library, Prestwick fragment library, Selcia fragment library, TimTec fragment-based library, Allium from Vitas-M Laboratory, or Zenobia fragment library. In some cases, F is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B). In some cases, the small molecule fragment is a small molecule fragment illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0138] In some instances, a small molecule fragment has a molecular weight of about 150 Dalton or higher. In some cases, a small molecular fragment has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some cases, the molecular weight of the small molecular fragment is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some cases, the small molecular fragment of Formula (I) has a molecular weight of about 150, 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher.

[0139] In some instances, a vaccine is formulated in a conventional manner using one or more physiologically acceptable carriers including excipients and auxiliaries which facilitate processing of the active agents into preparations which are used pharmaceutically. Proper formulation is dependent upon the route of administration chosen. Any of the well-known techniques, carriers, and excipients are used as suitable and as understood in the art.

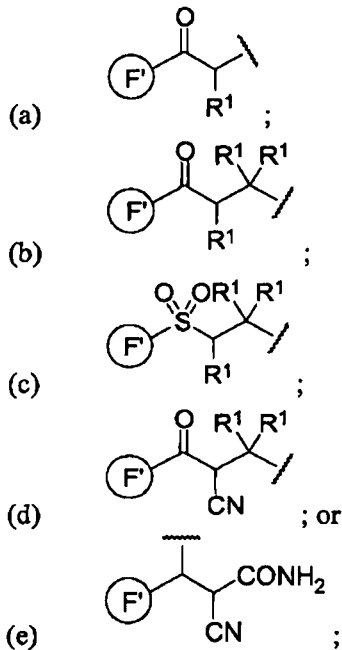
[0140] In some instances, a vaccine is further formulated with a cysteine-containing polypeptide-small molecule fragment adduct. In some instances, a cysteine-containing polypeptide-small molecule fragment adduct enhances an immune response. In some instances, the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, or 99% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655.

[0141] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine-containing protein having the structure of Formula (I),



(I)

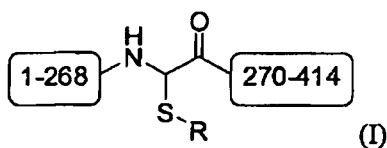
wherein,
the derivation occurs at a cysteine residue;
R is selected from:



wherein R¹ is H, C1-C3 alkyl, or aryl; and
F' is a small molecule fragment moiety.

[0142] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

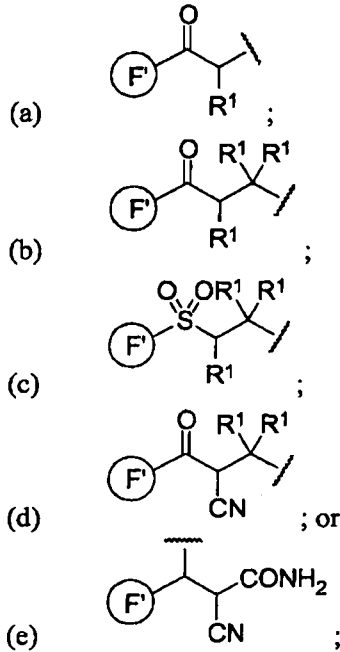
[0143] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of IDH1 protein having the structure of Formula (I),



(I)

wherein,

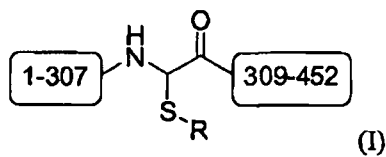
the derivation occurs at IDH1 cysteine residue position 269 based on SEQ ID NO: 9656;
R is selected from:



wherein R¹ is H, C1-C3 alkyl, or aryl; and
F' is a small molecule fragment moiety.

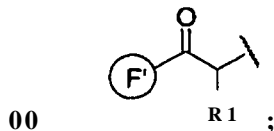
[0144] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

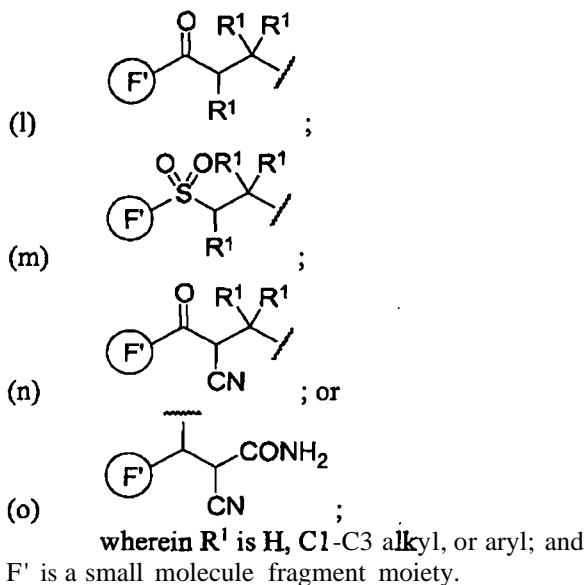
[0145] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of IDH2 protein having the structure of Formula (I),



wherein,

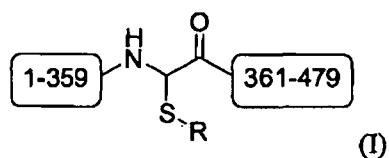
the derivation occurs at IDH2 cysteine residue position 308 based on SEQ ID NO: 9657;
R is selected from:





[0146] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

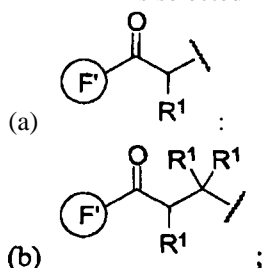
[0147] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of caspase-8 protein having the structure of Formula (I),

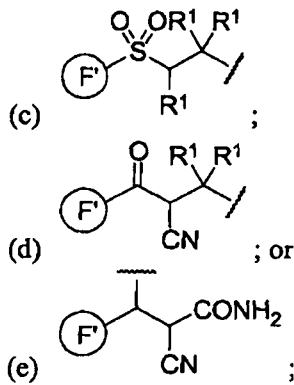


wherein,

the derivation occurs at caspase-8 cysteine residue position 360 based on SEQ ID NO: 9658;

R is selected from:

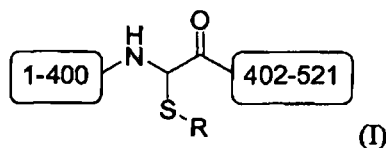




wherein R¹ is H, C1-C3 alkyl, or aryl; and F' is a small molecule fragment moiety.

[0148] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

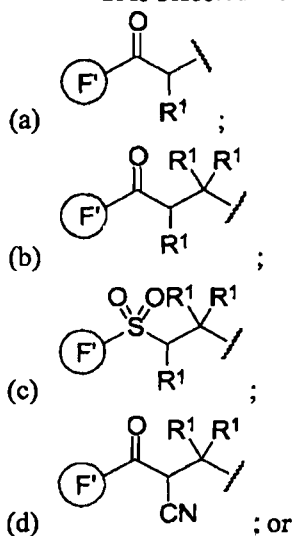
[0149] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of caspase-10 protein having the structure of Formula (I),

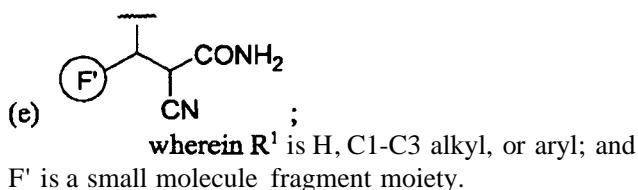


wherein,

the derivation occurs at caspase-10 cysteine residue position 401 based on SEQ ID NO: 9659;

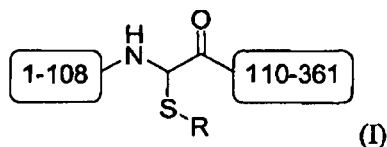
R is selected from:





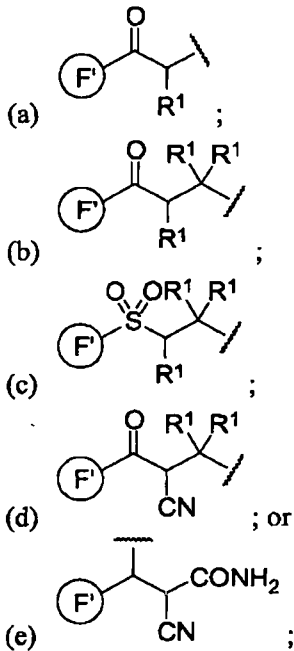
[0150] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0151] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of PRMT-1 protein having the structure of Formula (I),



wherein,
 the derivation occurs at PRMT-1 cysteine residue position 109 based on SEQ ID NO: 9660;

R is selected from:

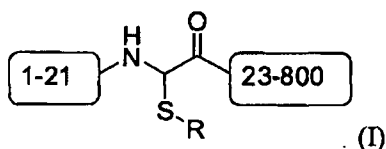


wherein R¹ is H, C1-C3 alkyl, or aryl; and
 F' is a small molecule fragment moiety.

[0152] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some

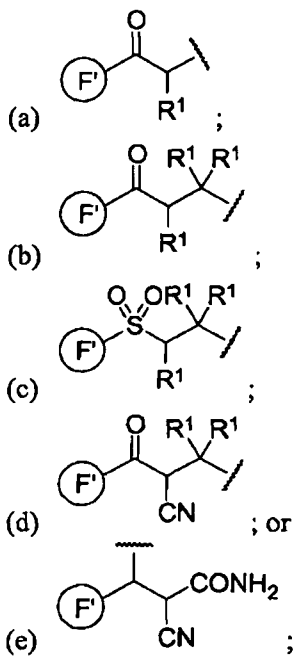
embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0153] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of ZAK protein having the structure of Formula (I),



wherein,

the derivation occurs at ZAK cysteine residue position 22 based on SEQ ID NO: 9661 ;
R is selected from:

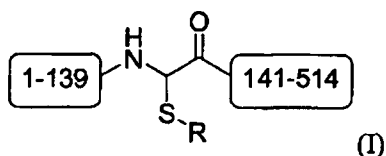


wherein R¹ is H, C1-C3 alkyl, or aryl; and

F' is a small molecule fragment moiety.

[0154] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

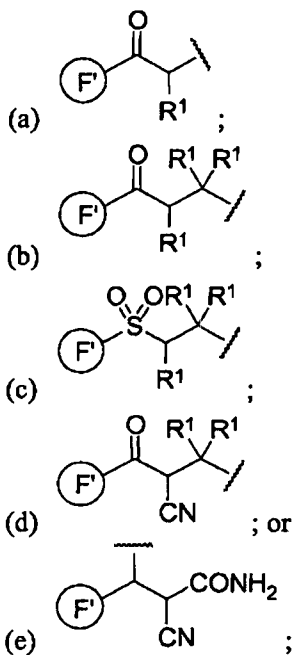
[0155] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of IMPDH2 protein having the structure of Formula (I),



wherein,

the derivation occurs at IMPDH2 cysteine residue position 140 based on SEQ ID NO: 9662;

R is selected from:

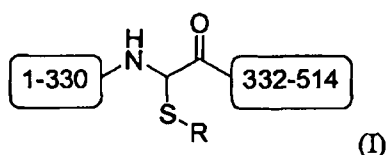


wherein R¹ is H, C1-C3 alkyl, or aryl; and

F' is a small molecule fragment moiety.

[0156] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

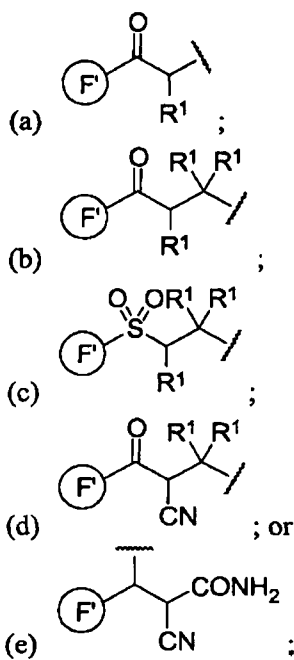
[0157] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of IMPDH2 protein having the structure of Formula (I),



wherein,

the derivation occurs at IMPDH2 cysteine residue position 331 based on SEQ ID NO: 9662;

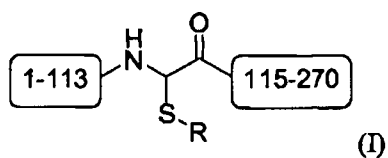
R is selected from:



wherein R¹ is H, C1-C3 alkyl, or aryl; and F' is a small molecule fragment moiety.

[0158] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

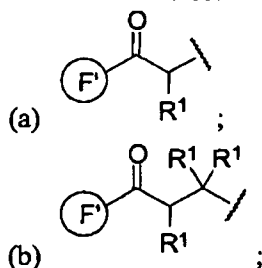
[0159] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of TIGAR protein having the structure of Formula (I),

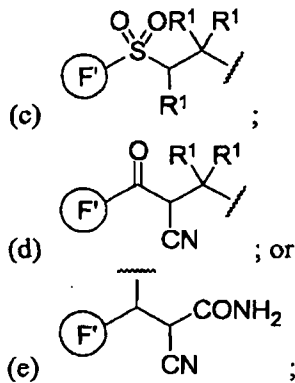


wherein,

the derivation occurs at TIGAR cysteine residue position 114 based on SEQ ID NO: 9663;

R is selected from:

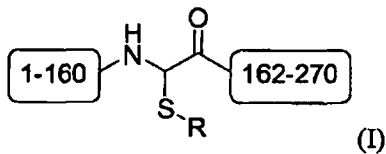




wherein R¹ is H, C1-C3 alkyl, or aryl; and F' is a small molecule fragment moiety.

[0160] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

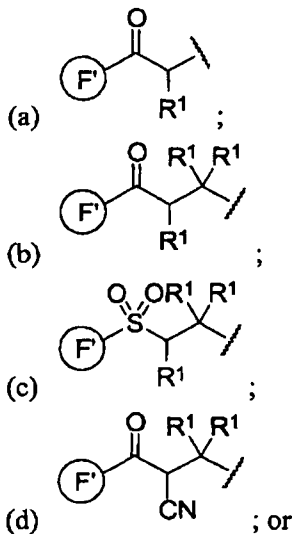
[0161] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of TIGAR protein having the structure of Formula (I),

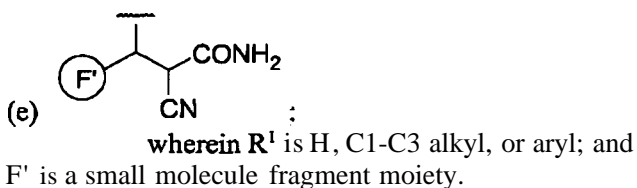


wherein,

the derivation occurs at TIGAR cysteine residue position 161 based on SEQ ID NO: 9663;

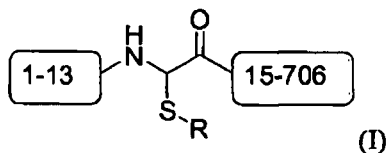
R is selected from:



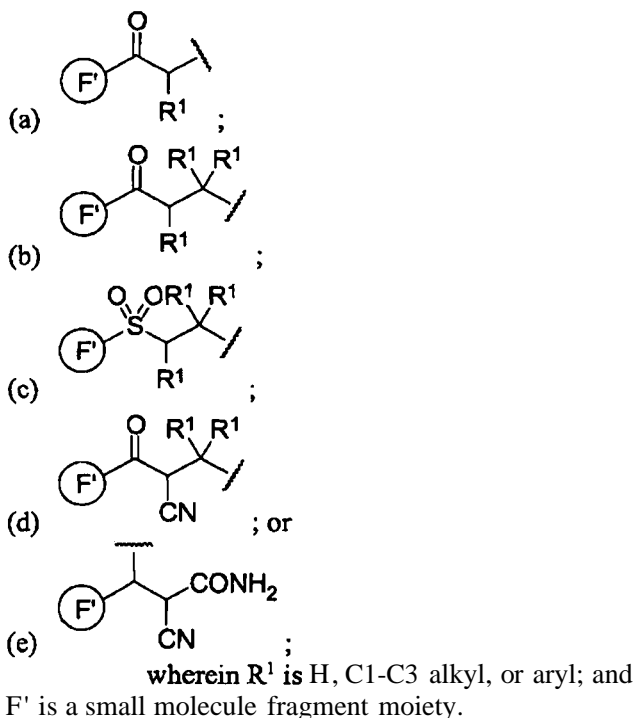


[0162] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0163] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of PKC0 protein having the structure of Formula (I),



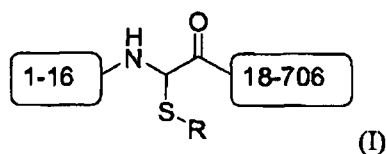
wherein,
the derivation occurs at PKC0 cysteine residue position 14 based on SEQ ID NO: 9664;
R is selected from:



[0164] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some

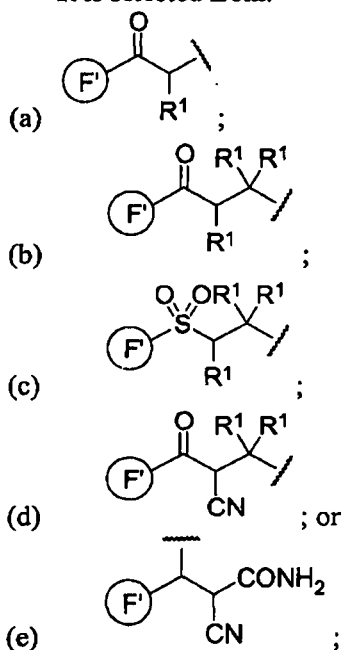
embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0165] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of PKC θ protein having the structure of Formula (I),



wherein,

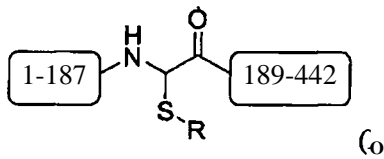
the derivation occurs at PKC θ cysteine residue position 17 based on SEQ ID NO: 9664;
R is selected from:



wherein R¹ is H, C1-C3 alkyl, or aryl; and
F' is a small molecule fragment moiety.

[0166] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

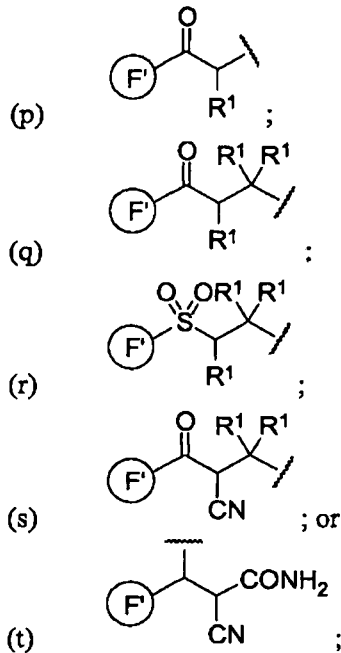
[0167] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of cereblon protein having the structure of Formula (I),



wherein,

the derivation occurs at cereblon cysteine residue position 188 based on SEQ IDNO: 9665;

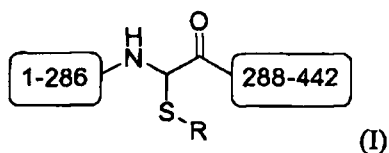
R is selected from:



wherein R' is H, C1-C3 alkyl, or aryl; and F' is a small molecule fragment moiety.

[0168] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

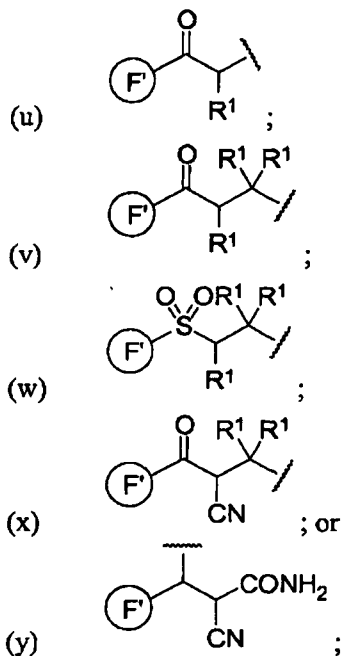
[0169] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of cereblon protein having the structure of Formula (I),



wherein,

the derivation occurs at cereblon cysteine residue position 287 based on SEQ ID NO: 9665;

R is selected from:



wherein R¹ is H, C1-C3 alkyl, or aryl; and F' is a small molecule fragment moiety.

[01701] In some embodiments, F' has a molecular weight of about 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000 Dalton, or higher. In some embodiments, the molecular weight of F' is prior to enrichment with a halogen, a nonmetal, or a transition metal. In some embodiments, F' is a small molecule fragment moiety illustrated in Fig. 1 (e.g., Fig. 1A and/or Fig. 1B).

[0171] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_pC*Z, wherein X_p is a polar residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from AIP, PES1, IKBKB, XPO1, KDM4B, NR3C1, GSTP1, TNFAIP3, ACATI, IRAKI, GNB2L1, IRF4, USP34, ZC3HAV1, USP7, PELI1, DCUN1D1, USP28, UBE20, RRAGC, MLTK, USP22, KDM3A, and USP16.

[0172] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_pC*X_n, wherein X_p is a polar residue, C* denotes the site of modification, and X_n is a nonpolar residue. In some cases, the cysteine containing protein is selected from AIP, PES1, IKBKB, XPO1, GSTP1,

ACAT1, IRAKI, IRF4, ZC3HAV1, USP7, PELI1, USP28, UBE20, RRAGC, MLTK, USP22, KDM3A, and USP16.

[0173] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif $X_pC^*X_p$, wherein X_p is a polar residue and C^* denotes the site of modification. In some cases, the cysteine containing protein is selected from KDM4B, NR3C1, TNFAIP3, USP7, and USP22.

[0174J] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif $X_pC^*X_b$, wherein X_p is a polar residue, C^* denotes the site of modification, and X_b is a basic residue. In some cases, the cysteine containing protein is selected from GNB2L1 and USP34.

[0175] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif $X_pC^*X_e$, wherein X_p is a polar residue, C^* denotes the site of modification, and X_e is an acidic residue. In some cases, the cysteine containing protein is DCUN1D1.

[0176] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif SC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from PES1, 1KBKB, GSTP1, ACAT1, IRAKI, ZC3HAV1, and RRAGC.

[0177] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif NC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from XPO1, GNB2L1, USP34, UBE20, MLTK, and USP22.

[0178] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif YC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from KDM4B and NR3C1.

[0179] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif TC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from TNFAIP3, USP7, USP28, KDM3A, and USP16.

[0180] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif QC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from IRF4, PELI1, DCUN1D1, and USP22.

[0181] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif CC*Z, wherein C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is ATP.

[0182] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_pC*Z, wherein X_p is a polar residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from IKBKB, KDM4B, GSTP1, TNFAIP3, ACAT1, IRAKI, USP34, USP7, PELI1, USP28, UBE20, MLTK, USP22, KDM3A, and USP16.

[0183] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_pC*Z, wherein X_p is a polar residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from NR3C1, IRF4, and ZC3HAV1.

[0184] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_pC*Z, wherein X_p is a polar residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from GNB2LI and RRAGC.

[0185] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_pC*Z, wherein X_p is a polar residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from ATP, PES1, XPO1, and DCUN1D1.

[0186] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_nC*Z, wherein X_n is a nonpolar residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from PES1, CYR61, UBE2L6, XPO1, ADA, NR3C1, POU2F2, UCHL3, MGMT, ERCC3, ACAT1, STAT3, UBA7, CASP2, IDH2, LRBA, UBE2L3, RELB, IRF8, CASP8, PDIA6, PCK2, PFKFB4, PDE12, USP34, USP48, SMARCC2, and SAMHD1.

[0187] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_nC*X_n, wherein X_n is a nonpolar residue and C* denotes the site of modification. In some cases, the cysteine containing protein is selected from PES1, CYR61, NR3C1, UCHL3, ERCC3, ACAT1, STAT3, CASP2, LRBA, UBE2L3, RELB, PDIA6, PCK2, PFKFB4, USP48, and SMARCC2.

[0188] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif

$X_nC^*X_p$, wherein X_n is a nonpolar residue, C^* denotes the site of modification, and X_p is a polar residue. In some cases, the cysteine containing protein is selected from UBE2L6, POU2F2, MGMT, ACAT1, UBA7, CASP8, PDE12, and USP34.

[0189] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif $X_nC^*X_a$, wherein X_n is a nonpolar residue, C^* denotes the site of modification, and X_a is an acidic residue. In some cases, the cysteine containing protein is selected from CYR61 and XPO1 .

[0190] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif $X_nC^*X_b$, wherein X_n is a nonpolar residue, C^* denotes the site of modification, and X_b is a basic residue. In some cases, the cysteine containing protein is selected from ADA, MGMT, IDH2, IRF8, and SAMHD1.

[0191] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif LC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from PES1, CYR61, XPO1, NR3C1, and SMARCC2.

[0192] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif PC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from CYR61, UBE2L6, MGMT, ERCC3, ACAT1, and USP48.

[0193] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif GC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from ADA, RELB, and USP34.

[0194] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif AC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from UCHL3, CASP2, IDH2, LRBA, CASP8, PCK2, and PDE12.

[0195] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif VC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from MGMT, ACAT1, UBA7, UBE2L3, and IRF8.

[0196] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif

X_rC^*Z , wherein X_r denotes an aromatic residue, C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from POU2F2, PDIA6, and SAMHD1.

[0197] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_oC^*Z , wherein X_o is a nonpolar residue, C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from UBE2L6, ADA, UCHL3, MGMT, ERCC3, ACAT1, UBA7, CASP2, IDH2, UBE2L3, CASP8, PDIA6, PCK2, PFKFB4, PDE12, USP34, USP48, and SAMHD1.

(0198J) In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_nC^*Z , wherein X_n is a nonpolar residue, C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from NR3C1, POU2F2, STAT3, RELB, IRF8, and SMARCC2.

[0199] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_nC^*Z , wherein X_n is a nonpolar residue, C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from PES1, CYR61, **XPO1**, and LRBA.

[0200] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_aC^*Z , wherein X_a is an acidic residue, C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from ZAP70, PRKCQ, and PRMT1.

[0201] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif EC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from ZAP70 and PRKCQ.

[0202] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_bC^*Z , wherein X_b is a basic residue, C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from CYR61, ZNF217, NCF1, IREB2, LRBA, CDK5, EP300, EZH2, UBE2S, VCPIP1, RRAGC, and IRAK4.

[0203] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif $X_bC^*X_n$, wherein X_b is a basic residue, C^* denotes the site of modification, and X_n is a nonpolar residue.

In some cases, the cysteine containing protein is selected from CYR61, ZNF217, IREB2, EP300, UBE2S, VCPIP1, RRAGC, and IRAK4.

[0204] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif $X_bC^*X_p$, wherein X_b is a basic residue, C^* denotes the site of modification, and X_p is a polar residue. In some cases, the cysteine containing protein is selected from NCF1, LRBA, and CDK5.

[0205] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif $X_bC^*X_b$, wherein X_b is a basic residue and C^* denotes the site of modification. In some cases, the cysteine containing protein is EZH2.

[0206] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif RC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from ZNF217, NCF1, CDK5, EP300, and IRAK4.

[0207] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif KC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from CYR61, IREB2, LRBA, and UBE2S.

[0208] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif HC^*Z , wherein C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from EZH2, VCPIP1, and RRAGC.

[0209] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_bC^*Z , wherein X_b is a basic residue, C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from CDK5, EP300, EZH2, UBE2S, VCPIP1, and IRAK4.

[0210] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif X_bC^*Z , wherein X_b is a basic residue, C^* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from ZNF217 and IREB2.

[0211] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif

XbC*Z, wherein X_b is a basic residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the adapter, scaffolding protein or the modulator protein is selected from NCF1.

[0212] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif XbC*Z, wherein X_b is a basic residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from RRAGC.

[0213] In some embodiments, disclosed herein is a vaccine comprising an antibody or its binding fragment thereof that recognizes a derivative of a cysteine containing protein that comprises the motif XbC*Z, wherein X_b is a basic residue, C* denotes the site of modification, and Z is any amino acid. In some cases, the cysteine containing protein is selected from CYR61 and LRBA.

[0214] In some cases, a vaccine described herein is further formulated with an adjuvant and/or additional carriers or excipients;

Adjuvant

[0215] In some embodiments, the pharmaceutical composition and/or the vaccine further comprises an adjuvant. In some instances, an adjuvant enhances the immune response (humoral and/or cellular) elicited in a subject receiving the pharmaceutical composition and/or the vaccine. In some instances, an adjuvant elicits a Th1-type response. In other instances, an adjuvant elicits a Th2-type response. In some instances, a Th1-type response is characterized by the production of cytokines such as IFN- γ as opposed to a Th2-type response which is characterized by the production of cytokines such as IL-4, IL-5, and IL-10.

[0216] In some embodiments, an adjuvant comprises a stimulatory molecule such as a cytokine. Non-limiting examples of cytokines include: CCL20, α -interferon (IFN- α), β -interferon (IFN- β), γ -interferon, platelet derived growth factor (PDGF), TNF α , TNF β , GM-CSF, epidermal growth factor (EGF), cutaneous T cell-attracting chemokine (CTACK), epithelial thymus-expressed chemokine (TECK), mucosae-associated epithelial chemokine (MEC), IL-12, IL-15, EL-28, MHC, CD80, CD86, IL-1, IL-2, IL-4, IL-5, IL-6, IL-10, EL-18, MCP-1, MIP-1 α , MIP-1 β , IL-8, L-selectin, P-selectin, E-selectin, CD34, GlyCAM-1, MadCAM-1, LFA-1, VLA-1, Mac-1, p150.95, PECAM, ICAM-1, ICAM-2, ICAM-3, CD2, LFA-3, M-CSF, G-CSF, mutant forms of EL-18, CD40, CD40L, vascular growth factor, fibroblast growth factor, IL-7, nerve growth factor, vascular endothelial growth factor, Fas, TNF receptor, Fit, Apo-1, p55, WSL-1, DR3, TRAMP, Apo-3, AIR, LARD, NGRF, DR4, DRS, KILLER, TRAIL-R2, TRICK2, DR6, Caspase ICE, Fos, c-jun, Sp-1, Ap-1, Ap-2, p38, p65Rel, MyD88, IRAK, TRAF6, I κ B, Inactive NIK, SAP K, SAP-I, JNK, interferon response genes, NF κ B, Bax, TRAIL, TRAILrec, TRAILrecDRC5,

TRAIL-R3, TRAIL-R4, RANK, RANK LIGAND, Ox40, Ox40 LIGAND, NKG2D, MICA, MICB, NKG2A, NKG2B, NKG2C, NKG2E, NKG2F, TAPI, and TAP2.

[0217] Additional adjuvants include, for example: MCP-1, MIP-1a, MIP-1p, IL-8, RANTES, L-selectin, P-selectin, E-selectin, CD34, GlyCAM-1, MadCAM-1, LFA-1, VLA-1, Mac-1, p150.95, PECAM, ICAM-1, ICAM-2, ICAM-3, CD2, LFA-3, M-CSF, G-CSF, IL-4, mutant forms of IL-18, CD40, CD40L, vascular growth factor, fibroblast growth factor, DL-7, IL-22, nerve growth factor, vascular endothelial growth factor, Fas, TNF receptor, Fit, Apo-1, p55, WSL-1, DR3, TRAMP, Apo-3, AIR, LARD, NGRF, DR4, DR5, KILLER, TRAIL-R2, TRICK2, DR6, Caspase ICE, Fos, c-jun, Sp-1, Ap-1, Ap-2, p38, p65Rel, MyD88, IRAK, TRAF6, IκB, Inactive NIK, SAP K, SAP-1, JNK, interferon response genes, NFκB, Bax, TRAIL, TRAILrec, TRAILrecDRC5, TRAIL-R3, TRAIL-R4, RANK, RANK LIGAND, Ox40, Ox40 LIGAND, NKG2D, MICA, MICB, NKG2A, NKG2B, NKG2C, NKG2E, NKG2F, TAPI, TAP2 and functional fragments thereof.

[0218] In some embodiments, an adjuvant is a modulator of a toll like receptor. Examples of modulators of toll-like receptors include TLR-9 agonists and are not limited to small molecule modulators of toll-like receptors such as Imiquimod. Other examples of adjuvants that are used in combination with a vaccine described herein include and are not limited to saponin, CpG ODN, and the like.

[0219] Sometimes, an adjuvant is selected from bacteria toxoids, polyoxypropylene-polyoxyethylene block polymers, aluminum salts, liposomes, CpG polymers, oil-in-water emulsions, or a combination thereof.

[0220] In some embodiments, an adjuvant is a lipid-based adjuvant, such as MPLA and MDP. In some instances, monophosphoryl lipid A (MPLA) is an adjuvant that causes increased presentation of liposomal antigen to specific T Lymphocytes. In some cases, a muramyl dipeptide (MDP) is used as a suitable adjuvant in conjunction with the vaccine formulations described herein.

[0221] In some embodiments, an adjuvant is an oil-in-water emulsion. The oil-in-water emulsion suitable for use with a vaccine described herein include, for example, at least one oil and at least one surfactant, with the oil(s) and surfactant(s) being biodegradable (metabolizable) and biocompatible. In some instances, the oil droplets in the emulsion is less than 5 μm in diameter, or have a sub-micron diameter, with these small sizes being achieved with a high pressure homogenizer to provide stable emulsions. Droplets with a size less than 220 nm are optionally subjected to filter sterilization.

[0222] In some instances, oils used include such as those from an animal (such as fish) or vegetable source. Sources for vegetable oils include, for example, nuts, seeds and grains. Peanut oil, soybean oil, coconut oil, and olive oil, exemplify the nut oils. Jojoba oil is used e.g. obtained from the jojoba bean. Seed oils include safflower oil, cottonseed oil, sunflower seed oil, sesame seed oil, etc. The grain group include: corn oil and oils of other cereal grains such as wheat, oats, rye, rice, teff, triticale, and the like. 6-

10 carbon fatty acid esters of glycerol and 1[^]-propanediol, while not occurring naturally in seed oils, can be prepared by hydrolysis, separation and esterification of the appropriate materials starting from the nut and seed oils. Fats and oils from mammalian milk are optionally metabolizable and are therefore used in with the vaccines described herein. The procedures for separation, purification, saponification and other means necessary for obtaining pure oils from animal sources are well known in the art. Fish contain metabolizable oils which are readily recovered. For example, cod liver oil, shark liver oils, and whale oil such as spermaceti can exemplify several of the fish oils which can be used herein. A number of branched chain oils can be synthesized biochemically in 5-carbon isoprene units and can be generally referred to as terpenoids. Shark liver oil contains a branched, unsaturated terpenoid known as squalene, 2,6,10,15,19,23-hexamethyl-2,6,10,14,18,22-tetracosahexaene. Squalane, the saturated analog to squalene, can also be used. Fish oils, including squalene and squalane, can be readily available from commercial sources or can be obtained by methods known in the art.

[0223] Other useful oils include tocopherols, for use in elderly patients (e.g. aged 60 years or older) due to vitamin E been reported to have a positive effect on the immune response in this patient group. Further, tocopherols have antioxidant properties that, for example, help to stabilize the emulsions. Various tocopherols exist (α , β , γ , δ , ϵ or ξ) but α is usually used. An example of α -tocopherol is DL- α -tocopherol. α -tocopherol succinate can be compatible with HIV vaccines and can be a useful preservative as an alternative to mercurial compounds.

[0224] Mixtures of oils are used e.g. squalene and α -tocopherol. In some instances, an oil content in the range of 2-20% (by volume) is used.

[0225] In some instances, surfactants are classified by their 'HLB' (hydrophile/lipophile balance). In some cases, surfactants have a HLB of at least 10, at least 15, and/or at least 16. Surfactants can include, but are not limited to: the polyoxyethylene sorbitan esters surfactants (commonly referred to as the Tweens), especially polysorbate 20 and polysorbate 80; copolymers of ethylene oxide (EO), propylene oxide (PO), and/or butylene oxide (BO), sold under the DOWFAXTM tradename, such as linear EO/PO block copolymers; octoxynols, which can vary in the number of repeating ethoxy (oxy-1,2-ethanediyl) groups, such as octoxynol-9 (Triton X-100, or t-octylphenoxypolyethoxyethanol); (octylphenoxy)polyethoxyethanol (IGEPAL CA-630/NP-40); phospholipids such as phosphatidylcholine (lecithin); nonylphenol ethoxylates, such as the TergitolTM NP series; polyoxyethylene fatty ethers derived from lauryl, cetyl, stearyl, and oleyl alcohols (known as Brij surfactants), such as triethyleneglycol monolauryl ether (Brij 30); and sorbitan esters (commonly known as the SPANs), such as sorbitan trioleate (Span 85) and sorbitan monolaurate. Non-ionic surfactants can be used herein.

[0226] Mixtures of surfactants are used e.g. Tween 80/Span 85 mixtures. A combination of a polyoxyethylene sorbitan ester and an octoxynol are also suitable. Another combination comprises, for example, laureth 9 plus a polyoxyethylene sorbitan ester and/or an octoxynol.

[0227] The amounts of surfactants (% by weight) include, for example, polyoxyethylene sorbitan esters (such as Tween 80) 0.01 to 1%, in particular about 0.1%; octyl- or nonylphenoxy polyoxyethanols (such as Triton X-100, or other detergents in the Triton series) 0.001 to 0.1%, such as 0.005 to 0.02%; polyoxyethylene ethers (such as laureth 9) 0.1 to 20%, such as 0.1 to 10% and in particular 0.1 to 1% or about 0.5%.

Carriers and Excipients

[0228] In some instances, a vaccine further includes carriers and excipients (including, but not limited to, buffers, carbohydrates, mannitol, proteins, polypeptides or amino acids such as glycine, antioxidants, bacteriostats, chelating agents, suspending agents, thickening agents, and/or preservatives), water, oils (including those of petroleum, animal, vegetable or synthetic origin, such as peanut oil, soybean oil, mineral oil, sesame oil, and the like), saline solutions, aqueous dextrose and glycerol solutions, flavoring agents, coloring agents, detackifiers, and other acceptable additives, adjuvants, binders, or other pharmaceutically acceptable auxiliary substances as required to approximate physiological conditions (such as pH buffering agents, tonicity adjusting agents, emulsifying agents, wetting agents, and the like). Examples of excipients include starch, glucose, lactose, sucrose, gelatin, malt, rice, flour, chalk, silica gel, sodium stearate, glycerol monostearate, talc, sodium chloride, dried skim milk, glycerol, propylene, glycol, water, ethanol, and the like. In another instances, the pharmaceutical preparation is substantially free of preservatives. In other instances, the pharmaceutical preparation can contain at least one preservative. General methodology on pharmaceutical dosage forms is found in Ansel et al., *Pharmaceutical Dosage Forms and Drug Delivery Systems* (Lippencott Williams & Wilkins, Baltimore Md. (1999)). It will be recognized that, while any suitable carrier known to those of ordinary skill in the art can be employed to administer the pharmaceutical compositions described herein, the type of carrier will vary depending on the mode of administration.

[0229] In some instances, a pharmaceutical composition of the vaccine is encapsulated within liposomes using well-known technology. Biodegradable microspheres can also be employed as carriers for the pharmaceutical compositions described herein. Suitable biodegradable microspheres are disclosed, for example, in U.S. Pat. Nos. 4,897,268; 5,075,109; 5,928,647; 5,811,128; 5,820,883; 5,853,763; 5,814,344 and 5,942,252.

[0230] In some cases, a pharmaceutical composition is administered in liposomes or microspheres (or microparticles). Methods for preparing liposomes and microspheres for administration to a patient are

well known to those of skill in the art. U.S. Pat. No. 4,789,734, the contents of which are hereby incorporated by reference, describes methods for encapsulating biological materials in liposomes. Essentially, the material is dissolved in an aqueous solution, the appropriate phospholipids and lipids added, along with surfactants if required, and the material dialyzed or sonicated, as necessary. A review of known methods is provided by G. Gregoriadis, Chapter 14, "Liposomes," *Drug Carriers in Biology and Medicine*, pp. 2.sup.87-341 (Academic Press, 1979).

[0231] Microspheres formed of polymers or proteins are well known to those skilled in the art, and can be tailored for passage through the gastrointestinal tract directly into the blood stream. Alternatively, the compound can be incorporated and the microspheres, or composite of microspheres, implanted for slow release over a period of time ranging from days to months. See, for example, U.S. Pat. Nos. 4,906,474, 4,925,673 and 3,625,214, and Jain, *TIPS* 19:155-157 (1998), the contents of which are hereby incorporated by reference.

[0232] In some cases, a vaccine includes preservatives such as thiomersal or 2-phenoxyethanol. In some instances, the vaccine is substantially free from (e.g. <10 µg/ml) mercurial material e.g. thiomersal-free. In some instances, a-Tocopherol succinate is used as an alternative to mercurial compounds.

[0233] For controlling the tonicity, a physiological salt such as sodium salt are optionally included in the vaccine. Other salts include potassium chloride, potassium dihydrogen phosphate, disodium phosphate, and/or magnesium chloride, or the like.

[0234] In some instances, a vaccine has an osmolality of between 200 mOsm/kg and 400 mOsm/kg, between 240-360 mOsm/kg, or within the range of 290-310 mOsm/kg.

[0235] In some cases, a vaccine comprises one or more buffers, such as a Tris buffer; a borate buffer; a succinate buffer; a histidine buffer (particularly with an aluminum hydroxide adjuvant); or a citrate buffer. Buffers, in some cases, are included in the 5-20 mM range.

[0236] In some cases, the pH of the vaccine is between about 5.0 and about 8.5, between about 6.0 and about 8.0, between about 6.5 and about 7.5, or between about 7.0 and about 7.8.

[0237] In some instances, a vaccine is sterile. In some cases, the vaccine is non-pyrogenic e.g. containing <1 EU (endotoxin unit, a standard measure) per dose, and can be <0.1 EU per dose.

[0238] In some instances, a vaccine includes detergent e.g. a polyoxyethylene sorbitan ester surfactant (known as 'Tweens'), an octoxynol (such as octoxynol-9 (Triton X-100) or t-octylphenoxyethoxyethanol), a cetyl trimethyl ammonium bromide ('CTAB'), or sodium deoxycholate, particularly for a split or surface antigen vaccine. The detergent can be present only at trace amounts. Thus the vaccine can include less than 1 mg/ml of each of octoxynol-10 and polysorbate 80. Other residual components in trace amounts can be antibiotics (e.g. neomycin, kanamycin, polymyxin B).

[0239] In some instances, a vaccine is formulated as a sterile solution or suspension, in suitable vehicles, well known in the art. The pharmaceutical compositions can be sterilized by conventional, well-known sterilization techniques, or can be sterile filtered. The resulting aqueous solutions can be packaged for use as is, or lyophilized, the lyophilized preparation being combined with a sterile solution prior to administration. Suitable formulations and additional carriers are described in Remington "The Science and Practice of Pharmacy" (20th Ed., Lippincott Williams & Wilkins, Baltimore Md.), the teachings of which are incorporated by reference in their entirety herein.

[0240] In some instances, a vaccine is formulated with one or more pharmaceutically acceptable salts. Pharmaceutically acceptable salts can include those of the inorganic ions, such as, for example, sodium, potassium, calcium, magnesium ions, and the like. Such salts can include salts with inorganic or organic acids, such as hydrochloric acid, hydrobromic acid, phosphoric acid, nitric acid, sulfuric acid, methanesulfonic acid, p-toluenesulfonic acid, acetic acid, fumaric acid, succinic acid, lactic acid, mandelic acid, malic acid, citric acid, tartaric acid, or maleic acid. In addition, if the agent(s) contain a carboxy group or other acidic group, it can be converted into a pharmaceutically acceptable addition salt with inorganic or organic bases. Examples of suitable bases include sodium hydroxide, potassium hydroxide, ammonia, cyclohexylamine, dicyclohexyl-amine, ethanolamine, diethanolamine, triethanolamine, and the like.

[0241] Pharmaceutical compositions comprising an active agent such as small molecule fragment and/or a cysteine[^]containing polypeptide-small molecule fragment adduct described herein, in combination with one or more adjuvants, can be formulated to comprise certain molar ratios. For example, molar ratios of about 99: 1 to about 1:99 of an active agent such as a peptide, a nucleic acid, an antibody or fragments thereof, and/or an APC described herein, in combination with one or more adjuvants, can be used. In some instances, the range of molar ratios of an active agent such as a peptide, a nucleic acid, an antibody or fragments thereof, and/or an APC described herein, in combination with one or more adjuvants, can be selected from about 80:20 to about 20:80; about 75:25 to about 25:75, about 70:30 to about 30:70, about 66:33 to about 33:66, about 60:40 to about 40:60; about 50:50; and about 90:10 to about 10:90. The molar ratio of an active agent such as a peptide, a nucleic acid, an antibody or fragments thereof, and/or an APC described herein, in combination with one or more adjuvants, can be about 1:9, and in some cases can be about 1:1. The active agent such as a peptide, a nucleic acid, an antibody or fragments thereof, and/or an APC described herein, in combination with one or more adjuvants, can be formulated together, in the same dosage unit e.g., in one vial, suppository, tablet, capsule, an aerosol spray; or each agent, form, and/or compound can be formulated in separate units, e.g., two vials, suppositories, tablets, two capsules, a tablet and a vial, an aerosol spray, and the like.

Methods of Generating an Antibody

[0242] In some embodiments, a method of generating or raising an antibody or its binding fragment thereof comprises inoculating a mammal (e.g., a mouse, rat, or rabbit) with a small molecule fragment composition described herein. In some instances, the small molecule fragment is a small molecule fragment of Formula (I). In some instances, the method further comprises harvesting and purifying an antibody against the small molecule fragment composition.

[0243] In some embodiments, a method of generating or raising an antibody or its binding fragment thereof comprises inoculating a mammal (e.g., a mouse, rat, or rabbit) with a cysteine-containing polypeptide-small molecule fragment adduct described herein. In some instances, the cysteine-containing polypeptide-small molecule fragment adduct is a purified cysteine-containing polypeptide-small molecule fragment adduct. In some instances, the cysteine-containing polypeptide is a polypeptide illustrated in Tables 1-5. In some instances, the cysteine-containing polypeptide is an isolated and purified polypeptide comprising at least 70%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some instances, the method further comprises harvesting and purifying an antibody against the cysteine-containing polypeptide-small molecule fragment adduct.

[0244] In some instances, a method of generating or raising an antibody or its binding fragment thereof comprises inoculating a mammal (e.g., a mouse, rat, or rabbit) with a cultured cell expressing a cysteine-containing polypeptide and further administering a small molecule fragment described herein to generate a cysteine-containing polypeptide-small molecule fragment adduct. In some instances, the cysteine-containing polypeptide is a polypeptide illustrated in Tables 1-5. In some instances, the cysteine-containing polypeptide is an isolated and purified polypeptide comprising at least 70%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some instances, the method further comprises harvesting and purifying an antibody against the cultured cell expressing a cysteine-containing polypeptide and further incubated with a small molecule fragment described herein.

[0245] In some instances, a method of generating or raising an antibody or its binding fragment thereof comprises inoculating a mammal (e.g., a mouse, rat, or rabbit) with dendritic-cell derived exosomes. In some instances, a dendritic-cell derived exosome comprises an antigen (e.g., a cysteine-containing polypeptide-small molecule fragment adduct) which then includes activation of the antigen-specific B-cell antibody response. In some cases, the dendritic-cell derived exosome comprises a cysteine-containing polypeptide-small molecule fragment antigen. In some cases, a method of generating or raising an antibody or its binding fragment thereof comprises inoculating a mammal (e.g., a mouse, rat, or rabbit) with dendritic-cell derived exosomes comprising a cysteine-containing polypeptide-small molecule

fragment antigen. In some instances, the method further comprises harvesting and purifying an antibody against the dendritic-cell derived exosomes.

Vaccine Formulations

[0246] In some embodiments, a vaccine described herein, in combination with one or more adjuvants, is formulated in conventional manner using one or more physiologically acceptable carriers, comprising excipients, diluents, and/or auxiliaries, e.g., which facilitate processing of the active agents into preparations that can be administered. Proper formulation depends at least in part upon the route of administration chosen. The agent(s) described herein can be delivered to a patient using a number of routes or modes of administration, including oral, buccal, topical, rectal, transdermal, transmucosal, subcutaneous, intravenous, and intramuscular applications, as well as by inhalation.

[0247] In some instances, the active agents are formulated for parenteral administration (e.g., by injection, for example bolus injection or continuous infusion) and can be presented in unit dose form in ampoules, pre-filled syringes, small volume infusion or in multi-dose containers with an added preservative. The compositions can take such forms as suspensions, solutions, or emulsions in oily or aqueous vehicles, for example solutions in aqueous polyethylene glycol.

[0248] For injectable formulations, the vehicle can be chosen from those known in art to be suitable, including aqueous solutions or oil suspensions, or emulsions, with sesame oil, com oil, cottonseed oil, or peanut oil, as well as elixirs, mannitol, dextrose, or a sterile aqueous solution, and similar pharmaceutical vehicles. The formulation can also comprise polymer compositions which are biocompatible and biodegradable, such as poly(lactic-co-glycolic)acid. These materials can be made into micro or nanospheres, loaded with drug and further coated or derivatized to provide superior sustained-release performance. Vehicles suitable for periocular or intraocular injection include, for example, suspensions of therapeutic agent in injection grade water, liposomes, and vehicles suitable for lipophilic substances. Other vehicles for periocular or intraocular injection are well known in the art.

[0249] When administration is by injection, the active agent is sometimes formulated in aqueous solutions, specifically in physiologically compatible buffers such as Hanks' solution, Ringer's solution, or physiological saline buffer. The solution can contain formulatory agents such as suspending, stabilizing and/or dispersing agents. Alternatively, the active compound can be in powder form for constitution with a suitable vehicle, e.g., sterile pyrogen-free water, before use. In another embodiment, the pharmaceutical composition does not comprise an adjuvant or any other substance added to enhance the immune response stimulated by the peptide. In another embodiment, the pharmaceutical composition comprises a substance that inhibits an immune response to the peptide. Methods of formulation are known in the art, for

example, as disclosed in Remington's Pharmaceutical Sciences, latest edition, Mack Publishing Co., Easton P.

[0250] For oral administration, the active agent is sometimes formulated readily by combining the active agent with pharmaceutically acceptable carriers well known in the art. Such carriers enable the agents of the disclosure to be formulated as tablets, including chewable tablets, pills, dragees, capsules, lozenges, hard candy, liquids, gels, syrups, slurries, powders, suspensions, elixirs, wafers, and the like, for oral ingestion by a patient to be treated. Such formulations can comprise pharmaceutically acceptable carriers including solid diluents or fillers, sterile aqueous media and various non-toxic organic solvents. A solid carrier can be one or more substances which can also act as diluents, flavoring agents, solubilizers, lubricants, suspending agents, binders, preservatives, tablet disintegrating agents, or an encapsulating material. In powders, the carrier generally is a finely divided solid which is a mixture with the finely divided active component. In tablets, the active component generally is mixed with the carrier having the necessary binding capacity in suitable proportions and compacted in the shape and size desired. The powders and tablets preferably contain from about one (1) to about seventy (70) percent of the active compound. Suitable carriers include but are not limited to magnesium carbonate, magnesium stearate, talc, sugar, lactose, pectin, dextrin, starch, gelatin, tragacanth, methylcellulose, sodium carboxymethylcellulose, a low melting wax, cocoa butter, and the like. Generally, the active agents can be included at concentration levels ranging from about 0.5%, about 5%, about 10%, about 20%, or about 30% to about 50%, about 60%, about 70%, about 80% or about 90% by weight of the total composition of oral dosage forms, in an amount sufficient to provide a desired unit of dosage.

[0251] In some instances, the vaccine is formulated into aerosol solutions, suspensions, or dry powders. The aerosol can be administered through the respiratory system or nasal passages. For example, one skilled in the art will recognize that a composition of the present disclosure can be suspended or dissolved in an appropriate carrier, e.g., a pharmaceutically acceptable propellant, and administered directly into the lungs using a nasal spray or inhalant. For example, an aerosol formulation comprising a transporter, carrier, or ion channel inhibitor can be dissolved, suspended or emulsified in a propellant or a mixture of solvent and propellant, e.g., for administration as a nasal spray or inhalant. Aerosol formulations can contain any acceptable propellant under pressure, such as a cosmetically or dermatologically or pharmaceutically acceptable propellant, as conventionally used in the art.

[0252] An aerosol formulation for nasal administration is generally an aqueous solution designed to be administered to the nasal passages in drops or sprays. Nasal solutions can be similar to nasal secretions in that they are generally isotonic and slightly buffered to maintain a pH of about 5.5 to about 6.5, although pH values outside of this range can additionally be used. Antimicrobial agents or preservatives can also be included in the formulation.

[0253] In some instances, an aerosol formulation for inhalations and inhalants are designed so that the agent or combination of agents is carried into the respiratory tree of the subject when administered by the nasal or oral respiratory route. Inhalation solutions can be administered, for example, by a nebulizer. Inhalations or insufflations, comprising finely powdered or liquid drugs, can be delivered to the respiratory system as a pharmaceutical aerosol of a solution or suspension of the agent or combination of agents in a propellant, e.g., to aid in disbursement. Propellants can be liquefied gases, including halocarbons, for example, fluorocarbons such as fluorinated chlorinated hydrocarbons, hydrochlorofluorocarbons, and hydrochlorocarbons, as well as hydrocarbons and hydrocarbon ethers.

[0254] Halocarbon propellants can include fluorocarbon propellants in which all hydrogens are replaced with fluorine, chlorofluorocarbon propellants in which all hydrogens are replaced with chlorine and at least one fluorine, hydrogen-containing fluorocarbon propellants, and hydrogen-containing chlorofluorocarbon propellants. Halocarbon propellants are described in Johnson, U.S. Pat. No. 5,376,359, issued Dec. 27, 1994; Byron et al., U.S. Pat. No. 5,190,029, issued Mar. 2, 1993; and Purewal et al., U.S. Pat. No. 5,776,434, issued Jul. 7, 1998. Hydrocarbon propellants useful in the disclosure include, for example, propane, isobutane, n-butane, pentane, isopentane, and neopentane. A blend of hydrocarbons can also be used as a propellant. Ether propellants include, for example, dimethyl ether as well as the ethers. An aerosol formulation in some instances also comprises more than one propellant. For example, the aerosol formulation can comprise more than one propellant from the same class, such as two or more fluorocarbons; or more than one, more than two, more than three propellants from different classes, such as a fluorohydrocarbon and a hydrocarbon. In some instances, vaccines are also dispensed with a compressed gas, e.g., an inert gas such as carbon dioxide, nitrous oxide or nitrogen.

[0255] Aerosol formulations can also include other components, for example, ethanol, isopropanol, propylene glycol, as well as surfactants or other components such as oils and detergents. These components can serve to stabilize the formulation and/or lubricate valve components.

[0256] In some instances, the aerosol formulation is packaged under pressure and is formulated as an aerosol using solutions, suspensions, emulsions, powders and semisolid preparations. For example, a solution aerosol formulation can comprise a solution of an agent of the disclosure such as a transporter, carrier, or ion channel inhibitor in (substantially) pure propellant or as a mixture of propellant and solvent. The solvent can be used to dissolve the agent and/or retard the evaporation of the propellant. Solvents can include, for example, water, ethanol, and glycols. Any combination of suitable solvents can be used, optionally combined with preservatives, antioxidants, and/or other aerosol components.

[0257] In some instances, an aerosol formulation is a dispersion or suspension. A suspension aerosol formulation can comprise a suspension of an agent or combination of agents of the instant disclosure, e.g., a transporter, carrier, or ion channel inhibitor, and a dispersing agent. Dispersing agents can include, for

example, sorbitan trioleate, oleyl alcohol, oleic acid, lecithin, and corn oil. A suspension aerosol formulation can also include lubricants, preservatives, antioxidant, and/or other aerosol components.

[0258] In some cases, an aerosol formulation is formulated as an emulsion. An emulsion aerosol formulation can include, for example, an alcohol such as ethanol, a surfactant, water, and a propellant, as well as an agent or combination of agents of the disclosure, e.g., a transporter, carrier, or ion channel. The surfactant used can be nonionic, anionic or cationic. One example of an emulsion aerosol formulation comprises, for example, ethanol, surfactant, water, and propellant. Another example of an emulsion aerosol formulation comprises, for example, vegetable oil, glyceryl monostearate and propane.

Vaccine Dosages, Routes of Administration and Therapeutic Regimens

[0259] In some instances, a vaccine is delivered via a variety of routes. Exemplary delivery routes include oral (including buccal and sub-lingual), rectal, nasal, topical, transdermal patch, pulmonary, vaginal, suppository, or parenteral (including intramuscular, intraarterial, intrathecal, intradermal, intraperitoneal, subcutaneous, and intravenous) administration or in a form suitable for administration by aerosolization, inhalation or insufflation. General information on drug delivery systems can be found in Ansel et al., *Pharmaceutical Dosage Forms and Drug Delivery Systems* (Lippencott Williams & Wilkins, Baltimore Md. (1999)). The vaccine described herein can be administered to muscle, or can be administered via intradermal or subcutaneous injections, or transdermally, such as by iontophoresis. Epidermal administration of the vaccine can be employed.

[0260] In some instances, the vaccine is formulated for administration via the nasal passages. Formulations suitable for nasal administration, wherein the carrier is a solid, can include a coarse powder having a particle size, for example, in the range of about 10 to about 500 microns, which is administered in the manner in which snuff is taken, i.e., by rapid inhalation through the nasal passage from a container of the powder held close up to the nose. The formulation can be a nasal spray, nasal drops, or by aerosol administration by nebulizer. The formulation can include aqueous or oily solutions of the vaccine.

[0261] In some cases, the vaccine is a liquid preparation such as a suspension, syrup or elixir. The vaccine can also be a preparation for parenteral, subcutaneous, intradermal, intramuscular, or intravenous administration (e.g., injectable administration), such as a sterile suspension or emulsion.

[0262] In some instances, the vaccine includes material for a single immunization, or may include material for multiple immunizations (i.e. a 'multidose' kit). The inclusion of a preservative is preferred in multidose arrangements. As an alternative (or in addition) to including a preservative in multidose compositions, the compositions can be contained in a container having an aseptic adaptor for removal of material.

[0263] In some instances, the vaccine is administered in a dosage volume of about 0.5 mL, although a half dose (i.e. about 0.25 mL) can be administered to children. Sometimes the vaccine can be administered in a higher dose e.g. about 1 ml.

[0264] In some instances, the vaccine is administered as a 1, 2, 3, 4, 5, or more dose-course regimen. Sometimes, the vaccine is administered as a 2, 3, or 4 dose-course regimen. Sometimes the vaccine is administered as a 2 dose-course regimen.

[0265] In some instances, the administration of the first dose and second dose of the 2 dose-course regimen are separated by about 0 day, 1 day, 2 days, 5 days, 7 days, 14 days, 21 days, 30 days, 2 months, 4 months, 6 months, 9 months, 1 year, 1.5 years, 2 years, 3 years, 4 years, or more.

[0266] In some instances, the vaccine described herein is administered every 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, or more years. Sometimes, the vaccine described herein is administered every 2, 3, 4, 5, 6, 7, or more years. Sometimes, the vaccine described herein is administered every 4, 5, 6, 7, or more years. Sometimes, the vaccine described herein is administered once.

[0267] The dosage examples are not limiting and are only used to exemplify particular dosing regimens for administering a vaccine described herein. The effective amount for use in humans can be determined from animal models. For example, a dose for humans can be formulated to achieve circulating, liver, topical, and/or gastrointestinal concentrations that have been found to be effective in animals. Based on animal data, and other types of similar data, those skilled in the art can determine the effective amounts of a vaccine composition appropriate for humans.

[0268] The effective amount when referring to an agent or combination of agents will generally mean the dose ranges, modes of administration, formulations, etc., that have been recommended or approved by any of the various regulatory or advisory organizations in the medical or pharmaceutical arts (e.g., FDA, AMA) or by the manufacturer or supplier.

[0269] In some instances, the vaccine is administered before, during, or after the onset of a symptom associated with a disease or condition (e.g., a cancer). Exemplary symptoms can include fever, cough, sore throat, runny and/or stuffy nose, headaches, chills, fatigue, nausea, vomiting, diarrhea, pain, or a combination thereof. In some instances, a vaccine is administered for treatment of a cancer. In some cases, a vaccine is administered for prevention, such as a prophylactic treatment of a cancer. In some cases, a vaccine is administered to illicit an immune response from a patient.

[0270] In some aspects, a vaccine and kit described herein are stored at between 2°C and 8°C. In some instances, a vaccine is not stored frozen. In some instances, a vaccine is stored in temperatures of such as at -20°C or -80°C. In some instances, a vaccine is stored away from sunlight.

Pharmaceutical Compositions and Formulations

[0271] In some embodiments, disclosed herein include pharmaceutical composition and formulations comprising a small molecule fragment of Formula (I). In some instances, also described herein include pharmaceutical composition and formulations comprising a cysteine-containing polypeptide-small molecule fragment adduct. In some instances, the cysteine-containing polypeptide is a polypeptide illustrated in Tables 1-5. In other instances, the cysteine-containing polypeptide is an isolated and purified polypeptide comprising at least 70%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or more sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655. In some embodiments, the pharmaceutical formulations described herein are administered to a subject by multiple administration routes, including but not limited to, parenteral (e.g., intravenous, subcutaneous, intramuscular), oral, intranasal, buccal, rectal, or transdermal administration routes. In some instances, the pharmaceutical composition describe herein is formulated for parenteral (e.g., intravenous, subcutaneous, intramuscular) administration. In other instances, the pharmaceutical composition describe herein is formulated for oral administration. In still other instances, the pharmaceutical composition describe herein is formulated for intranasal administration.

[0272] In some embodiments, the pharmaceutical formulations include, but are not limited to, aqueous liquid dispersions, self-emulsifying dispersions, solid solutions, liposomal dispersions, aerosols, solid dosage forms, powders, immediate release formulations, controlled release formulations, fast melt formulations, tablets, capsules, pills, delayed release formulations, extended release formulations, pulsatile release formulations, multiparticulate formulations (e.g., nanoparticle formulations), and mixed immediate and controlled release formulations.

[0273] In some embodiments, the pharmaceutical formulations include a carrier or carrier materials selected on the basis of compatibility with the composition disclosed herein, and the release profile properties of the desired dosage form. Exemplary carrier materials include, e.g., binders, suspending agents, disintegration agents, filling agents, surfactants, solubilizers, stabilizers, lubricants, wetting agents, diluents, and the like. Pharmaceutically compatible carrier materials include, but are not limited to, acacia, gelatin, colloidal silicon dioxide, calcium glycerophosphate, calcium lactate, maltodextrin, glycerine, magnesium silicate, polyvinylpyrrolidone (PVP), cholesterol, cholesterol esters, sodium caseinate, soy lecithin, taurocholic acid, phosphatidylcholine, sodium chloride, tricalcium phosphate, dipotassium phosphate, cellulose and cellulose conjugates, sugars sodium stearyl lactylate, carrageenan, monoglyceride, diglyceride, pregelatinized starch, and the like. See, e.g., *Remington: The Science and Practice of Pharmacy*, Nineteenth Ed (Easton, Pa.: Mack Publishing Company, 1995); Hoover, John E., *Remington's Pharmaceutical Sciences*, Mack Publishing Co., Easton, Pennsylvania 1975; Libennan, H.A. and Lachman, L., Eds., *Pharmaceutical Dosage Forms*, Marcel Decker, New York, N.Y., 1980; and

Pharmaceutical Dosage Forms and Drug Delivery Systems, Seventh Ed. (Lippincott Williams & Wilkins 1999).

[0274] In some instances, the pharmaceutical formulations further include pH adjusting agents or buffering agents which include acids such as acetic, boric, citric, lactic, phosphoric and hydrochloric acids; bases such as sodium hydroxide, sodium phosphate, sodium borate, sodium citrate, sodium acetate, sodium lactate and tris-hydroxymethylaminomethane; and buffers such as citrate/dextrose, sodium bicarbonate and ammonium chloride. Such acids, bases and buffers are included in an amount required to maintain pH of the composition in an acceptable range.

[0275] In some instances, the pharmaceutical formulation includes one or more salts in an amount required to bring osmolality of the composition into an acceptable range. Such salts include those having sodium, potassium or ammonium cations and chloride, citrate, ascorbate, borate, phosphate, bicarbonate, sulfate, thiosulfate or bisulfite anions; suitable salts include sodium chloride, potassium chloride, sodium thiosulfate, sodium bisulfite and ammonium sulfate.

[0276] In some instances, the pharmaceutical formulations further include diluent which are used to stabilize compounds because they can provide a more stable environment. Salts dissolved in buffered solutions (which also can provide pH control or maintenance) are utilized as diluents in the art, including, but not limited to a phosphate buffered saline solution. In certain instances, diluents increase bulk of the composition to facilitate compression or create sufficient bulk for homogenous blend for capsule filling. Such compounds can include e.g., lactose, starch, mannitol, sorbitol, dextrose, microcrystalline cellulose such as Avicel[®]; dibasic calcium phosphate, dicalcium phosphate dihydrate; tricalcium phosphate, calcium phosphate; anhydrous lactose, spray-dried lactose; pregelatinized starch, compressible sugar, such as Di-Pac[®] (Amstar); mannitol, hydroxypropylmethylcellulose, hydroxypropylmethylcellulose acetate stearate, sucrose-based diluents, confectioner's sugar; monobasic calcium sulfate monohydrate, calcium sulfate dihydrate; calcium lactate trihydrate, dextrans; hydrolyzed cereal solids, amylose; powdered cellulose, calcium carbonate; glycine, kaolin; mannitol, sodium chloride; inositol, bentonite, and the like.

[0277] In some cases, the pharmaceutical formulations include disintegration agents or disintegrants to facilitate the breakup or disintegration of a substance. The term "disintegrate" include both the dissolution and dispersion of the dosage form when contacted with gastrointestinal fluid. Examples of disintegration agents include a starch, e.g., a natural starch such as corn starch or potato starch, a pregelatinized starch such as National 1551 or Amijel[®], or sodium starch glycolate such as Promogel^{*} or Explotab[®], a cellulose such as a wood product, methylcrystalline cellulose, e.g., Avicel[®], Avicel[®] PH101, Avicel[®] PH102, Avicel[®] PH105, Elcema[®] P100, Emcocel[®], Vivacel[®], Ming Tia[®], and Solka-Floc[®], methylcellulose, croscarmellose, or a cross-linked cellulose, such as cross-linked sodium carboxymethylcellulose (Ac-Di-

Sol[®]), cross-linked carboxymethylcellulose, or cross-linked croscarmellose, a cross-linked starch such as sodium starch glycolate, a cross-linked polymer such as crospovidone, a cross-linked polyvinylpyrrolidone, alginate such as alginic acid or a salt of alginic acid such as sodium alginate, a clay such as Veegum[®] HV (magnesium aluminum silicate), a gum such as agar, guar, locust bean, Karaya, pectin, or tragacanth, sodium starch glycolate, bentonite, a natural sponge, a surfactant, a resin such as a cation-exchange resin, citrus pulp, sodium lauryl sulfate, sodium lauryl sulfate in combination starch, and the like.

[0278] In some instances, the pharmaceutical formulations include filling agents such as lactose, calcium carbonate, calcium phosphate, dibasic calcium phosphate, calcium sulfate, microcrystalline cellulose, cellulose powder, dextrose, dextrans, dextran, starches, pregelatinized starch, sucrose, xylitol, lactitol, mannitol, sorbitol, sodium chloride, polyethylene glycol, and the like.

[0279] Lubricants and glidants are also optionally included in the pharmaceutical formulations described herein for preventing, reducing or inhibiting adhesion or friction of materials. Exemplary lubricants include, e.g., stearic acid, calcium hydroxide, talc, sodium stearyl fumarate, a hydrocarbon such as mineral oil, or hydrogenated vegetable oil such as hydrogenated soybean oil (Sterotex[®]), higher fatty acids and their alkali-metal and alkaline earth metal salts, such as aluminum, calcium, magnesium, zinc, stearic acid, sodium stearates, glycerol, talc, waxes, Stearowet[®], boric acid, sodium benzoate, sodium acetate, sodium chloride, leucine, a polyethylene glycol (e.g., PEG-4000) or a methoxypolyethylene glycol such as Carbowax[™], sodium oleate, sodium benzoate, glyceryl behenate, polyethylene glycol, magnesium or sodium lauryl sulfate, colloidal silica such as Syloid[™], Cab-O-Sil[®], a starch such as corn starch, silicone oil, a surfactant, and the like.

[0280] Plasticizers include compounds used to soften the microencapsulation material or film coatings to make them less brittle. Suitable plasticizers include, e.g., polyethylene glycols such as PEG 300, PEG 400, PEG 600, PEG 1450, PEG 3350, and PEG 800, stearic acid, propylene glycol, oleic acid, triethyl cellulose and triacetin. Plasticizers can also function as dispersing agents or wetting agents.

[0281] Solubilizers include compounds such as triacetin, triethylcitrate, ethyl oleate, ethyl caprylate, sodium lauryl sulfate, sodium docusate, vitamin E TPGS, dtmethylacetamide, N-methylpyrrolidone, N-hydroxyethylpyrrolidone, polyvinylpyrrolidone, hydroxypropylmethyl cellulose, hydroxypropyl cyclodextrins, ethanol, n-butanol, isopropyl alcohol, cholesterol, bile salts, polyethylene glycol 200-600, glycofurol, transcitol, propylene glycol, and dimethyl isosorbide and the like.

[0282] Stabilizers include compounds such as any antioxidation agents, buffers, acids, preservatives and the like.

[0283] Suspending agents include compounds such as polyvinylpyrrolidone, e.g., polyvinylpyrrolidone K12, polyvinylpyrrolidone K17, polyvinylpyrrolidone K25, or polyvinylpyrrolidone K30, vinyl

pyrrolidone/vinyl acetate copolymer (S630), polyethylene glycol, e.g., the polyethylene glycol can have a molecular weight of about 300 to about 6000, or about 3350 to about 4000, or about 7000 to about 5400, sodium carboxymethylcellulose, methylcellulose, hydroxypropylmethylcellulose, hydroxymethylcellulose acetate stearate, polysorbate-80, hydroxyethylcellulose, sodium alginate, gums, such as, e.g., gum tragacanth and gum acacia, guar gum, xanthans, including xanthan gum, sugars, cellulosics, such as, e.g., sodium carboxymethylcellulose, methylcellulose, sodium carboxymethylcellulose, hydroxypropylmethylcellulose, hydroxyethylcellulose, polysorbate-80, sodium alginate, polyethoxylated sorbitan monolaurate, polyethoxylated sorbitan monolaurate, povidone and the like.

[0284] Surfactants include compounds such as sodium lauryl sulfate, sodium docusate, Tween 60 or 80, triacetin, vitamin E TPGS, sorbitan monooleate, polyoxyethylene sorbitan monooleate, polysorbates, polaxomers, bile salts, glyceryl monostearate, copolymers of ethylene oxide and propylene oxide, e.g., Pluronic* (BASF), and the like. Additional surfactants include polyoxyethylene fatty acid glycerides and vegetable oils, e.g., polyoxyethylene (60) hydrogenated castor oil; and polyoxyethylene alkylethers and alkylphenyl ethers, e.g., octoxynol 10, octoxynol 40. Sometimes, surfactants is included to enhance physical stability or for other purposes.

[0285] Viscosity enhancing agents include, e.g., methyl cellulose, xanthan gum, carboxymethyl cellulose, hydroxypropyl cellulose, hydroxypropylmethyl cellulose, hydroxypropylmethyl cellulose acetate stearate, hydroxypropylmethyl cellulose phthalate, carbomer, polyvinyl alcohol, alginates, acacia, chitosans, and combinations thereof.

[0286] Wetting agents include compounds such as oleic acid, glyceryl monostearate, sorbitan monooleate, sorbitan monolaurate, triethanolamine oleate, polyoxyethylene sorbitan monooleate, polyoxyethylene sorbitan monolaurate, sodium docusate, sodium oleate, sodium lauryl sulfate, sodium docusate, triacetin, Tween 80, vitamin E TPGS, ammonium salts, and the like.

Therapeutic regimens for a pharmaceutical composition

[0287] In some embodiments, pharmaceutical compositions described herein are administered for therapeutic applications. In some embodiments, the pharmaceutical composition is administered once per day, twice per day, three times per day or more. The pharmaceutical composition is administered daily, every day, every alternate day, five days a week, once a week, every other week, two weeks per month, three weeks per month, once a month, twice a month, three times per month, or more. The pharmaceutical composition is administered for at least 1 month, 2 months, 3 months, 4 months, 5 months, 6 months, 7 months, 8 months, 9 months, 10 months, 11 months, 12 months, 18 months, 2 years, 3 years, or more.

[0288] In the case wherein the patient's status does improve, upon the doctor's discretion the administration of the composition is given continuously; alternatively, the dose of the composition being administered is temporarily reduced or temporarily suspended for a certain length of time (i.e., a "drug holiday"). In some instances, the length of the drug holiday varies between 2 days and 1 year, including by way of example only, 2 days, 3 days, 4 days, 5 days, 6 days, 7 days, 10 days, 12 days, 15 days, 20 days, 28 days, 35 days, 50 days, 70 days, 100 days, 120 days, 150 days, 180 days, 200 days, 250 days, 280 days, 300 days, 320 days, 350 days, or 365 days. The dose reduction during a drug holiday is from 10%-100%, including, by way of example only, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, or 100%.

[0289] Once improvement of the patient's conditions has occurred, a maintenance dose is administered if necessary. Subsequently, the dosage or the frequency of administration, or both, can be reduced, as a function of the symptoms, to a level at which the improved disease, disorder or condition is retained.

[0290] In some embodiments, the amount of a given agent that corresponds to such an amount varies depending upon factors such as the particular compound, the severity of the disease, the identity (e.g., weight) of the subject or host in need of treatment, but nevertheless is routinely determined in a manner known in the art according to the particular circumstances surrounding the case, including, e.g., the specific agent being administered, the route of administration, and the subject or host being treated. In some instances, the desired dose is conveniently presented in a single dose or as divided doses administered simultaneously (or over a short period of time) or at appropriate intervals, for example as two, three, four or more sub-doses per day.

[0291] The foregoing ranges are merely suggestive, as the number of variables in regard to an individual treatment regime is large, and considerable excursions from these recommended values are not uncommon. Such dosages are altered depending on a number of variables, not limited to the activity of the compound used, the disease or condition to be treated, the mode of administration, the requirements of the individual subject, the severity of the disease or condition being treated, and the judgment of the practitioner.

[0292] In some embodiments, toxicity and therapeutic efficacy of such therapeutic regimens are determined by standard pharmaceutical procedures in cell cultures or experimental animals, including, but not limited to, the determination of the LD50 (the dose lethal to 50% of the population) and the ED50 (the dose therapeutically effective in 50% of the population). The dose ratio between the toxic and therapeutic effects is the therapeutic index and it is expressed as the ratio between LD50 and ED50. Compounds exhibiting high therapeutic indices are preferred. The data obtained from cell culture assays and animal studies are used in formulating a range of dosage for use in human. The dosage of such compounds lies preferably within a range of circulating concentrations that include the ED50 with minimal toxicity. The

dosage varies within this range depending upon the dosage form employed and the route of administration utilized.

Kits/Article of Manufacture

[0293] Disclosed herein, in certain embodiments, are kits and articles of manufacture for use with one or more methods described herein. Such kits include a carrier, package, or container that is compartmentalized to receive one or more containers such as vials, tubes, and the like, each of the container's) comprising one of the separate elements to be used in a method described herein. Suitable containers include, for example, bottles, vials, syringes, and test tubes. In one embodiment, the containers are formed from a variety of materials such as glass or plastic.

[0294] The articles of manufacture provided herein contain packaging materials. Examples of pharmaceutical packaging materials include, but are not limited to, blister packs, bottles, tubes, bags, containers, bottles, and any packaging material suitable for a selected formulation and intended mode of administration and treatment.

[0295] For example, the container(s) include a small molecule fragment disclosed herein or an antibody that recognizes a cysteine-containing polypeptide-small molecule fragment adduct described herein. Such kits optionally include an identifying description or label or instructions relating to its use in the methods described herein.

[0296] A kit typically includes labels listing contents and/or instructions for use, and package inserts with instructions for use. A set of instructions will also typically be included.

[0297] In one embodiment, a label is on or associated with the container. In one embodiment, a label is on a container when letters, numbers or other characters forming the label are attached, molded or etched into the container itself; a label is associated with a container when it is present within a receptacle or carrier that also holds the container, e.g., as a package insert. In one embodiment, a label is used to indicate that the contents are to be used for a specific therapeutic application. The label also indicates directions for use of the contents, such as in the methods described herein.

[0298] In certain embodiments, the pharmaceutical compositions are presented in a pack or dispenser device which contains one or more unit dosage forms containing a compound provided herein. The pack, for example, contains metal or plastic foil, such as a blister pack. In one embodiment, the pack or dispenser device is accompanied by instructions for administration. In one embodiment, the pack or dispenser is also accompanied with a notice associated with the container in form prescribed by a governmental agency regulating the manufacture, use, or sale of pharmaceuticals, which notice is reflective of approval by the agency of the form of the drug for human or veterinary administration. Such notice, for example, is the labeling approved by the U.S. Food and Drug Administration for prescription

drugs, or the approved product insert. In one embodiment, compositions containing a compound provided herein formulated in a compatible pharmaceutical carrier are also prepared, placed in an appropriate container, and labeled for treatment of an indicated condition.

Certain Terminology

[0299] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as is commonly understood by one of skill in the art to which the claimed subject matter belongs. It is to be understood that the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of any subject matter claimed. In this application, the use of the singular includes the plural unless specifically stated otherwise. It must be noted that, as used in the specification and the appended claims, the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. In this application, the use of "or" means "and/or" unless stated otherwise. Furthermore, use of the term "including" as well as other forms, such as "include", "includes," and "included," is not limiting.

[0300] As used herein, ranges and amounts can be expressed as "about" a particular value or range. About also includes the exact amount. Hence "about 5 μL " means "about 5 μL " and also "5 μL ." Generally, the term "about" includes an amount that would be expected to be within experimental error.

[0301] The section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

[0302] As used herein, the terms "individual(s)", "subject(s)" and "patient(s)" mean any mammal. In some embodiments, the mammal is a human. In some embodiments, the mammal is a non-human. None of the terms require or are limited to situations characterized by the supervision (e.g. constant or intermittent) of a health care worker (e.g. a doctor, a registered nurse, a nurse practitioner, a physician's assistant, an orderly or a hospice worker).

[0303] "Antibodies" and "immunoglobulins" (Igs) are glycoproteins having the same structural characteristics. The terms are used synonymously. In some instances, the antigen specificity of the immunoglobulin is known.

[0304] The term "antibody" is used in the broadest sense and covers fully assembled antibodies, antibody fragments that can bind antigen (e.g., Fab, **F(ab')₂**, Fv, single chain antibodies, diabodies, antibody chimeras, hybrid antibodies, bispecific antibodies, humanized antibodies, and the like), and recombinant peptides comprising the foregoing.

[0305] The terms "monoclonal antibody" and "mAb" as used herein refer to an antibody obtained from a substantially homogeneous population of antibodies, i.e., the individual antibodies comprising the

population are identical except for possible naturally occurring mutations that may be present in minor amounts.

[0306] Native antibodies" and "native immunoglobulins" are usually heterotetrameric glycoproteins of about 150,000 daltons, composed of two identical light (L) chains and two identical heavy (H) chains. Each light chain is linked to a heavy chain by one covalent disulfide bond, while the number of disulfide linkages varies among the heavy chains of different immunoglobulin isotypes. Each heavy and light chain also has regularly spaced intrachain disulfide bridges. Each heavy chain has at one end a variable domain (V_H) followed by a number of constant domains. Each light chain has a variable domain at one end (V_L) and a constant domain at its other end; the constant domain of the light chain is aligned with the first constant domain of the heavy chain, and the light chain variable domain is aligned with the variable domain of the heavy chain. Particular amino acid residues are believed to form an interface between the light and heavy-chain variable domains.

[0307] The term "variable" refers to the fact that certain portions of the variable domains differ extensively in sequence among antibodies. Variable regions confer antigen-binding specificity. However, the variability is not evenly distributed throughout the variable domains of antibodies. It is concentrated in three segments called complementarity determining regions (CDRs) or hypervariable regions, both in the light chain and the heavy-chain variable domains. The more highly conserved portions of variable domains are called in the framework (FR) regions. The variable domains of native heavy and light chains each comprise four FR regions, largely adopting a β -pleated-sheet configuration, connected by three CDRs, which form loops connecting, and in some cases forming part of, the β -pleated-sheet structure. The CDRs in each chain are held together in close proximity by the FR regions and, with the CDRs from the other chain, contribute to the formation of the antigen-binding site of antibodies (see, Kabat et al. (1991) N1H PubL. No. 91-3242, Vol. I, pages 647-669). The constant domains are not involved directly in binding an antibody to an antigen, but exhibit various effector functions, such as Fc receptor (FcR) binding, participation of the antibody in antibody-dependent cellular toxicity, initiation of complement dependent cytotoxicity, and mast cell degranulation.

[0308] The term "hypervariable region," when used herein, refers to the amino acid residues of an antibody that are responsible for antigen-binding. The hypervariable region comprises amino acid residues from a "complementarily determining region" or "CDR" (i.e., residues 24-34 (L1), 50-56 (L2), and 89-97 (L3) in the light-chain variable domain and 31-35 (H1), 50-65 (H2), and 95-102 (H3) in the heavy-chain variable domain; Kabat et al. (1991) Sequences of Proteins of Immunological Interest, 5th Ed. Public Health Service, National Institute of Health, Bethesda, Md.) and/or those residues from a "hypervariable loop" (i.e., residues 26-32 (L1), 50-52 (L2), and 91-96 (L3) in the light-chain variable domain and (H1), 53-55 (H2), and 96-101 (H3) in the heavy chain variable domain; Clothia and Lesk,

(1987) J. Mol. Biol., 196:901-917). "Framework" or "FR" residues are those variable domain residues other than the hypervariable region residues, as herein deemed.

[0309] "Antibody fragments" comprise a portion of an intact antibody, preferably the antigen-binding or variable region of the intact antibody. Examples of antibody fragments include Fab, Fab, F(ab')₂, and Fv fragments; diabodies; linear antibodies (Zapata et al. (1995) Protein Eng. 10:1057-1062); single-chain antibody molecules; and multispecific antibodies formed from antibody fragments. Papain digestion of antibodies produces two identical antigen-binding fragments, called "Fab" fragments, each with a single antigen-binding site, and a residual "Fc" fragment, whose name reflects its ability to crystallize readily. Pepsin treatment yields an F(ab')₂ fragment that has two antigen-combining sites and is still capable of cross-linking antigen.

[0310] "Fv" is the minimum antibody fragment that contains a complete antigen recognition and binding site. This region consists of a dimer of one heavy- and one light-chain variable domain in tight, non-covalent association. It is in this configuration that the three CDRs of each variable domain interact to define an antigen-binding site on the surface of the **VH-V_L** dimer. Collectively, the six CDRs confer antigen-binding specificity to the antibody. However, even a single variable domain (or half of an Fv comprising only three CDRs specific for an antigen) has the ability to recognize and bind antigen, although at a lower affinity than the entire binding site.

[0311] The Fab fragment also contains the constant domain of the light chain and the first constant domain (**C_{HL}**) of the heavy chain. Fab fragments differ from Fab' fragments by the addition of a few residues at the carboxy terminus of the heavy chain **CH1** domain including one or more cysteines from the antibody hinge region. Fab'-SH is the designation herein for Fab' in which the cysteine residue(s) of the constant domains bear a free thiol group. Fab' fragments are produced by reducing the F(ab')₂ fragment's heavy chain disulfide bridge. Other chemical couplings of antibody fragments are also known.

[0312] The "light chains" of antibodies (immunoglobulins) from any vertebrate species can be assigned to one of two clearly distinct types, called kappa (κ) and lambda (λ), based on the amino acid sequences of their constant domains.

[0313] Depending on the amino acid sequence of the constant domain of their heavy chains, immunoglobulins can be assigned to different classes. There are five major classes of human immunoglobulins: IgA, IgD, IgE, IgG, and IgM, and several of these may be further divided into subclasses (isotypes), e.g., IgG1, IgG2, IgG3, IgG4, IgA1, and IgA2. The heavy-chain constant domains that correspond to the different classes of immunoglobulins are called alpha, delta, epsilon, gamma, and mu, respectively. The subunit structures and three-dimensional configurations of different classes of immunoglobulins are well known. Different isotypes have different effector functions. For example, human IgG1 and IgG3 isotypes have ADCC (antibody dependent cell-mediated cytotoxicity) activity.

[0314] The term "alkyl" as used herein is a branched or unbranched saturated hydrocarbon group of 1 to 24 carbon atoms, such as methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, s-butyl, t-butyl, n-pentyl, isopentyl, s-pentyl, neopentyl, hexyl, heptyl, octyl, nonyl, decyl, dodecyl, tetradecyl, hexadecyl, eicosyl, tetracosyl, and the like. It is understood that the alkyl group is acyclic. In some instances, the alkyl group is branched or unbranched. In some instances, the alkyl group is also substituted or unsubstituted. For example, the alkyl group is substituted with one or more groups including, but not limited to, alkyl, cycloalkyl, alkoxy, amino, ether, halide, hydroxy, nitro, silyl, sulfo-oxo, or thiol. A "lower alkyl" group is an alkyl group containing from one to six (e.g., from one to four) carbon atoms. In some instances, the term alkyl group is also a C1 alkyl, C1-C2 alkyl, C1-C3 alkyl, C1-C4 alkyl, C1-C5 alkyl, C1-C6 alkyl, C1-C7 alkyl, C1-C8 alkyl, C1-C9 alkyl, C1-C10 alkyl, and the like up to and including a C1-C24 alkyl.

[0315] The term "aryl" as used herein is a group that contains any carbon-based aromatic group including, but not limited to, benzene, naphthalene, phenyl, biphenyl, anthracene, and the like. The aryl group can be substituted or unsubstituted. In some instances, the aryl group is substituted with one or more groups including, but not limited to, alkyl, cycloalkyl, alkoxy, alkenyl, cycloalkenyl, alkynyl, cycloalkynyl, aryl, heteroaryl, aldehyde, $\text{—N}^{\frac{3}{4}}$, carboxylic acid, ester, ether, halide, hydroxy, ketone, azide, nitro, silyl, sulfo-oxo, or thiol. The term "biaryl" is a specific type of aryl group and is included in the definition of "aryl." In addition, the aryl group is optionally a single ring structure or comprise multiple ring structures that are either fused ring structures or attached via one or more bridging groups such as a carbon-carbon bond. For example, biaryl refers to two aryl groups that are bound together via a fused ring structure, as in naphthalene, or are attached via one or more carbon-carbon bonds, as in biphenyl.

EXAMPLES

[0316] These examples are provided for illustrative purposes only and not to limit the scope of the claims provided herein.

Example 1

General Synthetic Methods

[0317] Chemicals and reagents were purchased from a variety of vendors, including Sigma Aldrich, Acros, Fisher, Fluka, Santa Cruz, CombiBlocks, BioBlocks, and Matrix Scientific, and were used without further purification, unless noted otherwise. Anhydrous solvents were obtained as commercially available pre-dried, oxygen-free formulations. Flash chromatography was carried out using 230-400 mesh silica gel. Preparative thin layer chromatography (PTLC) was carried out using glass backed PTLC plates 500-2000 μm thickness (Analtech). All reactions were monitored by thin layer chromatography carried out on 0.25 mm E. Merck silica gel plates (60F-254) and visualized with UV light, or by ninhydrin, ethanolic

phosphomolybdic acid, iodine, *p*-anisaldehyde or potassium permanganate stain. NMR spectra were recorded on Varian INOVA-400, Bruker DRX-600 or Bruker DRX-500 spectrometers in the indicated solvent. Multiplicities are reported with the following abbreviations: s singlet; d doublet; t triplet; q quartet; p pentet; m multiplet; br broad. Chemical shifts were reported in ppm relative to TMS and *J* values were reported in Hz. Mass spectrometry data were collected on a HP1 100 single-quadrupole instrument (ESI; low resolution) or an Agilent ESI-TOF instrument (HRMS).

[0318] In some embodiments, General Procedure A was used for the synthesis of one or more of the small molecule fragments and/or cysteine-reactive probes described herein. The amine was dissolved in anhydrous **CH₂Cl₂** (0.2 M) and cooled to 0 °C. To this, anhydrous pyridine (1.5 equiv.) was added in one portion, then chloroacetyl chloride (1.5 equiv.) dropwise and the reaction was monitored by TLC until complete disappearance of starting material and conversion to product was detected (typically 1 h). If the reaction did not proceed to completion, additional aliquots of pyridine (0.5 equiv.) and chloroacetyl chloride (0.5 equiv.) were added. The reaction was quenched with **H₂O** (1 mL), diluted with **CH₂Cl₂** (20 mL), and washed twice with saturated NaHCCb (100 mL). The organic layer was concentrated *in vacuo* and purified by preparatory thin layer or flash column chromatography to afford the desired product. In some embodiments, General Procedure A1 is similar to General Procedure A except triethylamine (3 equiv.) was used instead of pyridine. In some embodiments, General Procedure A2 is similar to General Procedure A except *N*-methylmorpholine (3 equiv.) was used instead of pyridine.

[0319] In some embodiments, General Procedure B was used for the synthesis of one or more of the small molecule fragments and/or cysteine-reactive probes described herein. The amine was dissolved in anhydrous **CH₂Cl₂** (0.2 M) and cooled to 0 °C. To this, triethylamine (TEA, 1.5 equiv.), was added in one portion, then acryloyl chloride (1.5 equiv.) dropwise, and the reaction was monitored by TLC until complete disappearance of starting material and conversion to product was detected (typically 1 h). If the reaction did not proceed to completion, additional aliquots of TEA (0.5 equiv.) and acryloyl chloride (0.5 equiv.) were added. The reaction was quenched with **H₂O** (1 mL), diluted with **CH₂Cl₂** (20 mL), and washed twice with saturated NaHCO₃ (100 mL). The organic layer was passed through a plug of silica, after which, the eluant was concentrated *in vacuo* and purified by preparatory thin layer or flash column chromatography to afford the desired product.

[0320] In some embodiments, General Procedure C was used for the synthesis of one or more of the small molecule fragments and/or cysteine-reactive probes described herein. Acryloyl chloride (80.4 μL, 1.0 mmol, 2 equiv.) was dissolved in anhydrous **CH₂Cl₂** (4 mL) and cooled to 0 °C. A solution of the amine (0.5 mmol, 1 equiv.) and *N*-methylmorpholine (0.16 mL, 1.5 mmol, 3 equiv.) in **CH₂Cl₂** (2 mL) was then added dropwise. The reaction was stirred for 1 hr at 0 °C then allowed to warm up to room temperature slowly. After TLC analysis showed disappearance of starting material, or 6 h, whichever was

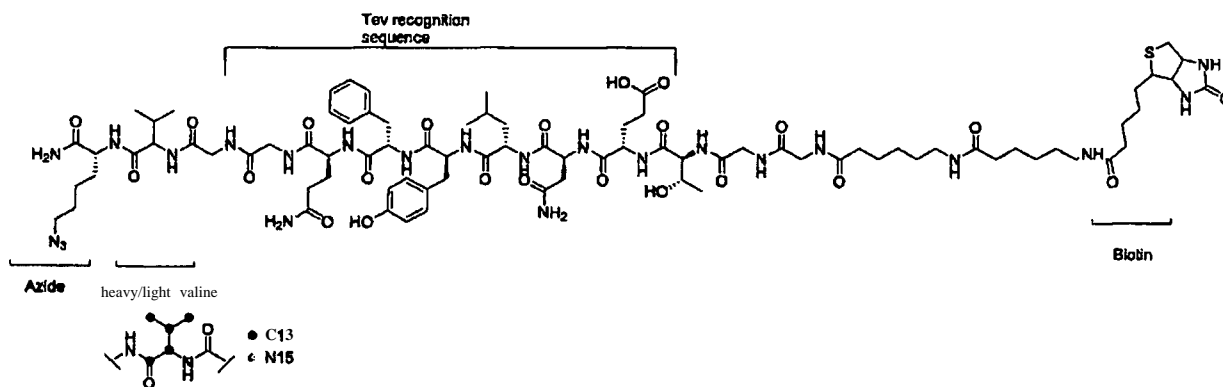
sooner, the reaction was quenched with saturated aqueous **NaHCO₃** (5 mL) and extracted with **CH₂Cl₂** (3 × 10 mL). The combined organic layers were dried over anhydrous **Na₂SO₄**, concentrated *in vacuo*, and the residue obtained was purified by preparatory thin layer chromatography to afford the desired product.

Synthesis of probes and fragments

Purchased fragments

[0321] The following electrophilic fragments were purchased from the indicated vendors. **2** (Santa Cruz Biotechnology sc-345083), **3** (Key Organics JS-092C), **4** (Sigma Aldrich T142433-10mg), **6** (Toronto Research Chemicals M320600), **8** (Alfa Aesar H33763), **10** (Santa Cruz Biotechnology sc-345060), **11** (Santa Cruz Biotechnology sc-354895), **12** (Santa Cruz Biotechnology sc-354966), **21** (Santa Cruz Biotechnology, sc-279681), **22** (Sigma Aldrich 699357-5G), **26** (Sigma Aldrich T109959), **27** (Santa Cruz Biotechnology sc-342184), **28** (Santa Cruz Biotechnology sc-335173), **29** (Santa Cruz Biotechnology sc-348978), **30** (Santa Cruz Biotechnology sc-355362), **32** (Santa Cruz Biotechnology sc-354613), **33** (Sigma Aldrich R996505), **34** (Santa Cruz Biotechnology sc-355477), **35** (Santa Cruz Biotechnology sc-328985), **41** (Sigma Aldrich L469769), **42** (Sigma Aldrich R901946), **43** (Santa Cruz Biotechnology sc-307626), **52** (Enamine, EN300-08075), **55** (Santa Cruz Biotechnology sc-354880), **57** (VWR 100268-442), **58** (Enzo Life Sciences ALX-430-142-M005), **62** (WuXi Apptec).

Synthesis of isotopically-labeled TEV-tags:

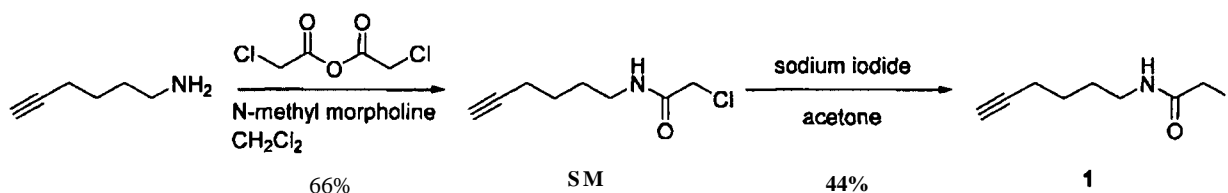


[0322] Isotopically-labeled heavy and light tags were synthesized with minor modifications to the procedure reported in Weerapana *et al. Nat Protoc* 2:1414-1425 (2007) and Weerapana *et al. Nature* 468:790-795 (2010). Fmoc-Rink-Amide-MBHA resin (EMD Biosciences; 0.5 M, 830 mg, 0.6 mmol / g loading) was deprotected with 4-methylpiperidine in DMF (50% v/v, 2 × 5 mL, 1 min). Fmoc-Lys(N₃)-OH (Anaspec) (500 mg, 1.26 mmol, 1.26 equiv.) was coupled to the resin overnight at room temperature with DIEA (113 μl) and 2-(6-chloro-1H-benzotriazole-1-yl)-1,1,3,3-tetramethylammonium hexafluorophosphate (HCTU; 1.3 mL of 0.5 M stock in DMF) followed by a second overnight coupling with Fmoc-Lys(N₃)-OH (500 mg, 1.26 mmol, 1.26 equiv.), DIEA (113 μl), 0-(7-azabenzotriazol-1-yl)-N,N,N',N'-tetramethyluronium hexafluorophosphate (HATU; 1.3 mL of 0.5 M stock in DMF).

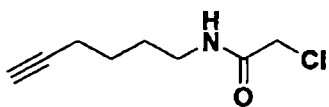
Unmodified resin was then capped (2 x 30 min) with Ac₂O (400 μl) and DIEA (700 μL) in DMF after which the resin was washed with DMF (2 x 1 min). Deprotection with 4-methylpiperidine in DMF (50% v/v, 2 x 5 mL, 1 min) and coupling cycles (4 equiv. Fmoc-protected amino acid (EMD biosciences) in DMF) with HCTU (2 mL, 0.5 M in DMF) and DIEA (347.7 μL) were then repeated for the remaining amino acids. For the heavy TEV-tag, Fmoc-Valine-OH (¹³C₅C₁₅H₂₁¹⁵N₀₄, ³C₅, 97-99%, ⁵N, 97-99%, Cambridge Isotope Laboratories, Inc.) was used. Reactions were monitored by ninhydrin stain and dual couplings were used for all steps that did not go to completion. Biotin (0.24 g, 2 equiv.) was coupled for two days at room temperature with NHS (0.1 g, 2 equiv.), DIC (0.16 g, 2 equiv.) and DIEA (0.175 g, 2 equiv.). The resin was then washed with DMF (5 mL, 2 x 1 min) followed by 1:1 CH₂Cl₂:MeOH (5 mL, 2 x 1 min), dried under a stream of nitrogen and transferred to a round-bottom flask. The peptides were cleaved for 90 minutes from the resin by treatment with 95:2.5:2.5 trifluoroacetic acid: water:triisopropylsilane. The resin was removed by filtration and the remaining solution was triturated with cold ether to provide either the light or heavy TEV-tag as a white solid. HPLC-MS revealed only minor impurities and the compounds were used without further purification. HRMS-ESI (m/z): calculated for C₈₃H₁₂₈N₂302₃S [M+H]: (Light-TEV-Tag) 1846.9268; found: 1846.9187; calculated for C₇₈³C₅H₁₂₈N₂⁵N₀2₃S [M+H]: (Heavy-TEV-Tag): 1852.9237; found: 1852.9309.

Synthesis of probes and fragments

Synthesis of 1

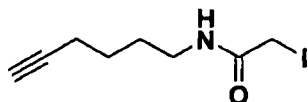


N-(hex-5-yn-1-yl)-2-chloroacetamide (SI-1)



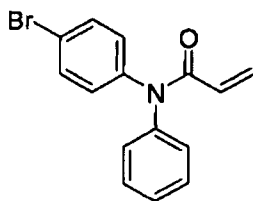
[0323] To a solution of 5-hexynylamine (63 mg, 0.65 mmol, 1.0 equiv.) in CH₂Cl₂ (3.2 mL, 0.2 M) at 0 °C was added N-methylmorpholine (215 μL, 3 equiv.) followed by chloroacetic anhydride portionwise (222 mg, 2 equiv.). The reaction was allowed to come to room temperature and then stirred overnight. The reaction was then diluted with ether (50 mL), washed with 1 M HCl, 1 M NaOH, then brine (20 mL each). The combined organic layers were dried over magnesium sulfate and concentrated to yield chloroacetamide SI-1 (74 mg, 66%). ¹H NMR (400 MHz, Chloroform-*rf*) δ 6.79 (s, 1H), 4.09 (d, *J* = 1.1 Hz, 2H), 3.34 (q, *J* = 6.8 Hz, 2H), 2.23 (td, *J* = 6.9, 2.7 Hz, 2H), 1.98 (t, *J* = 2.7 Hz, 1H), 1.75 - 1.62 (m, 4H), 1.62 - 1.51 (m, 2H).

N-(hex-5-yn-1-yl)-2-iodoacetamide (**1**)



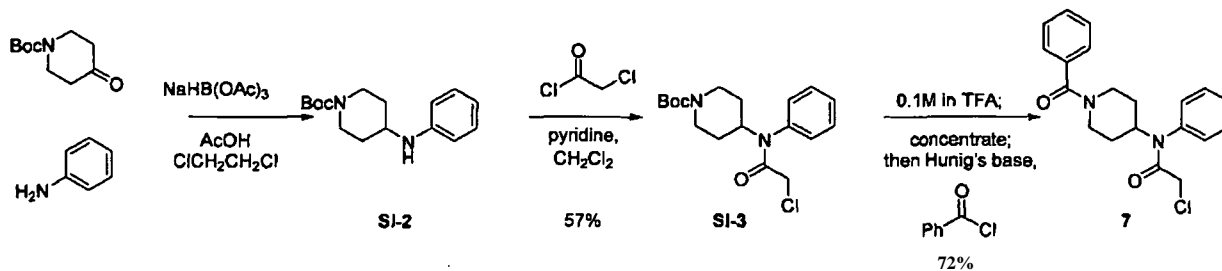
[0324] To a solution of chloroacetamide **SI-1** (36.1 mg, 0.2 mmol) in acetone (1 mL, 0.2 M) was added sodium iodide (47 mg, 1.5 equiv.) and the reaction was stirred overnight. The next day the reaction was filtered through a plug of silica eluting with 20% ethyl acetate in hexanes, and the filtrate was concentrated to yield a 10:1 mixture of the desired iodoacetamide **1** and starting material. This mixture was re-subjected to the reaction conditions for one further day, at which point complete conversion was observed. The product was purified by silica gel chromatography, utilizing a gradient of 5 to 10 to 15 to 20% ethyl acetate in hexanes to yield the desired product (24 mg, 44%). In some embodiments, the reaction is performed with 2.5 equiv. of sodium iodide, in which case re-subjection is not necessary, and purification by PTLC is accomplished in 30% EtOAc/hexanes as eluent. ¹H NMR (500 MHz, Chloroform-*d*) δ 6.16 (s, 1H), 3.69 (s, 2H), 3.30 (q, *J* = 6.8 Hz, 2H), 2.23 (td, *J* = 6.8, 2.6 Hz, 2H), 1.97 (t, *J* = 2.6 Hz, 1H), 1.75 - 1.61 (m, 2H), 1.61 - 1.52 (m, 2H).

N-(4-bromophenyl)-*N*-phenylacrylamide (**5**)

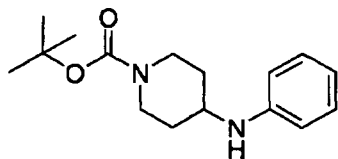


[0325] The title compound was synthesized according to General Procedure C from 4-bromophenylaniline (18.9 mg, 0.0762 mmol, 1 equiv.). Purification of the crude product by prep. TLC (30% EtOAc / hexanes) provided the title compound as a white solid (12.5 mg, 54%). ¹H NMR (500 MHz, Chloroform-*d*) δ 7.47 (d, *J* = 8.2 Hz, 2H), 7.39 (t, *J* = 7.6 Hz, 2H), 7.32 (d, *J* = 7.4 Hz, 1H), 7.21 (d, *J* = 7.7 Hz, 2H), 7.12 (d, *J* = 8.2 Hz, 2H), 6.48 (d, *J* = 16.7 Hz, 1H), 6.17 (dd, *J* = 16.8, 10.3 Hz, 1H), 5.65 (d, *J* = 10.3 Hz, 1H); HRMS-ESI (*m/z*) calculated for C₁₅H₁₁BrNO [M+H]⁺: 302.0175; found: 302.0176.

Synthesis of **7**

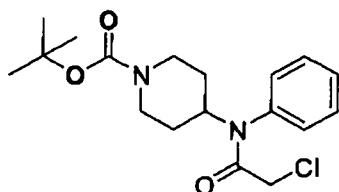


tert-butyl 4-(phenylamino)piperidine-1-carboxylate (**SI-2**)



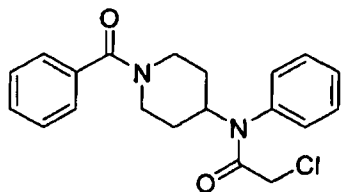
SI-2 was prepared according to Thoma *et al*, *J. Med. Chem.* **47**:1939-1955 (2004). ¹H NMR (400 MHz, Chloroform-*d*₃) δ 7.24 - 7.12 (m, 2H), 6.75 - 6.68 (m, 1H), 6.66 - 6.58 (m, 2H), 3.88 - 3.81 (m, 1H), 3.44 (tt, J = 10.4, 3.9 Hz, 2H), 3.00 - 2.88 (m, 2H), 2.10 - 1.99 (m, 2H), 1.48 (bs 9H), 1.41 - 1.27 (m, 2H).

tert-butyl 4-(2-chloro-N-phenylacetamido)piperidine-1-carboxylate (SI-3)



[0326] To a solution of aniline **SI-2** (65 mg, 0.24 mmol) at 0 °C in CH₂Cl₂ (0.6 mL) was added pyridine (38 μL, 2 equiv.) followed by chloroacetyl chloride (37.4 μL, 2.0 equiv.) in CH₂Cl₂ (0.6 mL). The resulting solution was allowed to warm to room temperature and stirred overnight. The solution was then quenched with saturated aqueous sodium bicarbonate, extracted with Et₂O (3 × 10 mL). The combined organic layers were dried over magnesium sulfate, filtered and concentrated to give an off-white solid, which was used without further purification (47 mg, 57%). ¹H NMR (400 MHz, Chloroform-*d*₃) δ 7.47 - 7.38 (m, 3H), 7.18 - 7.03 (m, 2H), 4.75 - 4.63 (m, 1H), 4.07 (s, 2H), 3.68 (s, 2H), 2.76 (s, 2H), 1.84 - 1.69 (m, 2H), 1.35 (s, 9H), 1.27 - 1.12 (m, 2H).

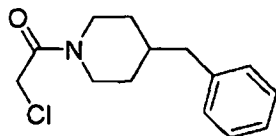
N-(1-benzoylpiperidin-4-yl)-2-chloro-N-phenylacetamide (7)



[0327] To neat **SI-3** (47 mg, 0.128 mmol) was added trifluoroacetic acid (0.7 mL, final 0.2 M). The resulting solution was concentrated under a stream of nitrogen until no further evaporation was observed, providing the deprotected amine as its trifluoroacetate salt. This viscous gum was then treated with triethylamine in ethyl acetate (10% v/v, 2 mL; solution smokes upon addition). The resulting solution was concentrated to afford the free base, which contained only triethylammonium trifluoroacetate and the free amine by proton NMR. A stock solution was prepared by dissolving the resulting gum in CH₂Cl₂ (1.2 mL, -0.1 M final).

[0328] The deprotected amine (0.3 mL of stock solution, 0.0319 mmol) was treated with Hunig's base (17.5 μ L, 3 equiv.) and benzoyl chloride (7.6 μ L, 2.0 equiv.). This solution was stirred overnight, quenched with saturated aqueous sodium bicarbonate, extracted with Et₂O (3 \times 10 mL). The resulting solution was dried over magnesium sulfate, filtered and concentrated. The resulting oil was purified by silica gel chromatography (20% EtOAc/hexanes) to afford chloroacetamide 7 as a white solid (8.6 mg, 75%). ¹H NMR (500 MHz, Chloroform-*d*) δ 7.55 (dd, *J* = 5.5, 3.0 Hz, 3H), 7.50 - 7.32 (m, 5H), 7.21 (s, 2H), 4.92 (tt, *J* = 12.3, 4.0 Hz, 1H), 4.87 (s, 1H), 3.87 (s, 1H), 3.78 (s, 2H), 3.21 (s, 1H), 2.97 - 2.90 (m, 1H), 2.01 (s, 1H), 1.90 (s, 1H), 1.45 (s, 1H), 1.36 - 1.26 (m, 1H); HRMS-ESI (*m/z*) calculated for C₂₀H₂₂ClN₂O₂ [M+H]: 357.1364; found: 357.1362.

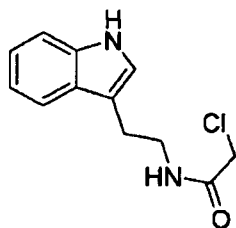
l-(4-benzylpiperidin-1-yl)-2-chloroethan-1-one (9)



[0329] Following General Procedure A, starting from 4-benzylpiperidine (840 mg, 5.2 mmol, 1 equiv.), the desired compound was obtained after column chromatography as a yellow oil (1 g, 81%).

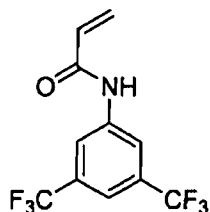
Spectroscopic data matches those reported previously reported in Papadopoulou *et al. J. Med. Chem.* 55:5554-5565 (2012). ¹H NMR (500 MHz, Chloroform-*d*) δ 7.42 - 7.14 (m, 5H), 4.61 (d, *J* = 13.4 Hz, 1H), 4.14 (q, *J* = 21.9, 11.5 Hz, 2H), 3.89 (d, *J* = 13.5, 1H), 3.11 (td, *J* = 13.1, 2.7 Hz, 1H), 2.69 - 2.57 (m, 3H), 1.92 - 1.75 (m, 3H), 1.40 - 1.21 (m, 2H); HRMS-ESI (*m/z*) calculated for C₁₄H₁₉ClNO [M+H]: 252.115; found: 252.115.

N-(2-(1*H*-indol-3-yl)ethyl)-2-chloroacetamide (13)



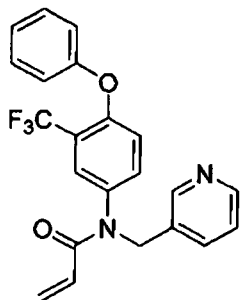
[0330] Following General Procedure A, starting from tryptamine (400 mg, 2.5 mmol, 1 equiv.), the desired compound was obtained after column chromatography as a brownish solid (460 mg, 77%). ¹H NMR (500 MHz, Chloroform-*d*) δ 8.55 (s, 1H), 7.70 (d, *J* = 7.9 Hz, 1H), 7.45 (d, *J* = 8.1 Hz, 1H), 7.30 (t, *J* = 7.5 Hz, 1H), 7.23 (t, *J* = 7.4 Hz, 1H), 7.10 (s, 1H), 6.84 (s, 1H), 4.08 (s, 2H), 3.72 (q, *J* = 6.4 Hz, 2H), 3.10 (t, *J* = 6.8 Hz, 2H); HRMS-ESI (*m/z*) calculated for C₁₂H₁₄ClN₂O₂ [M+H]: 237.0789; found: 237.0791.

N-(3,5-bis(trifluoromethyl)phenyl)acrylamide (14)



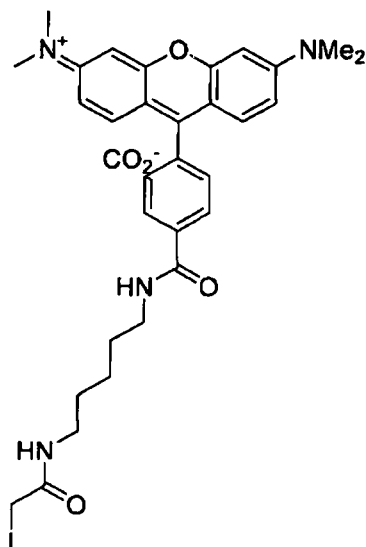
[0331] Following General Procedure B, starting from 3,5-bis(trifluoromethyl)aniline (1.16 g, 5 mmol, 1 equiv.), the desired compound was obtained after column chromatography as a white solid (1.05 g, 74%). ¹H NMR (500 MHz, Chloroform-*d*) δ 8.33 (s, 1H), 8.18 (s, 2H), 7.68 (s, 1H), 6.57 (d, *J* = 17.5 Hz, 1H), 6.38 (dd, *J* = 16.9, 10.3 Hz, 1H), 5.93 (d, *J* = 12.5 Hz, 1H); HRMS-ESI (*m/z*) calculated for C₁₁H₈F₆N₂ [M+H]⁺: 284.0505; found: 284.0504.

N-(4-phenoxy-3-(trifluoromethyl)phenyl)-*N*-(pyridin-3-ylmethyl)acrylamide (15)



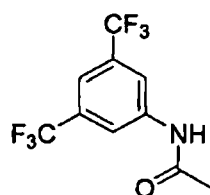
[0332] 4-phenoxy-3-(trifluoromethyl)aniline (260 mg, 1 mmol, 1 equiv.) (Combi-Blocks) was dissolved in TFA (5 mL). Following the reductive amination protocol reported by Bpros *et al. J. Org. Chem* 74:3587-3590 (2009), the reaction mixture was cooled to 0 °C and to this sodium triacetoxyborohydride (STAB) (270 mg, 1.3 mmol, 1.3 equiv.) was added. 3-pyridinecarboxaldehyde (200 mg, 2 mmol, 2 equiv.) was dissolved in CH₂Cl₂ (5 mL) and slowly added to the reaction mixture. Upon complete conversion to product, the reaction was diluted with CH₂Cl₂ (20 mL) and washed with saturated sodium bicarbonate solution (3 * 20 mL) and the organic layer was dried then concentrated under reduced pressure. Without further purification the crude material was dissolved in anhydrous CH₂Cl₂ and subjected to General Procedure B. The resulting crude was purified by prep. TLC to give a white solid (31 mg, 10%). ¹H NMR (500 MHz, Chloroform-*d*) δ 8.52 (d, *J* = 3.5 Hz, 1H), 8.39 (s, 1H), 7.68 (d, *J* = 7.8 Hz, 1H), 7.40 (t, *J* = 7.7 Hz, 2H), 7.34 (s, 1H), 7.28-7.18 (m, 2H), 7.07 (d, *J* = 8.2 Hz, 2H), 6.98 (d, *J* = 7.5 Hz, 1H), 6.82 (d, *J* = 8.8 Hz, 1H), 6.46 (d, *J* = 16.8 Hz, 1H), 6.01 (dd, *J* = 16.2, 10.7 Hz, 1H), 5.64 (d, *J* = 10.3 Hz, 1H), 4.96 (s, 2H). HRMS-ESI (*m/z*) calculated for C₂₂H₁₈F₃N₂O₂ [M+H]⁺: 399.1315; found: 399.1315.

Iodoacetamide-rhodamine (16)



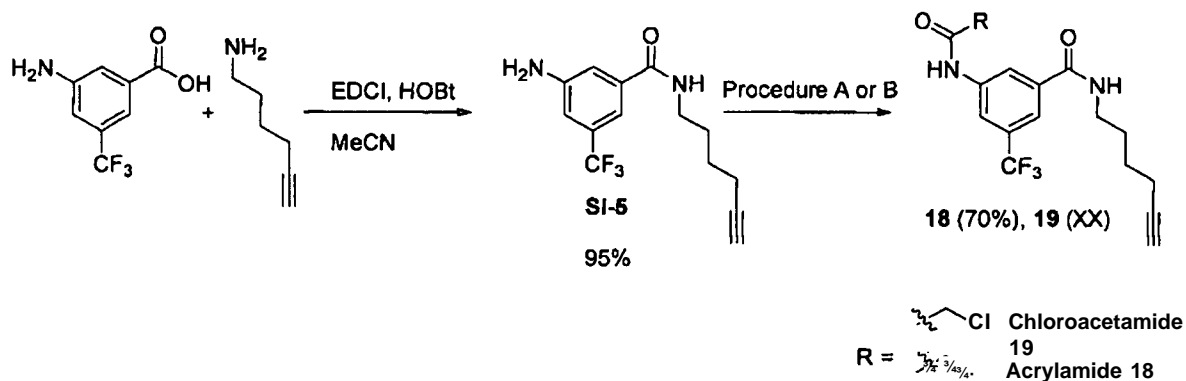
[0333] 5^{and-6})-(N-(5-aminopentyl)rhodamine)carboxamide (tetramethylrhodamine cadaverine) mixed isomers (60 mg, 0.12 mmol, 1 equiv.) were dissolved in anhydrous DMF (500 μ L) with sonication. To this was added DIPEA (60 μ L, 0.34 mmol, 3 equiv.) and chloroacetyl chloride (10 μ L, 0.13 mmol, 1 equiv., diluted 1:10 in DMF) and the reaction was stirred at room temperature for 20 min until complete conversion to the product was detected by TLC. The DMF was removed under a stream of nitrogen and the reaction mixture was separated by PTLC in MeOH:CH₂Cl₂:TEA (15:85:0.001). The chloroacetamide rhodamine was then eluted in MeOH:CH₂Cl₂ (15:85), concentrated under reduced pressure and redissolved in acetone (500 μ L). NaI (150 mg, 1 mmol, 10 equiv.) was added to this and the reaction was stirred for 20 min at 50 °C until complete conversion to product was detected and the crude reaction mixture was purified by reverse phase HPLC on a C18 column and concentrated to yield the title compound as a purple solid that is a mixture of 5 and 6 carboxamide tetramethylrhodamine isomers (ratio ~ 6:1) (10 mg, 12 %). ¹H NMR (600 MHz, Methanol-d₄) δ 8.87 (t, *J* = 4.8 Hz, 0.14 H), 8.80 - 8.71 (m, 1H), 8.41 (dd, *J* = 8.2, 1.1 Hz, 0.86H), 8.35 (br s, 1H), 8.27 (dt, *J* = 7.9, 1.5 Hz, 0.164 H), 8.20 (dt, *J* = 8.2, 1.5 Hz, 0.86H), 7.81 (s, 0.86H), 7.53 (d, *J* = 7.8 Hz, 0.14 H), 7.18 - 7.11 (m, 2H), 7.07 (d, *J* = 9.5 Hz, 2H), 7.00 (s, 2H), 3.68 - 3.62 (m, 2H), 3.46 - 3.37 (m, 2H), 3.31 (s, 12H, obscured by solvent) 3.21 - 3.12 (m, 2H), 1.81 - 1.21 (m, 6H); HRMS-ESI (*m/z*) calculated for C₃₂H₃₆N₄O₅ [M+H]: 683.1725; found: 683.1716.

N-(3,5-bis(trifluoromethyl)phenyl)acetamide (17)

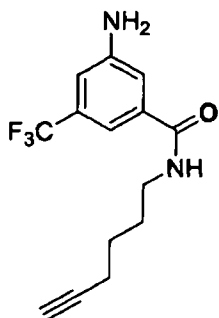


[0334] Following General Procedure A, starting with 3,5-bis(trifluoromethyl)aniline (327 mg, 1.42 mmol, 1 equiv.) and acetic anhydride (200 μ L, 3 mmol, 2 equiv.), the title compound was obtained after PTLC as a white solid (302 mg, 78%). ^1H NMR (500 MHz, Chloroform- d_3) δ 8.10 (s, 2H), 7.72 (s, 1H), 7.68 (s, 1H), 2.32 (d, J = 0.9 Hz, 3H). HRMS-ESI (m/z) calculated for $\text{C}_{11}\text{H}_8\text{F}_6\text{NO}_2$ [M+H]: 284.0505; found: 284.0504.

Synthesis of 18 and 19

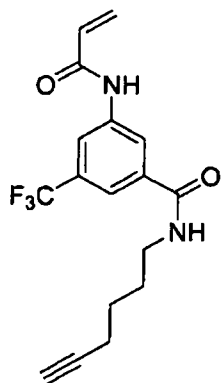


3-amino-N-(hex-5-yn-1-yl)-5-(trifluoromethyl)benzamide (SI-5)



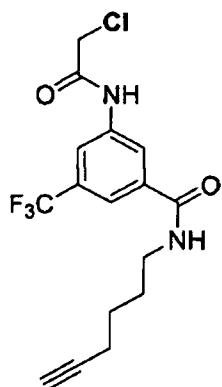
[03351] To a solution of 3-amino-5-(trifluoromethyl)benzoic acid (74 mg, 0.36 mmol) in acetonitrile (3.6 mL, 0.1 M final) was added EDCI (83 mg, 1.2 equiv.) followed by hex-5-ynamine (35 mg, 1.0 equiv.) followed by 1-hydroxybenzotriazole hydrate (HOBT, 66.3 mg, 1.2 equiv.) and the resulting solution was stirred overnight. The reaction was diluted with ethyl acetate, washed with 1 M HCl twice and then brine. The organic layer was dried over magnesium sulfate and concentrated to yield aniline **SI-5** (97.4 mg, 95%) as a white solid. ^1H NMR (400 MHz, Chloroform- d_3) δ 7.29 - 7.22 (m, 2H), 6.98 (t, J = 1.8 Hz, 1H), 6.38 (t, J = 5.5 Hz, 1H), 4.08 (s, 2H), 3.46 (td, J = 7.1, 5.7 Hz, 2H), 2.25 (td, J = 6.9, 2.6 Hz, 2H), 1.99 (t, J = 2.7 Hz, 1H), 1.81 - 1.55 (m, 4H).

3-acrylamido-N-(hex-5-yn-1-yl)-5-(trifluoromethyl)benzamide (18)



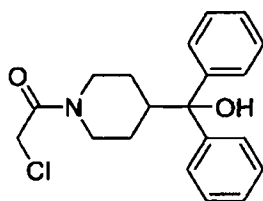
[0336] Following General Procedure **B**, starting with **SI-5** (42 mg, 0.15 mmol, 1 equiv.), the title compound was obtained after column chromatography as a white solid (34 mg, 70%). ¹H NMR (500 MHz, Chloroform-*d*) δ 8.94 (s, 1H), 8.24 (d, *J* = 11.9 Hz, 2H), 7.71 (s, 1H), 6.87 (t, *J* = 5.7 Hz, 1H), 6.55 (dd, *J* = 17.4, 0.7 Hz, 1H), 6.43 (dd, *J* = 16.9, 10.1 Hz, 1H), 5.88 (dd, *J* = 10.1, 1.3 Hz, 1H), 3.56 (q, *J* = 6.7 Hz, 2H), 2.33 (td, *J* = 6.9, 2.7 Hz, 2H), 2.06 (t, *J* = 2.7 Hz, 1H), 1.87 (p, *J* = 7.3 Hz, 2H), 1.69 (p, *J* = 7.8 Hz, 2H); HRMS-ESI (*m/z*) calculated for $C_{17}H_{18}F_3N_2O_2$ [M+H]: 339.1314; found 339.1313.

3-acrylamido-N-(hex-5-yn-1-yl)-5-(trifluoromethyl)benzamide (19)

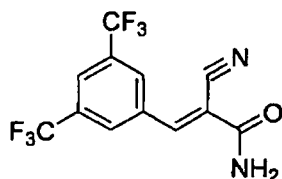


[0337] Synthesized according to General Procedure A2, starting from **SI-5**. ¹H NMR (600 MHz, Chloroform-*d*) δ 8.57 (s, 1H), 8.16 (t, *J* = 1.8 Hz, 1H), 8.05 (t, *J* = 1.8 Hz, 1H), 7.79 (d, *J* = 2.0 Hz, 1H), 6.38 (d, *J* = 6.1 Hz, 1H), 4.23 (s, 2H), 3.51 (td, *J* = 7.1, 5.7 Hz, 2H), 2.27 (td, *J* = 6.9, 2.7 Hz, 2H), 2.00 (t, *J* = 2.6 Hz, 1H), 1.82 - 1.74 (m, 2H), 1.71 - 1.59 (m, 2H); HRMS-ESI (*m/z*) calculated for $C_{16}H_{17}ClF_3N_2O_2$ [M+H]: 361.0925; found: 361.0925.

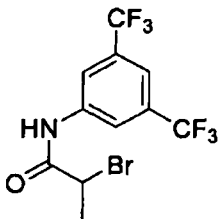
2-chloro-1-(4-(hydroxydiphenylmethyl)piperidin-1-yl)ethan-1-one (20)



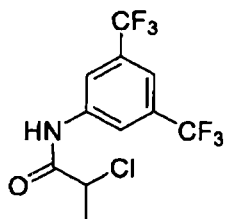
[0338] Following General Procedure A, starting with *a,a*-diphenyl-4-piperidinomethanol (800 mg, 3 mmol, 1 equiv.), the title compound was obtained after column chromatography as a white solid (637 mg, 61%). ¹H NMR (500 MHz, Chloroform-*d*₁) δ 7.56 (d, *J* = 7.6 Hz, 4H), 7.39 (q, *J* = 7.1 Hz, 4H), 7.28 (q, *J* = 6.8 Hz, 2H), 4.66 (d, *J* = 13.3 Hz, 1H), 4.07 (dd, *J* = 12.2, 4.2 Hz, 2H), 3.91 (d, *J* = 13.4 Hz, 1H), 3.18 (t, *J* = 12.9 Hz, 1H), 2.77 - 2.62 (m, 3H), 1.67 (t, *J* = 12.5 Hz, 2H), 1.56 (q, *J* = 11.8 Hz, 1H), 1.44 (q, *J* = 12.4, 11.8 Hz, 1H); HRMS-ESI (*m/z*) calculated for **C₂₀H₂₃CINO₂** [M+H]: 344.1412; found: 344.1412.
(E)-3-(3,5-bis(trifluoromethyl)phenyl)-2-cyanoacrylamide (23)



[0339] 3,5-bis(trifluoromethyl)benzaldehyde (880 mg, 3.6 mmol, 1 equiv.) and 2-cyanoacetamide (460 mg, 5.5 mmol, 1.5 equiv.) were dissolved in MeOH (10 mL). To this was added *piperidine* (214 mg, 0.7 equiv.) and the reaction was stirred at room temperature for 30 minutes at which point starting material was consumed. After addition of an equivalent volume of water (10 mL), the precipitate was collected by filtration and washed with water/methanol (1:1) to yield the title compound as a white solid (534 mg, 47%); ¹H NMR (400 MHz, Acetone-*d*₆) δ 8.78 (s, 2H), 8.61 (s, 1H), 8.41 (s, 1H), 7.57 (s, 1H), 7.42 (s, 1H); HRMS-ESI (*m/z*) calculated for **C₁₂H₇F₆N₂O₂** [M+H]: 309.0457; found: 309.0459.
N-(3,5-bis(trifluoromethyl)phenyl)-2-bromopropanamide (24)

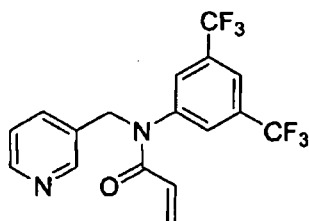


[0340] Following General Procedure AI, starting with 3,5-bis(trifluoromethyl)aniline (250 mg, 1.1 mmol, 1 equiv.) and 2-bromopropionyl chloride (200 μL, 2 mmol, 1.8 equiv.) the title compound was obtained by PTLC as a white solid (130 mg, 35%). ¹H NMR (500 MHz, Chloroform-*d*₁) δ 8.34 (s, 1H), 8.06 (s, 2H), 7.66 (s, 1H), 4.58 (q, *J* = 7.0 Hz, 1H), 1.98 (d, *J* = 7.0 Hz, 3H); HRMS-ESI (*m/z*) calculated for **C₁₁H₇BrF₆NO** [M-H]: 361.9621; found: 361.9623.
N-(3,5-bis(trifluoromethyl)phenyl)-2-chloropropanamide (25)



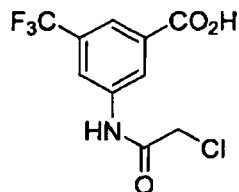
[0341] Following General Procedure A1, starting with 3,5-bis(trifluoromethyl)aniline (327 mg, 1.42 mmol, 1 equiv.) and 2-chloropropionyl chloride (200 μL , 2 mmol, 1.8 equiv.) the title compound was obtained by PTLC as a white solid (250 mg, 55%). ^1H NMR (500 MHz, Chloroform- d_3) δ 8.61 (s, 1H), 8.16 (s, 2H), 7.75 (s, 1H), 4.67 (q, $J = 7.1$ Hz, 1H), 1.93 (d, $J = 7.1$ Hz, 3H). HRMS-ESI (m/z) calculated for $\text{C}_{11}\text{H}_7\text{ClF}_6\text{NO}$ [M-H]: 318.0126; found: 318.0126.

N-(3,5-bis(trifluoromethyl)phenyl)-*N*-(pyridin-3-ylmethyl)acrylamide (31)



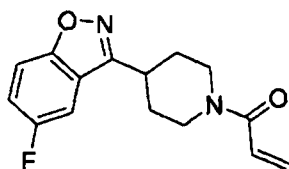
[0342] 3,5-bis(trifluoromethyl)aniline (350 mg, 1.6 mmol, 1 equiv.) was dissolved in TFA (5 mL). The reaction mixture was cooled to 0 $^\circ\text{C}$ and to this sodium triacetoxyborohydride (STAB) (400 mg, 2 mmol, 1.3 equiv.) was added. 3-pyridinecarboxaldehyde (244 mg, 1.5 mmol, 1 equiv.) was dissolved in CH_2Cl_2 (5 mL) and slowly added to the reaction mixture dropwise over 10 minutes. Upon complete conversion to product, the reaction mixture was diluted with CH_2Cl_2 (20 mL) and washed with saturated sodium bicarbonate solution (3 * 20 mL) and the organic layer was dried then concentrated under reduced pressure. Without further purification the crude material was dissolved in anhydrous CH_2Cl_2 and subjected to General Procedure B. The resulting crude was purified by PTLC to give a white solid (10 mg, 2%). ^1H NMR (500 MHz, Chloroform- d_3) δ 8.63 (d, $J = 3.8$ Hz, 1H), 8.49 (s, 1H), 7.93 (s, 1H), 7.70 (d, $J = 7.7$ Hz, 1H), 7.55 (s, 2H), 7.35 (dd, $J = 7.6, 5.3$ Hz, 1H), 6.60 (dd, $J = 16.6, 1.6$ Hz, 1H), 6.02 (dd, $J = 16.9, 10.2$ Hz, 1H), 5.79 (dd, $J = 10.3, 1.6$ Hz, 1H), 5.11 (s, 2H). HRMS-ESI (m/z) calculated for $\text{C}_{17}\text{H}_{13}\text{F}_6\text{N}_2\text{O}$ [M+H]: 375.0927; found: 375.0928.

3-(2-chloroacetamido)-5-(trifluoromethyl)benzoic acid (36)



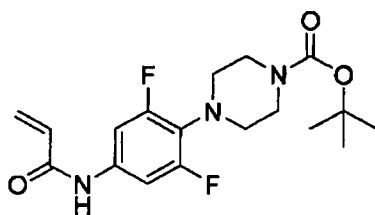
[0343] To a solution of 3-amino-5-(trifluoromethyl)benzoic acid (500 mg, 2.44 mmol) in 1.5 mL of dimethylacetamide (1.6 M) at 0 °C was added chloroacetyl chloride (214 μ L, 2.69 mmol, 1.1 equiv.). The resulting solution was warmed to ambient temperature and stirred for 20 minutes, at which point ethyl acetate (40 mL) and water (30 mL) were added. The pH of the aqueous layer was adjusted to pH 10 via addition of 1 N NaOH, and the phases were separated. The aqueous layer was washed with 40 mL of ethyl acetate, then acidified by adding 1 N HCl. The product was extracted with ethyl acetate (40 mL), and the organic layer was washed with 1M HCl (2 x 40 mL), brine (40 mL), dried over magnesium sulfate and concentrated to provide the desired product (456 mg, 66%). ^1H NMR (500 MHz, Chloroform-*d*) δ 8.31 (s, 1H), 8.27 (s, 1H), 8.14 (s, 1H), 4.13 (s, 2H); HRMS-ESI (m/z) calculated for $\text{C}_8\text{H}_8\text{ClF}_3\text{NO}_3$ [M+H]: 282.0139; found: 282.0141.

l-(4-(5-fluorobenzisoxazol-3-yl)piperidin-1-yl)prop-2-en-1-one (37)



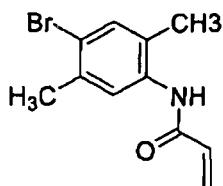
[0344] The title compound was obtained starting from 6-fluoro-3(4-piperidinyl)-1,2-benzisoxazole hydrochloride (53 mg, 0.2 mmol, 1 equiv.) according to General Procedure C as a colorless oil (49.1 mg, 87%). ^1H NMR (400 MHz, Chloroform-*d*) δ 7.64 (dd, $J = 8.7, 5.1$ Hz, 1H), 7.27 (dd, $J = 8.4, 2.3$ Hz, 1H), 7.08 (td, $J = 8.9, 2.1$ Hz, 1H), 6.64 (dd, $J = 16.8, 10.6$ Hz, 1H), 6.32 (dd, $J = 16.9, 1.9$ Hz, 1H), 5.73 (dd, $J = 10.6, 1.9$ Hz, 1H), 4.70 (d, $J = 13.4$ Hz, 1H), 4.15 (d, $J = 12.4$ Hz, 1H), 3.53 - 3.13 (m, 2H), 2.99 (t, $J = 13.1$ Hz, 1H), 2.25 - 2.07 (m, 2H), 2.00 (ddd, $J = 23.1, 14.2, 7.8$ Hz, 2H); HRMS-ESI (m/z) calculated for $\text{C}_{15}\text{H}_{16}\text{FN}_2\text{O}$ [M+H]: 275.119; found: 275.119.

tert-butyl 4-(4-acrylamido-2,6-difluorophenyl)piperazine-1-carboxylate (38)



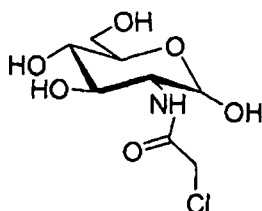
[0345] The title compound was obtained starting from *tert*-Butyl 4-(4-amino-2,6-difluorophenyl)piperazine-1-carboxylate according to General Procedure B. ^1H NMR (400 MHz, Chloroform-*d*) δ 8.12 (s, 1H), 7.13 (d, $J = 10.4$ Hz, 2H), 6.36 (d, $J = 16.9$ Hz, 1H), 6.19 (dd, $J = 16.8, 10.2$ Hz, 1H), 5.70 (d, $J = 10.2$ Hz, 1H), 3.45 (t, $J = 4.7$ Hz, 4H), 3.00 (t, $J = 3.7$ Hz, 4H), 1.41 (s, 9H); HRMS-ESI (m/z) calculated for $\text{C}_{18}\text{H}_{24}\text{F}_2\text{N}_3\text{O}_3$ [M+H]: 368.178; found: 368.178.

N-(4-bromo-2,5-dimethylphenyl)acrylamide (40)



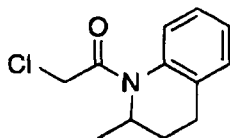
[0346] Following General Procedure B, starting from 4-bromo-2,5-dimethylaniline (900 mg, 4.5 mmol, 1 equiv.), the title compound was obtained after column chromatography and recrystallization from cold $C_3H_6Cl_2$ as a white solid (611 mg, 40%). 1H NMR (500 MHz, Chloroform- d_3) δ 7.87 (s, 1H), 7.43 (s, 1H), 7.16 (s, 1H), 6.50 (d, $J = 16.7$ Hz, 1H), 6.35 (dd, $J = 16.4, 10.3$ Hz, 1H), 5.86 (d, $J = 10.3$ Hz, 1H), 2.42 (s, 3H), 2.28 (s, 3H); HRMS-ESI (m/z) calculated for $C_{11}H_{13}BrNO$ [$M+H$]: 254.0175; found: 254.0175.

2-Chloroacetamido-2-deoxy- α -D-glucopyranose (44)



[0347] To a stirred solution of hexosamine hydrochloride (590 mg, 3.39 mmol, 1 equiv.) in anhydrous MeOH (200 mL) at room temperature was added sodium metal (60 mg, 2.6 mmol, 0.78 equiv.), TEA (400 μ L, 5.7 mmol, 1.8 equiv.). Chloroacetic anhydride (1 g, 5.9 mmol, 1 equiv.) was then added and the mixture stirred for 6 h, monitoring for completeness by TLC. After which, the reaction mixture was concentrated *in vacuo*. The crude product then was purified by two rounds of column chromatography to afford the pure title product as a white solid (610 mg, 72%). 1H NMR (500 MHz, Methanol- d_4) δ 5.20 (d, $J = 3.7$ Hz, 1H α), 4.75 (d, $J = 8.3$ Hz, 1H β), 4.19 (dd, $J = 20.2, 13.9$ Hz, 2H), 4.19 (d, $J = 12.6$ Hz, 1H), 3.95 (dd, $J = 10.6, 3.5$ Hz, 1Ha), 3.83 (m, 3Ha, 3H β), 3.74 (d, $J = 5.1$ Hz, 1H β), 3.70 (dd, $J = 11.4, 8.9$ Hz, 1H β), 3.60 (dd, $J = 10.7, 9.5$ Hz, 1H β), 3.46 (t, $J = 9.3$ Hz, 1H), 3.42 (t, $J = 10.0$ Hz, 1H β); HRMS-ESI (m/z) calculated for $C_8H_{15}ClNO_6$ [$M+H$]: 256.0582; found: 256.0582.

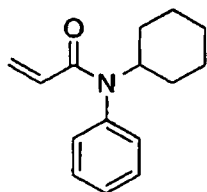
2-chloro-1-(2-methyl-3,4-dihydroquinolin-1(2H)-yl)ethan-1-one (45)



[0348] Chloroacetyl chloride (80.4 μ L, 0.9 mmol, 1.7 equiv.) was dissolved in anhydrous CH_2Cl_2 (3 mL) and cooled to 0 $^{\circ}C$. A solution of 2-methyl-1,2,3,4-tetrahydroquinoline (80.1 mg, 0.544 mmol, 1 equiv.) and *N*-methylmorpholine (0.11 mL, 1.0 mmol, 1.8 equiv.) in CH_2Cl_2 (2 mL) was then added dropwise. After 6 h, the reaction was quenched with saturated aqueous $NaHCO_3$ (5 mL) and extracted with CH_2Cl_2 (3×10 mL). The combined organic layers were dried over anhydrous Na_2SO_4 and concentrated under

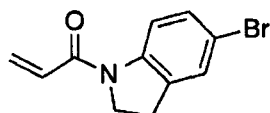
reduced pressure. The resultant residue was purified by prep. TLC (30% EtOAc / hexanes), providing the title compound as an off-white solid (108.8 mg, 89%). ^1H NMR (400 MHz, chloroform-*c*) δ 7.30 - 7.13 (m, 4H), 4.86 - 4.75 (m, 1H), 4.20 (d, $J = 12.5$ Hz, 1H), 4.09 (d, $J = 12.5$ Hz, 1H), 2.69 - 2.58 (m, 1H), 2.59 - 2.46 (m, 1H), 2.46 - 2.31 (m, 1H), 1.36 - 1.29 (m, 1H), 1.15 (d, $J = 6.5$ Hz, 3H); HRMS-ESI (m/z) calculated for $\text{C}_{12}\text{H}_{15}\text{ClNO}$ [$\text{M}+\text{H}$]: 224.0837; found: 224.0836.

N-cyclohexyl-*N*-phenylacrylamide (46)



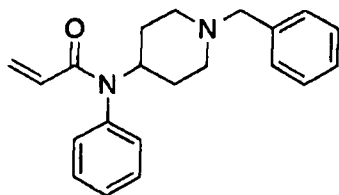
[0349] The title compound was synthesized according to General Procedure C from *N*-cyclohexylaniline (89.5 mg, 0.511 mmol, 1 equiv.). Purification of the crude product by flash column chromatography (10-20% EtOAc / hexanes) then prep. TLC (30% EtOAc / hexanes) provided the title compound as an off-white solid (53.1 mg, 45%). ^1H NMR (400 MHz, chloroform-*c*) δ 7.42 - 7.33 (m, 3H), 7.10 - 7.06 (m, 2H), 6.31 (dd, $J = 16.7, 2.1$ Hz, 1H), 5.77 (dd, $J = 16.7, 10.3$ Hz, 1H), 5.41 (dd, $J = 10.4, 2.1$ Hz, 1H), 4.65 (tt, $J = 12.2, 3.7$ Hz, 1H), 1.85 (dt, $J = 11.2, 1.8$ Hz, 2H), 1.75 - 1.68 (m, 2H), 1.61 - 1.53 (m, 1H), 1.40 (qt, $J = 13.3, 3.6$ Hz, 2H), 1.07 (qd, $J = 12.4, 3.6$ Hz, 2H), 0.91 (qt, $J = 13.1, 3.8$ Hz, 1H); HRMS-ESI (m/z) calculated for $\text{C}_{15}\text{H}_{20}\text{NO}$ [$\text{M}+\text{H}$]: 230.1539; found: 230.1539.

1-(5-bromoindolin-1-yl)prop-2-en-1-one (47)



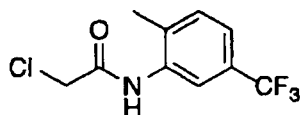
[0350] The title compound was synthesized according to General Procedure C from 5-bromoindoline (41.7 mg, 0.211 mmol, 1 equiv.), acryloyl chloride (32 μL , 0.40 mmol, 1.9 equiv.), and changing the base to pyridine (32 μL , 0.40 mmol, 1.9 equiv.). Purification of the crude product by re-precipitation from EtOAc provided the title compound as a white solid (67.8 mg, 64%). ^1H NMR (400 MHz, chloroform-*c*) δ 8.16 (d, $J = 8.6$ Hz, 1H), 7.33 - 7.25 (m, 2H), 6.60 - 6.42 (m, 2H), 5.84 - 5.76 (m, 1H), 4.15 (t, $J = 8.6$ Hz, 2H), 3.17 (t, $J = 8.6$ Hz, 2H); HRMS-ESI (m/z) calculated for $\text{C}_{11}\text{H}_{11}\text{BrNO}$ [$\text{M}+\text{H}$]: 252.0018; found: 252.0017.

N-(1-benzylpiperidin-4-yl)-*N*-phenylacrylamide (48)



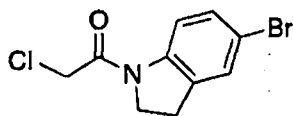
[0351] The title compound was synthesized according to General Procedure C from 1-benzyl-*N*-phenylpiperidin-4-amine (30.0 mg, 0.113 mmol, 1 equiv.), acryloyl chloride (17 μ L, 0.21 mmol, 1.9 equiv.), and changing the base to pyridine (17 μ L, 0.21 mmol, 1.9 equiv.). Purification of the crude product by prep. TLC provided the title compound as a white solid (22.5 mg, 64%). ^1H NMR (400 MHz, chloroform- d_3) δ 7.62 - 7.56 (m, 2H), 7.43 - 7.36 (m, 6H), 7.05 (d, J = 6.2 Hz, 2H), 6.29 (dd, J = 16.8, 2.1 Hz, 1H), 5.79 (dd, J = 16.8, 10.3 Hz, 1H), 5.46 (dd, J = 10.3, 2.1 Hz, 1H), 4.81 - 4.70 (m, 1H), 4.09 (s, 2H), 3.41 (d, J = 12.0 Hz, 2H), 2.82 (q, J = 11.5 Hz, 2H), 2.21 (q, J = 11.9 Hz, 2H), 1.94 (d, J = 14.2 Hz, 2H); HRMS-ESI (m/z) calculated for $\text{C}_{21}\text{H}_{25}\text{N}_2\text{O}$ [$\text{M}+\text{H}$]: 321.1961; found: 321.1962.

2-chloro-N-(2-methyl-5-(trifluoromethyl)phenyl)acetamide (49)



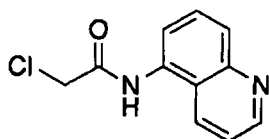
[0352] The title compound was synthesized according to General Procedure A1 from 2-methyl-5-(trifluoromethyl)aniline (35.0 mg, 0.2 mmol, 1 equiv.). Purification of the crude product by prep. TLC (20% EtOAc / hexanes) provided the title compound as a white solid (48.2 mg, 95%). ^1H NMR (600 MHz, chloroform- d_3) δ 8.31 (s, 1H), 8.25 (d, J = 1.9 Hz, 1H), 7.37 (dd, J = 7.9, 1.8 Hz, 1H), 7.32 (d, J = 7.9 Hz, 1H), 4.25 (s, 2H), 2.36 (s, 3H); HRMS-ESI calculated for $\text{C}_{10}\text{H}_{10}\text{ClF}_3\text{NO}$ [$\text{M}+\text{H}$]: 252.0397; found: 252.0397.

l-(5-bromoindolin-1-yl)-2-chloroethan-1-one (50)



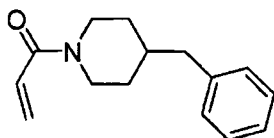
[0353] The title compound was synthesized according to General Procedure A1 from 5-bromoindoline (39.6 mg, 0.2 mmol, 1 equiv.). Purification of the crude product by prep. TLC (25% EtOAc / hexanes) provided the title compound as an off-white solid (48.6 mg, 89%). ^1H NMR (600 MHz, CDCl_3) δ 8.07 (d, J = 8.4 Hz, 1H), 7.32 (d, J = 8.8 Hz, 2H), 4.17 (t, J = 8.6 Hz, 2H), 4.14 (s, 2H), 3.22 (t, J = 8.4 Hz, 2H); HRMS-ESI (m/z) calculated for $\text{C}_{10}^3\text{H}_9\text{BrClNO}$ [$\text{M}+\text{H}$]: 273.9629; found: 273.9629.

2-chloro-N-(quinolin-5-yl)acetamide (51)



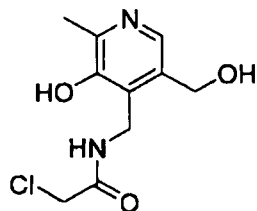
[0354] To a stirring suspension of 5-aminoquinoline (28.8 mg, 0.2 mmol, 1 equiv.) and potassium carbonate (82.9 mg, 0.6 mmol, 3 equiv.) in anhydrous CH_2Cl_2 (3 mL) at 0 °C was added chloroacetyl chloride (24 μL , 1.5 equiv.). The reaction was allowed to slowly warm up to room temperature. After 3 hours, the mixture was filtered, washed with EtOAc (10 mL) and CH_2Cl_2 (10 mL). The solid cake was then eluted with MeOH (20 mL) and the filtrate concentrated *in vacuo*. The residue was taken up in 10% MeOH / CH_2Cl_2 and passed through a pad of silica to provide the title compound as an off-white solid (42.6 mg, 82%). $^1\text{H NMR}$ (500 MHz, CDCl_3) δ 8.96 (d, $J = 2.5$ Hz, 1H), 8.71 (s, 1H), 8.20 (d, $J = 8.6$ Hz, 1H), 8.04 (d, $J = 8.5$ Hz, 1H), 7.94 (d, $J = 7.5$ Hz, 1H), 7.74 (t, $J = 8.0$ Hz, 1H), 7.48 (dd, $J = 8.5, 4.2$ Hz, 1H), 4.35 (s, 2H); HRMS-ESI (m/z) calculated for $\text{C}_9\text{H}_9\text{ClN}_2\text{O}$ [$\text{M}+\text{H}$]: 221.0476; found: 221.0477.

l-(4-benzylpiperidin-1-yl)prop-2-en-1-one (53)



[0355] Following General Procedure B, starting from 4-benzylpiperidine (1 g, 5.7 mmol, 1 equiv.), the title compound was obtained after column chromatography as a yellow oil (748 mg, 57%). $^1\text{H NMR}$ (500 MHz, Chloroform- d) δ 7.36 (t, $J = 7.4$ Hz, 2H), 7.28 (t, $J = 7.4$ Hz, 1H), 7.20 (d, $J = 7.1$ Hz, 2H), 6.64 (dd, $J = 16.8, 10.6$ Hz, 1H), 6.32 (dd, $J = 16.8, 1.9$ Hz, 1H), 5.72 (dd, $J = 10.6, 1.9$ Hz, 1H), 4.72 (d, $J = 12.7$ Hz, 1H), 4.03 (d, $J = 13.0$ Hz, 1H), 3.05 (t, $J = 12.7$ Hz, 1H), 2.70 - 2.59 (m, 3H), 1.86 (ddp, $J = 14.6, 7.2, 3.5$ Hz, 1H), 1.77 (m, 2H), 1.37-1.18 (m, 2H); HRMS-ESI (m/z) calculated for $\text{C}_{15}\text{H}_{20}\text{ClNO}$ [$\text{M}+\text{H}$]: 230.1539; found: 230.1539.

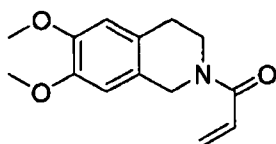
2-chloro-*N*-((3-hydroxy-5-(hydroxymethyl)-2-methylpyridin-4-yl)methyl)acetamide (54)



[0356] To a stirred solution of pyridoxamine hydrochloride (150 mg, 0.64 mmol, 1 equiv.) in anhydrous MeOH (20 mL) at room temperature was added sodium metal (30 mg, 1.5 mmol, 2.3 equiv.), TEA (100 μL , 1 mmol, 1.6 equiv.). Chloroacetic anhydride (390 mg, 2.29 mmol, 3.5 equiv.) was added and the mixture stirred for 6 h, monitoring for completeness by TLC. After which, the reaction mixture was

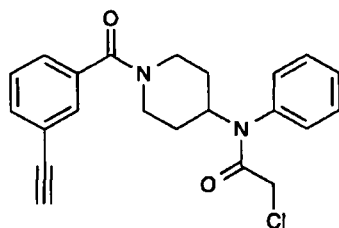
concentrated *in vacuo*. The crude product then was purified by prep. TLC to afford the title compound as a white solid (46 mg, 30%). ¹H NMR (500 MHz, Methanol-*d*₄) δ 7.97 (s, 1H), 4.81 (s, 2H), 4.61 (s, 2H), 4.17 (s, 3H), 4.06 (s, 1H), 3.35 (s, 1H), 2.52 (s, 3H); HRMS-ESI (m/z) calculated for C₁₀H₁₄N₂O₃ [M+H]: 245.0687; found: 245.0688.

1-(6,7-dimethoxy-3,4-dihydroisoquinolin-2(1H)-yl)prop-2-en-1-one (56)



[0357] To a stirring suspension of the 6,7-dimethoxy-3,4-dihydroisoquinoline (1 g, 5.2 mmol, 1 equiv.) and TEA (1800 μL, 12.6 mmol, 2.5 equiv.) in anhydrous THF (10 mL) at 0 °C was added acryloyl chloride (1320 μL, 13.2 mmol, 2.6 equiv.) and the reaction was allowed to slowly warm up to room temperature. After 2 hours, the mixture was diluted with CH₂Cl₂ (2 × 50 mL) and washed with saturated brine (2 × 50 mL) and the combined organics were concentrated *in vacuo*. The residue was taken up in 10% MeOH / CH₂Cl₂ and purified by column chromatography to afford the title compound as a white solid (700 mg, 54%, mixture of *EIZ* isomers). ¹H NMR (500 MHz, Chloroform-*d*) δ 6.63 (m, 3H), 6.29 (d, *J* = 16.8 Hz, 1H), 5.69 (dd, *J* = 10.6, 1.8 Hz, 1H), 4.69 (s, 1H [major]), 4.63 (s, 0.8H [minor]), 3.82 (s, 7H), 3.73 (t, *J* = 5.6 Hz, 1H), 2.84 - 2.77 (m, 2H); HRMS-ESI (m/z) calculated for C₁₄H₁₈N₂O₂ [M+H]: 248.128; found: 248.1281.

2-chloro-N-(1-(3-ethynylbenzoyl)piperidin-4-yl)-N-phenylacetamide (61)



[0358] To an excess of neat **SI-3** was added 0.7 mL of trifluoroacetic acid (0.2 M). The resulting solution was concentrated under a stream of nitrogen until no further evaporation was observed, providing the deprotected amine as its trifluoroacetate salt. The trifluoroacetate amine salt (90.6 mg, 0.25 mmol) was taken up in DMF (0.5 mL, 0.5 M) and the resulting solution was cooled to 0 °C. 3-ethynyl benzoic acid (44 mg, 1.2 equiv.), HATU (113 mg, 1.2 equiv.), and Hunig's base (86 μL, 2 equiv.) were sequentially added. The reaction was stirred for 2 hours at 0 °C, diluted with Et₂O, and then washed with 1 M HCl. The organic layer was dried over magnesium sulfate, concentrated, and purified by flash chromatography (gradient from 40 to 70 % ethyl acetate in hexanes) to provide the title compound (87 mg, 92%). ¹H NMR (400 MHz, Chloroform-*d*) δ 7.51 (dd, *J* = 9.5, 5.4 Hz, 4H), 7.43 (d, *J* = 1.9 Hz, 1H), 7.39 - 7.25 (m, 2H),

7.14 (d, $J = 10.4$ Hz, 2H), 4.86 (tt, $J = 15.1, 5.3$ Hz, 2H), 3.72 (s, 3H), 3.19 (d, $J = 14.0$ Hz, 1H), 3.11 (s, 1H), 2.86 (s, 1H), 1.90 (d, $J = 36.6$ Hz, 2H), 1.38 (s, 1H), 1.24 (d, $J = 19.9$ Hz, 1H); HRMS-ESI (m/z) calculated for C₂₂H₂₂CIN₂O₂ [M+H]: 381.1364; found: 381.1363.

Example 2

[0359] *Animal Treatment*

[0360] Female DBA/1 mice (7-10 week of age) are purchased from The Jackson Laboratory (Bar Harbor, ME), and are kept for 1 week before treatments. The animal facilities are certified by the Association for Assessment and Accreditation of Laboratory Animal Care. An illustrative compound from Fig. 1, compound A, is used for this study. The animals are injected i.p. with about 50 mg/kg of compound A (dissolved in phosphate-buffered saline) or vehicle four times weekly for 3 weeks. Four days after the last dose, mice are sacrificed, and splenocytes and lymph node cells are isolated for ex vivo T-cell proliferation assays.

[0361] *Lymph Node and Splenic T-cell proliferation Assay*

[0362] Splenocytes and lymph node cells obtained from the Animal Treatment study are separately pooled from three to five mice, and single-cell suspension are prepared. The cells (about 1×10^6 cells/well) are stimulated with 10 $\mu\text{g/ml}$ of compound A, and then incubated for 4 days in a 96-well plate in DMEM containing 10% fetal calf serum (FCS). During the last 16 hours, the cells are pulsed with [³H]thymidine (0.5 $\mu\text{Ci/well}$), and T-cell proliferation is determined by thymidine uptake. In the lymph node proliferation assay, serum-free X-VTVO medium is used.

[0363] *Electrophoresis Analysis*

[0364] Splenocytes and lymph node cells obtained from the Animal Treatment study are separately pooled and centrifuged to collect the respective cell pellet. The cell pellet is subsequently lysed and resolved on a 10-12% polyacrylamide gel. Protein bands are subsequently visualized by silver staining.

Example 3

[0365] *Tumor Cell Lines and Mice*

[0366] Six to eight-week female C57BL and C3H mice are purchased (Charles River Laboratories, Wilmington, MA). The animal facilities are certified by the Association for Assessment and Accreditation of Laboratory Animal Care.

[0367] ID8 is a clone of the MOSEC ovarian carcinoma of C57BL/6 origin. SW1 is a clone derived from the K1735 melanoma of C3H origin.

[0368] *In vivo Studies*

[03691] In experiments with the ID8 ovarian carcinoma, mice (5 or 10 /group) are transplanted i.p. with 3×10^6 cells. Either 10 or 15 days later, they are injected i.p. with compound A or vehicle, which is repeated weekly for a total of 3 times. Mice are monitored daily for tumor growth, including swollen bellies indicating that they have developed ascites, and for evidence of toxicity. Tumor growth is recorded using a digital caliper. The survival of each mouse is further recorded and overall survival is calculated as mean \pm standard error of mean ($M \pm SEM$).

[0370] In experiments with the SW1 melanoma, 5×10^5 cells are transplanted s.c. on the right flank. When the mice have developed tumors of about 4-5 mm in mean diameter, they are randomized into treatment group and control group; with either compound A or vehicle injected i.p., respectively, at weekly intervals for a total of 3 times. Mice are monitored daily for evidence of toxicity. Tumor diameters are measured twice/week using a digital caliper and tumor surfaces are calculated. Overall survival is also recorded.

Example 4

[03711] Phase 1 Clinical Trial

[0372] Purpose: this clinical trial is to assess the safety and tolerability of administration of compound A in combination with low-dose cytokines (IL-2 and IFN-alpha) in patients with metastatic or refractory cancer.

[0373] Study Type: Interventional

[0374] Study Design: Allocation: Non-Randomized

[0375] Intervention Model: Single Group Assignment

[0376] Masking: Open Label

[0377] Primary Purpose: Treatment

[0378] Primary Outcome Measures:

[0379] --Safety [Time Frame: Initial dose of study therapy through 30 days post last dose of study therapy]

[0380] -Tolerability [Time Frame: Initial dose of study therapy through 30 days post last dose of study therapy]

[0381] --Anti-tumor Activity [Time Frame: From initial dose of study therapy to disease progression]

[0382] Eligibility

[0383] Ages Eligible for Study: 18 Years and older (Adult, Senior)

[0384] Sexes Eligible for Study: All

[0385] Accepts Healthy Volunteers: No

[0386] Criteria**[0387]** Inclusion Criteria:

[0388] •Have a histologically confirmed diagnosis of metastatic or refractory cancer for which there are no effective standard therapeutic options available;

[0389] *Have signed an Institutional Review Board (IRB) approved informed consent form (ICF) prior to performing any study evaluation/procedures;

[0390] 'Be \geq 18 years of age and women must either be 1) not of childbearing potential or 2) have a negative serum pregnancy test within 7 days prior to commencing treatment. Patients are considered not of childbearing potential if they are surgically sterile (they have undergone a hysterectomy, bilateral tubal ligation or bilateral oophorectomy) or they are postmenopausal (12 consecutive months of amenorrhea [lack of menstruation]);

[0391] »(If applicable) Have completed prior cytotoxic chemotherapy, radiotherapy or immunotherapy or experimental therapy \geq 30 days prior to the study enrollment, and recovered from associated toxicities;

[0392] 'Have an Eastern Cooperative Oncology Group (ECOG) score of \leq 2, and an anticipated life expectancy of at least 6 months;

[0393] «Have adequate hematologic function, as defined by an absolute or calculated neutrophil count \geq 1500/microL, platelet count \geq 100000/microL, lymphocyte count \geq 500/microL, and hemoglobin level \geq 10 g/dL. Patients may not receive prophylactic transfusion in order to qualify for trial eligibility;

[0394] «Have adequate renal function, as defined by a documented serum creatinine of \leq 2.0mg/dL. Greater than "1+" proteinuria will require microscope evaluation and the results discussed with the medical monitor prior to patient enrollment; or if serum creatine is >2.0 , patient must have an actual or calculated 24-hour creatinine clearance of >60 mL/min and no obvious evidence of concurrent medullary cystic disease or obstructive uropathy;

[0395] 'Have adequate hepatic function, as defined by a total bilirubin level \leq 1.5 x upper limit of normal (ULN) and alkaline phosphatase, aspartate transaminase (AST), and alanine transaminase (ALT) levels \leq 2.5 x ULN. If alkaline phosphatase is outside of these parameters and is due to bone metastases (as verified by the assessment of isoenzymes), then the patient is eligible.

[0396] Exclusion Criteria:

[0397] »Have a history of severe hypersensitivity (grade 3 - 4 allergic reaction) to fluorescein or any drug, radiologic contrast agent, insect bite, food, cytokines, or any other agent; or have received fluorescein within 30 days of the study;

[0398] »Have medical conditions that preclude the use of IL-2 or IFN-alpha. These conditions include but are not limited to, diabetes mellitus with a history of progression to diabetic ketoacidosis, history of severe coagulation disorder, psoriasis, sarcoidosis, retinal hemorrhage, symptomatic pulmonary disease, heart failure (> or = New York Heart Association NYHA class II), or transplant requiring immunosuppressive therapy;

[0399] *Be pregnant or breast-feeding;

[0400] »Be currently receiving an experimental drug, or used an experimental device within 30 days of study entry;

[0401] »Be currently undergoing chemotherapy, anticancer hormonal therapy, and/or therapy with immunosuppressant agents;

[0402] «Have any concomitant malignancy with the exception of basal cell or squamous cell carcinoma of skin;

[0403] »Have radiographically documented evidence of current brain metastases, a history of stem cell transplant, immunodeficiency, and/or a medical or psychiatric illness (that in the investigator's opinion, would prevent adequate compliance with study therapy or evaluation of the endpoints).

Example 5

[0404] Tables 1-5 illustrate exemplary lists of cysteine-containing polypeptides.

[0405J] Table 1 illustrates an exemplary list of liganded cysteines which are identified from isoTOP-ABPP experiments performed in cell lysates (*in vitro*). Table 1 further shows the accession number (or the protein identifier) of the protein, cysteine residue number, and an illustrative peptide fragment containing the cysteine of interest (denoted by C*). For example, P23396 (row 2, col 1) is the accession number (or protein identifier) of RPS3 40S ribosomal protein S3. C97 (row 2, col 1) is the cysteine residue number of interest. The peptide fragment: R.GLC*AIAQAESLR.Y (SEQ ID NO: 1) is an illustrative peptide fragment of RPS3 40S ribosomal protein S3 containing the cysteine residue C97 and is denoted by C*.

Table 1

Identifier	Protein Name	Illustrative Cysteine Fragment	SEQ ID NO:
P23396_C 97	RPS3 40S ribosomal protein S3	R.GLC*AIAQAESLR.Y	1
P68366_C 295	TUBA4A Tubulin alpha-4A chain	K.AYHEQLSVAEITNAC*FEPANQMVK.C	2
P68366_C 347	TUBA4A Tubulin alpha-4A chain	K.RSIQFVDWC*PTGFK.V	3
Q71U36_ C347	TUBA1A Tubulin alpha-1A chain	K.RTIQFVDWC*PTGFK.V	4

Q71U36_C376	TUBA1A Tubulin alpha-1A chain	R.AVC*MLSNTTAIAEAWARL	5
Q7L1Q6_C35	BZW1 Basic leucine zipper and W2 domain-containing protein	K.JERFDPTQFQDC*nQGLTETGTDLEAVAK.F	6
P04406_C152	GAPDH Glyceraldehyde-3-phosphate dehydrogenase	K.IISNASC*TTNCLAPLAK.V	7
Q99873_C109	PRMT1 Protein arginine N-methyltransferase 1	K.VIGIEC*SSISDYAVK.I	8
Q15365_C109	PCBP1 Poly(rC)-binding protein 1	R.LWPATQC*GSUGK.G	9
Q13526_C113	PIN1 Peptidyl-prolyl cis-trans isomerase NIMA-interacting 1	K.IKSGEEDFESLASQFSDC*SSAK.A	10
Q9Y266_C188	NUDC Nuclear migration protein nudC	R.WTQTLSELDLAVPFC*VNFR.L	11
Q9Y696_C35	CLIC4 Chloride intracellular channel protein 4	K.AGSDGESIGNC*PFSQR.L	12
P24752_C119	ACATI Acetyl-CoA acetyltransferase, mitochondrial	R.QAVLGAGLPSTPC*TTINK.V	13
P10809_C442	HSPD1 60 kDa heat shock protein, mitochondrial	R.AAVEEGI VLGGGC *ALLR.C	14
P68366_C315	TUBA4A Tubulin alpha-4A chain	K.YMAC*CLLYR.G	15
P09211_C48	GSTP1 Glutathione S-transferase P	K.ASC*LYGQLPK.F	16
Q86SX6_C67	GLRX5 Glutaredoxin-related protein 5, mitochondrial	K.GTPEQPQC*GFSNAWQILR.L	17
P13639_C41	EEF2 Elongation factor 2	K.STLTDSLVC.A	18
014980_C34	XPO1 Exportin-1	K.LDINLLDNWNC*LYHGEGAQQR,M	19
Q15365_C194	PCBP1 Poly(rC)-binding protein 1	RVMTIPYQPMPASSPV1C*AGGQDR.C	20
Q99832_C29	CCT7 T-complex protein 1 subunit eta	K.EGTDSSQGIPQLVSNISAC*QVIAEAVR.T	21
P62280_C60	RPS11 40S ribosomal protein S11	K.C*PFTGNVSIR.G	22
P78417_C32	GSTO1 Glutathione S-transferase omega-1	R.FC*PFAER.T	23
P24752_C196	ACATI Acetyl-CoA acetyltransferase, mitochondrial	K.IHMGSC*AENTAK.K	24
P10599_C32	TXN Thioredoxin	K.LVWDFSATWC*GPK.M	25
P50990_C244	CCT8 T-complex protein 1 subunit theta	K.IAVYSC*PFDGMITETK.G	26
P13667_C206	PD1A4 Protein disulfide-isomerase A4	K.ENFDEWNDADIILVEFYAPWC*GHCK.K	27
P55735_C187	SEC13 Protein SEC13 homolog	R.FASGGC*DNLIKX	28
Q15185_C58	PTGES3 Prostaglandin E synthase 3	K.HLNEIDLFHC*IDPNDSK.H	29
P55263_C353	ADK Adenosine kinase	R.TGC*TFPEKPDFH	30
P46782_C	RPS5 40S ribosomal protein S5	K.AQCPIVERL	31

66			
Q99439_C 164	CNN2 Calponin-2	K.AGQC*V1GLQMGTNK.C	32
PI3639_C 136	EEF2 Elongation factor 2	R.VTDGALWVDCVSGVC*VQTETVLR.Q	33
Q2TAA2_ CI37	IAH1 Isoamyl acetate-hydrolyzing esterase 1 homolog	R.VILITPTPLC *ETAWEEQCIHQGCK.L	34
P30044_C 204	PRDX5 Peroxiredoxin-5, mitochondrial	KALNVEPDGTGLTC*SLAPNIISQL	35
P12268_C 140	IMPDH2 Inosine-5-monophosphate dehydrogenase 2	R.HGFC*GIPITDTGR.M	36
Q99714_C 214	HSD17B10 3-hydroxyacyl-CoA dehydrogenase type-2	K.VC*NFLASQVPFPSR.L	37
Q9NQR4_ C153	NIT2 Omega-amidase NIT2	R.VGLGIC*YDMR.F	38
P15121_C 299	AKR1B1 Aldose reductase	R.VC*ALLSCTSHK.D	39
Q6UB35_ C906	MTHFD1L Monofunctional C1- tetrahydrofolate synthase, mitochondrial	K.IDRYTQQGFGNLPIC +MAK.T	40
P07437_C 239	TUBB Tubulin beta chain	K.LTTPTYGDLNHLVSATMSGVTTC*LR.F	41
Q15084_C 55	PDIA6 Protein disulfide-isomerase A6	R.EVIQSDSLWLVEFYAPWC*GHCQR.L	42
P14618_C 423	PKM Pyruvate kinase isozymes M1/M2	K.C*CSGATJVLTK.S	43
P62266_C 90	RPS23 40S ribosomal protein S23	K.ITAFVPNDGC*LNFIENDEVLVAGFGR.K	44
Q71U36_ C20	TUBA1 A Tubulin alpha-1A chain	MRECISIHVGQAGVQIGNAC*WELCYCLEHG IQPDGQMPSDK.T	45
095336_C 32	PGLS 6-phosphogluconolactonase	R.AAC*CLAGAR-A	46
P24752_C 413	ACATI Acetyl-CoA acetyltransferase, mitochondrial	K.QGEYGLASIC*NGGGGASAMLIQK.L	47
P62701_C 41	RPS4X 40S ribosomal protein S4, X isoform	K.LREC*LPLIIFLR.N	48
P62829_C 28	RPL23 60S ribosomal protein L23	R.ISLGLPVGAVINC*ADNTGAK.N	49
Q71U36_ C25	TUBA1 A Tubulin alpha-1A chain	R.ECISIHVGQAGVQIGNACWELYC*LEHGI QPDGQMPSDK.T	50
Q96HE7_ CI66	EROIL EROI-like protein alpha	K.HDDSSDNFC*EADDIQSPEAEYVDLLNPNP ER.Y	51
Q96HE7_ C241	EROIL EROI-like protein alpha	K.RPLNPLASGQGTSEENTFYSWLEGLC*VE K.R	52
Q9BRA2_ C43	TXNDC17 Thioredoxin domain- containing protein 17	ICSWC*PDCVQAEPVVR.E	53
P13667_C 555	PDIA4 Protein disulfide-isomerase A4	K.DVLIEFYAPWC*GHCK.Q	54
P30101_C 406	PDIA3 Protein disulfide-isomerase A3	K.DVLIEFYAPWC*GHCK.N	55
P07437_C 354	TUBB Tubulin beta chain	K.TAVC*DIPPR.G	56
P83731_C	RPL24 60S ribosomal protein L24	K.C*ESAFLSK.R	57

36			
Q9ULV4_C420	COROIC Coronin-1C	K.C*DLIS1PK.K	58
P42677_C77	RPS27 40S ribosomal protein S27	R.LTEGC*SFR.R	59
000299_C24	CLIC1 Chloride intracellular channel protein 1	K.IGNC*PFSQR.L	60
P49458_C48	SRP9 Signal recognition particle 9 kDa protein	K.VTDDLVC*LVIYK.T	61
P42765_C92	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	R.LC*GSGFQSIIVNGCQEICVK.E	62
Q15233_C145	NONO Non-POU domain-containing octamer-binding protein	R.FAC*HSASLTVR.N	63
P50570_C27	DNM2 Dynamin-2	K,LQDAFSSIGQSC*HLDLPQIAWGGQSAG K.S	64
P25205_C119	MCM3 DNA replication licensing factor MCM3	R.TLTSC*FLSCWCVEGIVTK.C	65
Q5TFE4_C119	NT5DC1 5-nucleotidase domain-containing protein 1	K.HFLSDTGMAC*R.S	66
Q99439_C215	CNN2 Calponin-2	K.C*ASQVGMTAPGTR.R	67
Q06323_C22	PSME1 Proteasome activator complex subunit 1	K.VDVFREDLCTK.T	68
P49591_C438	SARS Serine-tRNA ligase, cytoplasmic	R.TIC*AILENYQTEICG	69
Q96RS6_C376	NUDCD1 NudC domain-containing protein 1	R.DSAQC*AAIAER.L	70
Q71U36_C129	TUBA1A Tubulin alpha-1A chain	K.LADQC*TGLQGFLVFHSFGGGTGSQFTSL LMER.L	71
Q9BXJ9_C721	NAA15 N-alpha-acetyltransferase 15, NatA auxiliary subunit	R.LFNTAVC*ESKX)	72
P33240_C150	CSTF2 Cleavage stimulation factor subunit 2	K.LC*VQNSPQEAR.N	73
Q13155_C291	AIMP2 Aminoacyl tRNA synthase complex-interacting multif	K.SPWLAGNELTVADVVLWS'vXQQIGGC*S VTVPANVQR.W	74
075663_C87	TIPRL TIP41-like protein	K.VAC*AEEWQESR.T	75
P63244_C182	GNB2L1 Guanine nucleotide-binding protein subunit beta-2-like 1	K.VWNLANC*K.L	76
Q7L2H7_C134	EIF3M Eukaryotic translation initiation factor 3 subunit	K.VAASC*GAIQYIPELDQVR.K	77
P49327_C2359	FASN Fatty acid synthase	K.LTPGC*EAEAETEAIFFVQQFTDMEHNR .V	78
P42166_C561	TMPO Lamina-associated polypeptide 2, isoform alpha	K.VDDEILGFISEATPLGGIQAASTESC*NQQ LDLALCR.A	79
P24752_C126	ACATI Acetyl-CoA acetyltransferase, mitochondrial	K.VC*ASGMK.A	80
P36578_C96	RPL4 60S ribosomal protein L4	R.SGQGAFGNMC*R.G	81
Q9NXG2_C31	THUMP1 THUMP domain-containing protein 1	R.RC*DAGGPR.Q	82
P07237_C397	P4HB Protein disulfide-isomerase	K.KNVFVEFYAPWC*GHCK.Q	83

P27707_C 9	DCK Deoxycytidine kinase	R.SC*PSFSASSEGR.I	84
000303_C 256	EIF3F Eukaryotic translation initiation factor 3 subunit	K.TC*FSPNR.V	85
Q9UNH7_C 264	SNX6 Sorting nexin-6	K.SAADDYNRIGSSLYALGTQDSTDIC *KFF LK.V	86
Q15084_C 190	PDIA6 Protein disulfide-isomerase A6	K.DVffILTDDSFDKNVLDSEVDVWVVEFYAP WC*GHCK.N	87
043390_C 99	HNRNPR Heterogeneous nuclear ribonucleoprotein R	K.SAFLC *GVMK.T	88
Q96JB2_C 65	COG3 Conserved oligomeric Golgi complex subunit 3	K.AAAENLPVPAELPIEDLC*SLTSQSLPIELT SWPESTEDILLK.G	89
P46109_C 249	CRKL Crk-like protein	K.RVPC*AYDK.T	90
P62888_C 92	RPL30 60S ribosomal protein L30	R.VC*TLAJIDPGDSDHR.S	91
Q9NUY8_C 283	TBC1D23 TBC1 domain family member 23	K.FLENTPSSLNIEDIEDLFLSLAQYYC*SK.T	92
Q09161_C 44	NCBP1 Nuclear cap-binding protein subunit 1	K.SAC*SLESNLEGLAGVLEADIJ *NYK.S	93
Q9UJW0_C 258	DCTN4 Dynactin subunit 4	R.LLQPDFQPV C*ASQLYPR.H	94
015294_C 758	OGT UDP-N-acetylglucosamine--peptide N-acetylglucosaminyl transferase	K.C*POGGDNADSSNTA LNMPVPMNTIAE AVIEMINR.G	95
P38646_C 317	HSPA9 Stress-70 protein, mitochondrial	K.AKC*ELSSSVQTDINLPYLTMDSGPK.H	96
Q9HA64_C 24	FN3KRP Ketosamine-3-kinase	R.ATGHSGGGC*ISQGR.S	97
Q9Y6G9_C 51	DYNC1LI1 Cytoplasmic dynein 1 light intermediate chain 1	R.VGSFGSSPPGLSSTYTGGPLGNEIASGNG GAAAGDDEDGQNLWSC*ILSEVSTR.S	98
P52597_C 267	HNRNPF Heterogeneous nuclear ribonucleoprotein F	R.DLSYC *LSGMYDHR.Y	99
Q99497_C 106	PARK7 Protein DJ-1	K.GLIAAIC*AGPTALLAHEIGFGSK.V	100
P57764_C 268	GSDMD Gasdermin-D	R.C*LHNFLTGDGVAEGAFTEDFQGLR.A	101
A6NDG6_C 297	PGP Phosphoglycolate phosphatase	K.NNQESDC*VSK.K	102
Q14566_C 301	MCM6 DNA replication licensing factor MCM6	R.LVFLAC*CVAPTNP.R.F	103
Q00610_C 870	CLTC Clathrin heavy chain 1	R.IHEGC*EEPATHNALAK.I	104
Q96T76_C 848	MMS19 MMS19 nucleotide excision repair protein homolog	R.LMGLLSDPEI_GPAAADGFSLMSDC*TD VLTR.A	105
P61158_C 235	ACTR3 Actin-related protein 3	R.YSYVC*PDLVK.E	106
P23528_C 80	CFL1 Cofilin-1	K.MLPDKDC*R.Y	107
Q9NQ88_C 161	TIGAR Fructose-2,6-bisphosphatase TIGAR	K.EADQKEQFSQGSPSNC*LETSLAEIFPLGK N	108
Q9UKF6_C 498	CPSF3 Cleavage and polyadenylation specificity factor subunit	R.NFNYHILSPC*DLSNYTDLAMSTVK.Q	109

Q8TAQ2_C145	SMARCC2 SWI/SNF complex subunit SMARCC2	R.PNIFLC*PEIEPK.L	110
P68036_C86	UBE2L3 Ubiquitin-conjugating enzyme E2 L3	K.GQVC*UVISAENWKPATK.T	111
Q9Y3A3_C134	MOB4 MOB-like protein phocein	R.HTLDGAAC*LLNSNK.Y	112
P49588_C773	AARS Alanine-tRNA ligase, cytoplasmic	K.C*LSVMEAK.V	113
Q96U6_C389	GMPPA Mannose-1-phosphate guanyltransferase alpha	K.LLPAILILGC*R.V	114
P27635_C105	RPL10 60S ribosomal protein L10	K.MLSC*AGADR.L	115
015145_C162	ARPC3 Actin-related protein 2/3 complex subunit 3	K.WWTC*FVK.R	116
P48643_C253	CCT5 T-complex protein 1 subunit epsilon	K.IAILTC*PFEPKPK.T	117
PI1586_C918	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	R.ASVGAGFLYPLVGTMTMPGLPTRPC*FYDIDLDPETEQVNGLF	118
Q96GX2_C75	ATXN7L3B Putative ataxin-7-like protein 3B	R.LPLC*SLPGEPGNGPDQQLQR.S	119
PI7987_C76	TCP1 T-complex protein 1 subunit alpha	K.VLC*ELADLQDK.E	120
Q9NYL9_C132	TMOD3 Tropomodulin-3	K.VSLDPELEEALTSASDTELC*DLAAILGMHNLITNTK.F	121
000429_C367	DNM1L Dynamin-1-like protein	R.IC*YIFHETFGFR.T	122
Q13155_C23	AIMP2 Aminoacyl tRNA synthase complex-interacting multif	R.VELPTC*MYR.L	123
P30101_C57	PDIA3 Protein disulfide-isomerase A3	R.ISDTGSAGLMLVEFFAPWC*GHCK.R	124
Q9ULA0_C144	DNPEP Aspartyl aminopeptidase	K.C*PTSGR.L	125
Q9BWD1_C92	ACAT2 Acetyl-CoA acetyltransferase, cytosolic	R.QASVGAGIPYSVPAWSCQMIC*GSLK.A	126
Q8NBS9_C350	TXNDC5 Thioredoxin domain-containing protein 5	KJYAPWC*GHCK.T	127
P68366_C54	TUBA4A Tubulin alpha-4A chain	K.TIGGGDSDSFTTFFC*ETGAGK.H	128
P04183_C66	TK1 Thymidine kinase, cytosolic	R.YSSSFC*THDR.N	129
Q15021_C439	NCAPD2 Condensin complex subunit 1	K.NAIQLLASFLANNPFSC*K.L	130
Q8WUM4_C250	PDCD6IP Programmed cell death 6-interacting protein	K.HC*IMQANA EYHQSI LAK.Q	131
Q96F86_C413	EDC3 Enhancer of mRNA-decapping protein 3	K.DLPTSPVDLVTNCLDC*PENVFLR.D	132
P35754_C23	GLRX Glutaredoxin-1	K.VWFIKPTC*PYCR.R	133
Q9NQ88_C114	TIGAR Fructose-2,6-bisphosphatase TIGAR	R.EEC*PVFTPPGGETLDQVK.M	134
P12268_C331	IMPDH2 Inosine-5-monophosphate dehydrogenase 2	R.VGMGSGSIC*ITQEV LACGRPQATAVYK.V	135
P25705_C	ATP5A1 ATP synthase subunit alpha,	K.YTIVVSATASDAAPLQYLAPYSGC*SMGE	136

294	mitochondrial	YFR.D	
PI5374_C 95	UCHL3 Ubiquitin carboxyl-terminal hydrolase isozyme L3	K.QTISNAC*GTIGIIHALANNK.D	137
P83731_C 6	RPL24 60S ribosomal protein L24	K_VELC*SFSGYK.I	138
Q9NX24_C C18	NHP2 H/ACA ribonucleoprotein complex subunit 2	K.IKADPDGPEAQAEAC*SGER.T	139
Q13418_C 346	ILK Integrin-linked protein kinase	FSFQCPGR K.FSFQC*PGR.M	140
Q13428_C 38	TCOF1 Treacle protein	K.C*FLAQPVTLX,DIYTHWQQTSELGR.K	141
P24941_C 177	CDK2 Cyclin-dependent kinase 2	R.APELLGC*K.Y	142
P43686_C 210	PSMC4 26S protease regulatory subunit 6B	R.GVLMYGPPGC*GK.T	143
Q9BTA9_C C553	WAC WW domain-containing adapter protein with coiled-coil	R.STC*SLTPALAAHFSENLIK.H	144
014929_C 101	HAT1 Histone acetyltransferase type B catalytic subunit	K.VDENFDC*VEADDVEGK.I	145
075521_C 380	ECI2 Enoyl-CoA delta isomerase 2, mitochondrial	R.WLSDEC*TNAWNFLSR.K	146
PI1586_C 863	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	K.QGFGNLPIC*MAK.T	147
P27707_C 45	DCK Deoxycytidine kinase	K.QLC*EDWEVPEPVAR.W	148
A0AVT1_C C347	UBA6 Ubiquitin-like modifier-activating enzyme 6	R.KPNVGC*QQDSEELLK.L	149
Q96AB3_C C114	ISOC2 Isochorismatase domain-containing protein 2, mitochondrial	R.SVLLCGIEAQAC*LLNTTLDLLDR.G	150
Q14203_C 1252	DCTN1 Dynactin subunit 1	K.VTFSC*AAGFGQR.H	151
Q9BTE3_C C287	MCMBP Mini-chromosome maintenance complex-binding protein	R.DASALT,DPMEC*TDTAEEQR.V	152
095373_C 757	IP07 Importin-7	R.GIDQC*IPLFVEAALER.L	153
P22061_C 102	PCMT1 Protein-L-isoaspartate(D-aspartate) O-methyltransferase	R.MVGC*TGK.V	154
P55060_C 842	CSE1L Exportin-2	K.KIC*AVGITK.L	155
Q9BXJ9_C C322	NAA15 N-alpha-acetyltransferase 15, NatA auxiliary subunit	K.GC*PPVFNTLR.S	156
P62333_C 170	PSMC6 26S protease regulatory subunit 10B	K.GC*LLYGPPGTGK.T	157
Q15398_C 129	DLGAP5 Disks large-associated protein 5	R.YRPDMPG*FLLSNQNAVK.A	158
Q9BVC5_C C10	C2orf49 Ashwin	R.SC*TDSELLLHPELLSQEFLLLTLEQK.N	159
P62280_C 116	RPS1 140S ribosomal protein S1	K.NMSVHLSPC*FR.D	160
P42224_C 255	STAT1 Signal transducer and activator of transcription 1	R.QQSACIGGPPNAC*LDQLQNWFTIVAESL QQVR.Q	161
Q96RN5_C C618	MED15 Mediator of RNA polymerase II transcription subunit	K.QQYLC*QPLLD AVLANIR.S	162

Q6UB35_C961	MTHFD1L Monofunctional C1-tetrahydrofolate synthase, mitochondrial	R.ASIGAGFIYPLVGTMTMPGLPTRPC*FY DIDLDTETEQVK.G	163
P23919_C163	DTYMK Thymidylate kinase	R.C*FHQLMKX>	164
Q92616_C1692	GCN1L1 Translational activator GCN1	K.GMGESC*FEDLLPWLMEITLTYEQSSVDR. S	165
P42166_C341	TMPO Lamina-associated polypeptide 2, isoform alpha	K.SGIQPLC*PER.S	166
095571_C170	ETHE1 Protein ETHE1, mitochondrial	RTDFQQGC*AK.T	167
014777_C449	NDC80 Kinetochore protein NDC80 homolog	K.FNPEAGANC*LVK.Y	168
P36542_C103	ATP5C1 ATP synthase subunit gamma, mitochondrial	R.GLC*GAIHSSIAK.Q	169
Q9Y3D0_C93	FAM96B Mitotic spindle-associated MMXD complex subunit MI	R.VQVSDPESTVAVAFPTIPHC*SMATLIGL SIK.V	170
P54136_C34	RARS Arginine-tRNA ligase, cytoplasmic	K.NCGC*LGASPNLEQLQEENLK.L	171
096T76_C819	MMS19 MMS19 nucleotide excision repair protein homolog	R.YHPLSSC*LTAR.L	172
Q8TBC4_C237	UBA3 NEDD8-activating enzyme E1 catalytic subunit	R.VILPGMTACIECTLELYPPQVNFPMC*TIA SMPR.L	173
Q13573_C250	SNW1 SNW domain-containing protein 1	K.IPPC*ISNWK.N	174
P46734_C207	MAP2K3 Dual specificity mitogen-activated protein kinase	K.MC*DFGISGYLVDSVAK.T	175
P34932_C34	HSPA4 Heat shock 70 kDa protein 4	R.AGGIETIANEYSDRC*TPACISFGPK.N	176
Q9UBR2_C92	CTSZ Cathepsin Z	R.NQHIPPQYCGSC*WAHASTSAMADR.I	177
Q16763_C118	UBE2S Ubiquitin-conjugating enzyme E2 S	K.C*LLIHPNPESALMEEAGR.L	178
Q06203_C100	PPAT Amidophosphoribosyltransferase	K.C*ELENCQPFVVETLHGK.I	179
P51649_C340	ALDH5A1 Succinate-semialdehyde dehydrogenase, mitochondrial	R.NTGQTC*VCSNQFLVQR.G	180
P43246_C822	MSH2 DNA mismatch repair protein Msh2	K.KGVC*DQSFGIHVAVELANFPK.H	181
P27708_C73	CAD CAD protein	K.AQILVLTYPPLIGNYGIPPDEMDEFGLC*K. W	182
Q16822_C306	PCK2 Phosphoenolpyruvate carboxykinase	R.YVAAAFPSAC*GK.T	183
Q01813_C641	PFKP 6-phosphofructokinase type C	R.NESC*SENYTTDFIYQLYSEEGK.G	184
Q96CM8_C64	ACSF2 Acyl-CoA synthetase family member 2, mitochondrial	R.MVSTPIGGLSYVQGC*TK.K	185
Q9BUK6_C403	MSTO1 Protein misato homolog 1	K.WTAGAIIPFPLAPGQSLPDSLMLQFGGAT PWTPLSAC*GEPGTR.C	186
P22234_C374	PAICS Multifunctional protein ADE2	RLPSGLGC+STVLSPEGSAQFAAQIFGLSNH LVWSK.L	187
Q6ICB0_C108	DES1 Desumoylating isopeptidase 1	R.GEAYNLFEHNC*NTFSNEVAQFLTGRJC	188

P62333_C 193	PSMC6 26S protease regulatory subunit 10B	R.AVASQLDC*NFLK.V	189
Q8IUR0_C 139	TRAPPC5 Trafficking protein particle complex subunit 5	K.ENSTLNC*ASFTAGIVEAVLTHSGFPAK.V	190
Q01813_C 179	PFKP 6-phosphofructokinase type C	K.YAYLNVVGMVGSIDNDFC*GDTMTIGTD SALHR.I	191
P38606_C 138	ATP6V1A V-type proton ATPase catalytic subunit A	K.WDFTPC*K.N	192
P82932_C 105	MRPS6 28S ribosomal protein S6, mitochondrial	K.EC*EGIVPVPLAEK.L	193
Q9NS86_C 187	LANCL2 LanC-like protein 2	R.SVVC*QESDLPDELLYGR.A	194
Q9ULV4_C 456	CORO1C Coronin-1C	K.SIKDTIC*NQDER.I	195
P09110_C 381	ACAA1 3-ketoacyl-CoA thiolase, peroxisomal	K.VNPLGGAVALGHPLGC*TGAR.Q	196
Q9HAV7_C 124	GRPEL1 GrpE protein homolog 1, mitochondrial	K.ATQC*VPKEEIKDDNPHLK.N	197
Q14738_C 17	PPP2R5D Serine/threonine-protein phosphatase 2A 56 kDa regulatory subunit delta isoform	K.C*TAKPSSSGK.D	198
Q99757_C 90	TXN2 Thioredoxin, mitochondrial	R.VVNSETPVVVDFHAQWC*GPCK.I	199
P51570_C 182	GALK1 Galactokinase	R.AQVCQQAHSFAGMPC*GIMDQFISLMG QK.G	200
Q06330_C 313	RBPJ Recombining binding protein suppressor of hairless	R.IIQFQATPC*PK.E	201
Q9NVC6_C 649	MED17 Mediator of RNA polymerase II transcription subunit	K.MELLSALSPC*LL	202
Q99832_C 511	CCT7 T-complex protein 1 subunit eta	R.INALTAASEAAC*LIVSVDETIK.N	203
Q9BTE3_C 325	MCMBP Mini-chromosome maintenance complex-binding protein	K.LQHINPLLPAC*LNKEESK.T	204
P04183_C 230	TK1 Thymidine kinase, cytosolic	R.KLFAPQIQC*SPAN	205
Q96S55_C 272	WRNIP1 ATPase WRNIP1	R.SLLETNEIPSLILWGPPGC*GK.T	206
Q0VGL1_C 51	C7orf59 UPF0539 protein C7orf59	R.IPDQLGYLVLSEGAVLASSGLENDEQA ASAISELVSTAC*GFR.L	207
Q86W42_C 35	THOC6 THO complex subunit 6 homolog	R.LHMTIFSQSVSPC*GK.F	208
O14980_C 528	XPO1 Exportin-1	K.DLLGLC*EQKR.G	209
P43246_C 843	MSH2 DNA mismatch repair protein Msh2	K.HVIEC*AK.Q	210
Q00839_C 562	HNRNPU Heterogeneous nuclear ribonucleoprotein U	R.APQC*LGK.F	211
Q8WW01_C 13	TSEN15 tRNA-splicing endonuclease subunit Sen15	R.GDSEPTPGC*SGLGPGGVR.G	212
O60610_C 1227	DIAPH1 Protein diaphanous homolog 1	R.KAGC*AVTSLLESELTK.D	213
Q9NVM9_C 349	Asun Protein asunder homolog	R.ISPVDVNSRPSSC*LTNLLNGR.S	214

O15067_C 270	PFAS Phosphoribosylformylglycinamide synthase	K.FC*DNSSAIQ GK.E	215
P38606_C 254	ATP6V1A V-type proton ATPase catalytic subunit A	R.VLDALFPCVQGGTTAIPGAFGC*GK.T	216
Q8NBS9_ C217	TXNDC5 Thioredoxin domain- containing protein 5	K.FFAPWC*GHCK.A	217
P35611_C 68	ADD1 Alpha-adducin	R.VSMILQSPAFC*EELESMIQE QFK.G	218
P42224_C 492	STAT1 Signal transducer and activator of transcription 1	R.NLSFFLTPPC*AR.W	219
P46940_C 781	IQGAP1 Ras GTPase-activating-like protein IQGAP1	K.KQIPAITC*IQSQWR.G	220
O95229_C 54	ZWINT ZW10 interactor	K.DKLLC*SQLQVADFLQNILAQEDTAK.G	221
Q969Q0_ C88	RPL36AL 60S ribosomal protein L36a-like	R.C*KHFELGGDK.K	222
Q29RF7_ C242	PDS5A Sister chromatid cohesion protein PDS5 homolog A	R.TVQTIEAC*IANFFNQVLVLGR.S	223
Q2NL82_ C126	TSR1 Pre-rRNA-processing protein TSR1 homolog	R.DTGTVHLNELGNTQNFMLLC*PR.L	224
Q9UKX7_ C151	NUP50 Nuclear pore complex protein Nup50	K.AC*VGNAYHK.Q	225
P18621_C 144	RPL17 60S ribosomal protein L17	R.INPYMSSPC*HIEMILTEK.E	226
P49189_C 288	ALDH9A1 4- trimethylaminobutyraldehyde dehydrogenase	K.GALMANFLTQGGVC*CNGTR.V	227
P45985_C 246	MAP2K4 Dual specificity mitogen- activated protein kinase	K.LC*DFGISGQLVDSIAK.T	228
Q13428_C 1298	TCOF1 Treacle protein	K.KGAGNPQASTLALQSNITQC*LLGQPWPL NEAQVQASVVK.V	229
Q9BRF8_ C54	CPPED1 Calcineurin-like phosphoesterase domain-containing	K.AWSTGDC*DNGGDEWEQEIR.L	230
O00170_C 122	AIP AH receptor-interacting protein	R.HCC*GVAQMR.E	231
Q9UNI6_ C265	DUSP12 Dual specificity protein phosphatase 12	R.QAQC*TSYFIEPVQWMESALLGVMDGQL LCPK.C	232
P52657_C 68	GTF2A2 Transcription initiation factor IIA subunit 2	R.FC*DNVWTFVLNDVEFR.E	233
O15067_C 1287	PFAS Phosphoribosylformylglycinamide synthase	R.GLAPLHWADDDGNPTEQYPLNPNPNSPGG VAGICSC*DGR.H	234
P37235_C 185	HPCAL1 Hippocalcin-like protein 1	R.LLQC*DPSSASQF	235
P53602_C 108	MVD Diphosphomevalonate decarboxylase	R.DGDPLPSSLSC*K.V	236
Q96C19_ C172	EFHD2 EF-hand domain-containing protein D2	K.AAAGELQEDSGLC*VLAR.L	237
Q9NQC3_ C1101	RTN4 Reticulon-4	K.YSNSALGHVNC*TIK.E	238
O43175_C 369	PHGDH D-3-phosphoglycerate dehydrogenase	K.NAGNC*LSPAVIVGLLK.E	239

Q99638_C 114	RAD9A Cell cycle checkpoint control protein RAD9A	R.LVVQLHC*K.F	240
Q06830_C 83	PRDX1 Peroxiredoxin-1	K.LNCQVIGASVDSHFC*HLAWVNTPK.K	241
Q00796_C 45	SORD Sorbitol dehydrogenase	R.MHSVGC*GSDVHYWEYGR.I	242
Q9NRG0_C C55	CHRAC1 Chromatin accessibility complex protein 1	K.ATELFVQC*LATYSYR.H	243
P31949_C 91	S100A11 Protein S100-A11	K.KLDTNSDGLDFSEFLNLIGGLAMAC*H DSFLK.A	244
Q9NY65_C C347	TUBA8 Tubulin alpha-8 chain	R^QFVDWC*PTGFK.V	245
Q9NXV6_C C516	CDKN2AIP CDKN2A-interacting protein	K.SVYLGTC*GK.S	246
Q13162_C 51	PRDX4 Peroxiredoxin-4	R.TREEEC*HFYAGGQVYPGEASR.V	247
Q14997_C 1840	PSME4 Proteasome activator complex subunit 4	K.QQFTDDQLLVLTDLLVSPC*YYA	248
Q15003_C 418	NCAPH Condensin complex subunit 2	R.TMC*PLLSMKPGEYSYFSPR.T	249
Q01433_C 107	AMPD2 AMP deaminase 2	R.SLPGPAPC*LK.H	250
075874_C 269	IDH1 Isocitrate dehydrogenase	K.SEGGFIWAC*K.N	251
Q29RF7_C C532	PDS5A Sister chromatid cohesion protein PDS5 homolog A	R.ELLDLHKQPTSEANC*SAMFGK.L	252
P11498_C 622	PC Pyruvate carboxylase, mitochondrial	FLYECPW R.FLYEC*PWR.R	253
P49411_C 147	TUFM Elongation factor Tu, mitochondria]	K.NMITGTAPLDGC*rLWAANDGMPMPQTR. E	254
Q9H0C8_C C301	ILKAP Integrin-linked kinase-associated serine/threonine	R.C*GVTSVPDIR.R	255
Q02252_C 317	ALDH6A1 Methylmalonate-semialdehyde dehydrogenase	RX*MALSTAVLVGEAK.K	256
000487_C 238	PSMD14 26S proteasome non-ATPase regulatory subunit 14	K.SWMEGLTLQDYSEHC*K.H	257
P23919_C 117	DTYMK Thymidylate kinase	K.ENFSLDWC*K.Q	258
075362_C 286	ZNF217 Zinc finger protein 217	R.C*IPQLDPFTTFQAWQLATK.G	259
P10644_C 18	PRKARI A cAMP-dependent protein kinase type I-alpha regulatory subunit alpha	R.EC*ELYVQK.H	260
P51610_C 1872	HCFC1 Host cell factor 1	R.VAGINAC*GR.G	261
POCB43_C C51	FAM203B Protein FAM203B	R.HVLALTGC*GPGR.A	262
060825_C 158	PFKFB2 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase	K.VFFVESVC*DDPDVIAANILEVK.V	263
Q15813_C 141	TBCE Tubulin-specific chaperone E	R.NCAVSC*AGEK.G	264
P30044_C 100	PPvDX5 Peroxiredoxin-5, mitochondrial	K.GVLFVPGAFTPGC*SK.T	265

Q8N1F7_C522	NUP93 Nuclear pore complex protein Nup93	K.SSGQSAQLLSHEPGDPPC*LR.R	266
Q9P0J1_C149	PDP1	R.GMLLGVFDGHAGC*ACSQAVSER.L	267
P07858_C319	CTSB Cathepsin B	R.GQDHC*GIESEVVAGIPR.T	268
P12814_C370	ACTN1 Alpha-actinin-1	R.MVSDINNAWGC*LEQVEK.G	269
O15294_C620	OGT UDP-N-acetylglucosamine--peptide N-acetylglucosaminyl transferase	K.VMAEANHFIDLSQIPC*NGK.A	270
Q86WS5_C64	TMPRSS12 Transmembrane protease serine 12	R.RREGGAHAEDC*GTAPLK.D	271
Q9NQW6_C712	ANLN Actin-binding protein anillin	K.NNAFPC*QVNIK.Q	272
Q9NY27_C22	PPP4R2 Serine/threonine-protein phosphatase 4 regulatory	K.EVC*PVLQFLCHVAK.T	273
P40763_C259	STAT3 Signal transducer and activator of transcription 3	R.QQIACIGGPPNIC*LDRLLENWITSLAESQLQTR.Q	274
O60701_C276	UGDH UDP-glucose 6-dehydrogenase	K.ASVGFGGSC*FQKDVNLVYLCEALNLP EVAR.Y	275
Q09666_C108	AHNAK Neuroblast differentiation-associated protein AHNA	R.EVFSSC*SSEVVLSGDDEEYQR.I	276
P49773_C84	HINT1 Histidine triad nucleotide-binding protein 1	K.C*AADLGLNK.G	277
O95071_C2314	UBR5 E3 ubiquitin-protein ligase UBR5	R.SFYTAIAQAFLSNEKLPNLEC*IQNANK.G	278
Q9Y3Z3_C522	SAMHD1 SAM domain and HD domain-containing protein 1	K.NPIDHVSFYC*K.T	279
O75717_C773	WDHD1 WD repeat and HMG-box DNA-binding protein 1	K.MLALSC*K.L	280
Q9NPF4_C265	OSGEP Probable tRNA threonylcarbamoyladenosine biosynthesis protein OSGEP	R.AMAHCGSQEALIVGGVGC*NVRL	281
P16455_C150	MGMT Methylated-DNA-protein-cysteine methyltransferase	R.VVC*SSGAVGNYSGLAVK.E	282
P49327_C1558	FASN Fatty acid synthase	R.HAQPTC*PGAQLCTVYYASLNFR.D	283
Q96GG9_C115	DCUN1D1 DCN1-like protein 1	R.AATQC*EFSK.Q	284
P13797_C33	PLS3 Plastin-3	K.DELDELKEAFKVDLNSNGFIC*DYELHEL LFK.E	285
P37198_C475	NUP62 Nuclear pore glycoprotein p62	K.DIEHLNTSGAPADTSDPLQQIC*K.I	286
P00813_C75	ADA Adenosine deaminase	K.FDYYPALAGC*R.E	287
O75153_C333	KIAA0664 Clustered mitochondria protein homolog	R.IATPFQVYSWTAPQAEHAMDC*VR.A	288
A6NDU8_C179	C5orf51 UPF0600 protein C5orf51	R.C*PIQLNEGVSFQDLDTAK.L	289
Q9BWU1_C349	CDK19 Cyclin-dependent kinase 19	R.ITSEQALQDPYFQEDPLPTLDVFAGC*QIP YPK.R	290
Q15208_C234	STK38 Serine/threonine-protein kinase 38	K.LSDFGLC*TGLK.K	291

Q9UKV3_C1223	ACINI Apoptotic chromatin condensation inducer in the nucleus	K.AAPC*IYWLPLTDSQIVQK.E	292
P45984_C177	MAPK9 Mitogen-activated protein kinase 9	RTAC*TNFMMTPYVVTR.Y	293
Q14204_C1999	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	K.TSAPITC*ELLNK.Q	294
P29590_C389	PML Protein PML	R.LQDLSSC*ITQGK.D	295
P62333_C228	PSMC6 26S protease regulatory subunit 10B	R.DHQPCIIFMDEIDAIGGR.R	296
P13796_C101	LCP1 Plastin-2	K.EGIC*AIGGTSEQSSVGTQHSYSEEEK.Y	297
Q9NWX8_C222	BABAMI BRISC and BRCA1-A complex member 1	R.TELVYSRPPC*QPQFSLTEPMKK.M	298
014879_C343	IFIT3 Interferon-induced protein with tetra-ricopeptide	K.GLNPLNAYSDLAEFLETEC*YQTPFNK.E	299
P50749_C251	RASSF2 Ras association domain-containing protein 2	R.ILQGPC*EQISK.V	300
043396_C34	TXNL1 Thioredoxin-like protein 1	R.GC*GPCLR.I	301
P35658_C728	NUP214 Nuclear pore complex protein Nup214	K.AC*FQVGTSEEMK.M	302
P42166_C684	TMPO Lamina-associated polypeptide 2, isoform alpha	K.GGTFLFGGEVC*K.V	303
Q96FX7_C209	TRMT61A tRNA (adenine(58)-N(1))-methyltransferase catalytic	R.FCSFSPC*IEQVQR.T	304
Q71U36_C200	TUBA1A Tubulin alpha-1A chain	K.LEFSIYPAPQVSTAVVEPYNLSILTTHTTLE HSDC*AFMVDNEAIYDICR.R	305
075822_C207	FJF3J Eukaryotic translation initiation factor 3 subunit	K.ITNSLTVLC*SEK.Q	306
Q9UBQ7_C216	GRHPR Glyoxylate reductase/hydroxypyruvate reductase	R.QRPREEAAEFQAEFVSTPELAAQSDFIW AC*SLTPATEGLCNK.D	307
P51946_C244	CCNH Cyclin-H	K.ENRTC*LSQLLDIMK.S	308
P05091_C319	ALDH2 Aldehyde dehydrogenase, mitochondrial	K.SPNIIMSDADMDWAVEQAHFALFFNQGG CC*CAGSR.T	309
Q9NZL4_C204	HSPBP1 Hsp70-binding protein 1	R.LLDRDAC*DTVR.V	310
075439_C265	PMPCB Mitochondrial-processing peptidase subunit beta	K.FHFGDSLK*THK.G	311
Q16527_C33	CSRP2 Cysteine and glycine-rich protein 2	R.C*CFLCMVCR.K	312
Q8TC07_C197	TBC1D15 TBC1 domain family member 15	R.TLLVNC*QNK.S	313
P07858_C211	CTSB Cathepsin B	K.IC*EPGYSPTYK.Q	314
Q15149_C3110	PLEC Plectin	K.GRLC*FEGLR.S	315
Q9NUP9_C47	LIN7C Protein lin-7 homolog C	R.VLQSEFC*NAVR.E	316
Q14683_C987	SMC1A Structural maintenance of chromosomes protein 1A	R.EALIEIDYGDLC*EDLKDAQAEIEIKQEM NTLQK.L	317
P09110_C	ACAAL 3-ketoacyl-CoA thiolase,	K.ARDC*LLPMGITSENVAER.F	318

177	peroxisomal		
A9UHW6_C49	MIF4GD MLF4G domain-containing protein	K.VANVrVDHSLQDC*VFSK.E	319
Q9NPH0_C267	ACP6 Lysophosphatidic acid phosphatase type 6	R.MGIDSSDKVDFILLDNVAAEQAHNLPSC*PMLK.R	320
Q92878_C1302	RAD50 DNA repair protein RAD50	RAD50 K.C*SVSSLGFNVH	321
014933_C98	UBE2L6 Ubiquitin/ISG15-conjugating enzyme E2 L6	K.IYHPNVDENGQICLPnSSENWKPC*TK.T	322
P39023_C253	RPL3 60S ribosomal protein L3	K.VAC*IGAWHPAR.V	323
Q9UHD8_C531	SEPT9 Septin-9	K.WGTIEVENTTHC*EFAYLR.D	324
P42167_C363	TMPO Lamina-associated polypeptide 2, isoforms beta/gamma	K.EMFPYEASTPTGISASC*R.R	325
Q14790_C360	CASP8 Caspase-8	K.VFFIQAC*QGDNYQK.G	326
Q15149_C4574	PLEC Plectin	K.YLTC*PK.T	327
Q9UJY4_C429	GGA2 ADP-ribosylation factor-binding protein GGA2	R.NLLDLLSAQPAPC*PLNYVSQK .S	328
Q15306_C194	IRF4 Interferon regulatory factor 4	R.DYVPDQPHPEIPYQC*PMTFGPR.G	329
Q6L8Q7_C108	PDE12 2,5-phosphodiesterase 12	K.SRPNASGGAAC*SGPGPEPAVFCEPWK.L	330
Q8TDP1_C34	RNASEH2C Ribonuclease H2 subunit C	R.DAVPATLHLLPC*EVAVDGPAPVGR.F	331
Q13045_C46	FLII Protein flightless- 1 homolog	R.TGLC*YLPEELALQKX	332
095881_C66	TXNDC12 Thioredoxin domain-containing protein 12	K.SWC*GACK.A	333
Q9Y296_C195	TRAPP4 Trafficking protein particle complex subunit 4	R.C*ELFDQNLK.L	334
Q00765_C18	REEP5 Receptor expression-enhancing protein 5	K.NC*MTDLLAK.L	335
Q86X76_C165	NIT1 Nitrilase homolog 1	K.THLC*DVEIPGQGPMCESNSTMPGPSLES PVSTPAGK.I	336
P52597_C122	HNRNPF Heterogeneous nuclear ribonucleoprotein F	R.GLPFGC*TK.E	337
Q96HE7_C37	EROIL EROI-like protein alpha	R.CFC*QVSGYLDDCTCDVETIDR.F	338
Q9BUH6_C180	C9orf142 Uncharacterized protein C9orf142	R.C*PGESLINPGFK .S	339
Q13158_C98	FADD Protein FADD	R.RVDDFEAGAAAGAAPGEEDLC*AAFNVI CDNVGK.D	340
Q9UBE0_C214	SAE1 SUMO-activating enzyme subunit 1	K.KVVFC*PVK.E	341
Q9P2J5_C554	LARS Leucine-tRNA ligase, cytoplasmic	K.NLETFC*EETR.R	342
Q96PU8_C35	QKI Protein quaking	K.LMSSLPNFC*GIFNHLEL.L	343
Q6XZF7_C691	DNMBP Dynamin-binding protein	R.SLDQTSPC*PLVLVR.I	344

Q9Y4R8_C628	TEL02 Telomere length regulation protein TEL2 homolog	R.MDILDVLTLLAAQELSRPGC*LGR.T	345
Q9HBM1_C27	SPC25 Kinetochore protein Spc25	K.STDTSC*QMAGLR.D	346
P21980_C277	TGM2 Protein-glutamine gamma-glutamyltransferase 2	K.YGQC*WVFAAVACTVLR.C	347
Q9H3U1_C426	UNC45A Protein unc-45 homolog A	R.AIQTVSCLLQGPC*DAGNR.A	348
Q9NRW3_C130	APOBEC3C Probable DNA dC- dU-editing enzyme APOBEC-3C	R.LYYFQYPC*YQEGLR.S	349
P55265_C1224	ADAR Double-stranded RNA-specific adenosine deaminase	K.NFYLC*PV	350
P48735_C308	IDH2 Isocitrate dehydrogenase	K.SSGGFVWAC*K.N	351
060664_C39	PLIN3 Perilipin-3	R.VASMP LISSTC*DMVSAAYASTK.E	352
Q9NYL9_C150	TMOD3 Tropomodulin-3	K.FC*NIMGSSNGVDQEHFSNWK.G	353
Q9HCC0_C216	MCCC2 Methylcrotonoyl-CoA carboxylase beta chain, mitochondrial	K.NIAQIAWMGSC*TAGGAYVPAMADENII VR.K	354
Q16831_C162	UPP1 Uridine phosphorylase 1	R.IGTSGGIGLEPGTVVITEQAVDTC*FK.A	355
000244_C12	ATOX1 Copper transport protein ATOX1	K.HEFSVDMTC*GGCAEAVSR.V	356
P11216_C326	PYGB Glycogen phosphorylase, brain form	R.TC*FETFPDK.V	357
P42166_C280	TMPO Lamina-associated polypeptide 2, isoform alpha	R.NLFISC*K.S	358
015372_C327	EIF3H Eukaryotic translation initiation factor 3 subunit	R.MDSmAGQINTYC *QNIK.E	359
Q9BRP1_C82	PDCD2L Programmed cell death protein 2-like	R.LLHVFCAC*PGCSTGGARS	360
Q15021_C767	NCAPD2 Condensin complex subunit 1	K.VACC*PLER.C	361
P30042_C177	C21orf33 ESI protein homolog, mitochondrial	K.EFHQAGKPIGLCC*IAPVLAAK.V	362
Q13425_C391	SNTB2 Beta-2-syntrophin	R.LVHSGSGC*R.S	363
000159_C802	MYO1C Unconventional myosin-1c	R.C*PENAFFLDHVR.T	364
095071_C2267	UBR5 E3 ubiquitin-protein ligase UBR5	R.C*ATTPMAVHR.V	365
Q02809_C680	PLOD1 Procollagen-lysine,2-oxoglutarate 5-dioxygenase 1	R.VGVVDYEGGGC*R.F	366
Q96RE7_C416	NACCI Nucleus accumbens-associated protein 1	R.NTLANSC*GTGIR.S	367
Q9UPQ0_C140	LIMCH1 LIM and calponin homology domains-containing protein 1	K.AANSC*TSYSGTTLNLKEFEGLLAQNIR.K	368
014776_C1062	TCERG1 Transcription elongation regulator 1	R.YLVLDL*C*VPEER.R	369
Q9H410_C287	DSN1 Kinetochore-associated protein DSN1 homolog	K.VFDC*MELVMDELQGSVK.Q	370
Q12959_C	DLG1 Disks large homolog 1	K.LLAVNNVC*LEEVTHEEA VTALK.N	371

378			
Q86UV5_C39	USP48 Ubiquitin carboxyl-terminal hydrolase 48	R.IWLEPC*IR.G	372
P50454_C156	SERPINH1 Serpin H1	K.QHYNC*EHSK.I	373
Q99798_C451	ACO2 Aconitate hydratase, mitochondrial	R.DLGGIVLANACGPC*IGQWDR.K	374
Q9P2T1_C186	GMPT2 GMP reductase 2	K.VGIGPGSVC*TTR.K	375
Q9BTW9_C850	TBCD Tubulin-specific chaperone D	K.AGAPDEAVCGENVSQIYC*ALLGCMDDY TTDSR.G	376
Q8NFH5_C255	NUP35 Nucleoporin NUP53	R.C*ALSSPSLAFTPIK.T	377
P32322_C120	PYCR1 Pyrroline-5-carboxylate reductase 1, mitochondrial	R.C*MTNTPVVVR.E	378
P50851_C1704	LRBA Lipopolysaccharide-responsive and beige-like anchor protein	R.SLVNIPADGVTVDPALLPPAC*LGALGDL SVEQPVQFR.S	379
Q9UBR2_C173	CTSZ Cathepsin Z	K.DQECDKFNQCGTC*NEFK.E	380
Q8IWW8_C1717	UBR2 E3 ubiquitin-protein ligase UBR2	R.GNPLHLC*K.E	381
O75369_C1087	FLNB Filamin-B	K.IEC*SDNGDGTCSVSYLPTKPGEYFVNILF EEVHIPGSPFK.A	382
Q9Y4P1_C74	ATG4B Cysteine protease ATG4B	K.NFPAIGGTGPTSDTGWGC*MLR.C	383
Q8TD19_C623	NEK9 Serine/threonine-protein kinase Nek9	R.LLTFGC*NK.C	384
Q9UMS0_C213	NFU1 NFU1 iron-sulfur cluster scaffold homolog, mitochondrial	K.LQGSCTSC*PSSITLK.N	385
O94953_C694	KDM4B Lysine-specific demethylase 4B	R.TEPYCAICTLFYPYC*QALQTEK.E	386
Q15149_C992	PLEC Plectin	K.VLSSSGSEAAVPSVC*FLVPPPNQEAQEA VTRL	387
P14735_C974	IDE Insulin-degrading enzyme	R.EMDSCPVVGEFPC*QNDINLSQAPALPQP EVIQNMTEFKR.G	388
Q9NVG8_C282	TBC1D13 TBC1 domain family member 13	K.SLDDSQC*GITYK.M	389
Q86TI2_C844	DPP9 Dipeptidyl peptidase 9	R.C*PESGEHYEVTLLHFLQEYL	390
O94992_C84	HEXIM1 Protein HEXIM1	R.AFPQLGGRPGPEGEGSLESQPPPLQTQAC PESSC*LR.E	391
Q86YH6_C71	PDSS2 Decaprenyl-diphosphate synthase subunit 2	R.C*LLSDELSNIAMQVR.K	392
P19447_C342	ERCC3 TFIIH basal transcription factor complex helicase	R.SGVIVLPC*GAGK.S	393
Q9Y3D2_C105	MSRB2 Methionine-R-sulfoxide reductase B2, mitochondrial	K.YC*SGTGWPSFSEAHGTSGSDESHTGILR. R	394
Q9P253_C22	VPS18 Vacuolar protein sorting-associated protein 18 homolog	R.SAVLQPGC*PSVGIPHSQVNAQLEK.E	395
O75150_C890	RNF40 E3 ubiquitin-protein ligase BRE1B	R.EIQPC*LAESR.A	396
P04818_C199	TYMS Thymidylate synthase	R.DLPLMALPPCHALC*QFYVVNSELSQCLY QR.S	397

Q00535_C 157	CDK5 Cyclin-dependent kinase 5	R.C*YSAEWTLWYRPPDVLFGAK.L	398
Q96N67_ C2125	D0CK7 Dedicator of cytokinesis protein 7	K.AVLPVTC*HR.D	399
095340_C 350	PAPSS2 Bifunctional 3-phosphoadenosine 5-phosphosulfate	R.VWGTTC*TK.H	400
Q96F86_ C499	EDC3 Enhancer of mRNA-decapping protein 3	R.IYLCDIGIPQQVFQEVGINYHSPFGC*K.F	401
Q6QNY0_ C168	BLOC 1S3 Biogenesis of lysosome-related organelles complex	R.GDLC*ALAER.L	402
Q7Z3B4_ C180	NUP54 Nucleoporin p54	K.AVGYSC*MPSNKDEDGLWLVFNK.K	403
Q9UPT9_ C171	USP22 Ubiquitin carboxyl-terminal hydrolase 22	R.KITSNC*TIGLR.G	404
P45954_C 175	ACADSB Short/branched chain specific acyl-CoA dehydrogenase	K.VGSFC*LSEAGAGSDSFALK.T	405
Q9UKT9_ C434	EKZF3 Zinc finger protein Aiolos	R.SYELLKPPPIC*PR.D	406
Q9NR50_ C281	EIF2B3 Translation initiation factor eIF-2B subunit gamma	K.EANTLNLAPYD AC*WNACR. G	407
Q9HB90_ C377	RRAGC Ras-related GTP-binding protein C	R.SC*GHQTSASSLK.A	408
Q5TON5_ C69	FNBP1L Formin-binding protein 1-like	R.FTSC*VAFFNILNELNDYAGQR.E	409
P07339_C 117	CTSD Cathepsin D	K.LLDIAC*WIHHK.Y	410
Q7Z6Z7_ C3372	HUWE1 E3 ubiquitin-protein ligase HUWE1	K.AC*SPCSSQSSSSGICTDFWDLLVK.L	411
000267_C 626	SUPT5H Transcription elongation factor SPT5	R.SFAFLHC*K.K	412
095347_C 1174	SMC2 Structural maintenance of chromosomes protein 2	R.FTQC*QNGK.I	413
Q92616_C 648	GCN1L1 Translational activator GCN1	R.VLQEALC*VISGVPGLK.G	414
P85037_C 254	FOXX1 Forkhead box protein K1	R.SMVSPVSPPTGTISVPNSC*PASPR.G	415
P17655_C 640	CAPN2 Calpain-2 catalytic subunit	K.MPC*QLHQVrVARF	416
P50851_C 2675	LRBA Lipopolysaccharide-responsive and beige-like anchor protein	K.C*SGIGDNPGETAAPR. A	417
014733_C 131	MAP2K7 Dual specificity mitogen-activated protein kinase	R.YQAEENDLENLGEMSGTC*GQVWK.M	418
A6NED2_ C139	RCCD1 RCC1 domain-containing protein 1	R.GEPLWAQNWPEAEGEDDPAGEAQAGR LPLLPC*AR.A	419
Q14980_C 961	NUMA1 Nuclear mitotic apparatus protein 1	R.QFC*STQAALQAMER.E	420
Q9NYL2_ C22	MLTK Mitogen-activated protein kinase kinase kinase MLT	K.FDDLQFFENC*GGGSGSVYR.A	421
Q13867_C 73	BLMH Bleomycin hydrolase	R.C*WIFSCLNVMR.L	422
Q9BRJ7_ C88	NUDT 16L1 Protein syndesmos	R.VLGLGLGC*LR.L	423
Q96P48_	ARAPI Arf-GAP with Rho-GAP	R.AVFPEGPC*EEPLQLR.K	424

C900	domain, ANK repeat and PH domain 1		
Q5MNZ6_C63	WDR45L WD repeat domain phosphoinositide-interacting protein 3	R.C*NYLALVGGGK.K	425
Q13588_C161	GRAP GRB2-related adapter protein	K.SPGAC*FAQAQDFSAQDPSQLSFR.R	426
H0Y2S0_C31	Uncharacterized protein	R.YTQQGFGNLPIC*MAK.T	427
Q9ULW0_C536	TPX2 Targeting protein for Xklp2	R.TVEIC*PFSFDSR.D	428
Q9HAV4_C646	XP05 Exportin-5	K.C+ALMEALVLISNQFK.N	429
Q5T1V6_C414	DDX59 Probable ATP-dependent RNA helicase DDX59	DDX59 K.NLPC*ANVR.Q	430
Q14181_C198	POLA2 DNA polymerase alpha subunit B	K.VLGC*PEALTGSYK.S	431
Q8IZ73_C246	RPUSD2 RNA pseudouridylate synthase domain-containing protein 2	R.LLAENEDVVWVKPSSIPVHPC*GR.F	432
Q86UP2_C303	KTNI Kinectin	K.TMMFSEDEALC*VVDLLK.E	433
Q9UGP4_C305	LIMD1 LIM domain-containing protein 1	R.TPSVSAPLALSC*PR.Q	434
P32929_C229	CTH Cystathionine gamma-lyase	K.YMNGHSDVVMGLVSVNC*ESLHNR.L	435
Q726Z7_C4367	HUWE1 E3 ubiquitin-protein ligase HUWE1	RHMLLLA1QEC*SEGFGLA.-	436
P31153_C214	MAT2A S-adenosylmethionine synthase isoform type-2	R.VHTrVISVQHDEEVC*LDEM RD	437
Q96NY7_C487	CLIC6 Chloride intracellular channel protein 6	R.AGYDGESIGNC*PFSQR.L	438
P14635_C238	CCNB1 G2/mitotic-specific cyclin-B1	R.FMQNNC*VPK.K	439
Q13303_C248	KCNAB2 Voltage-gated potassium channel subunit beta-2	R.EKVEVQLPELFHKIGVVGAMTWSPLAC *GI VSGKYDSGIPPYSR .A	440
Q9HAV4_C44	XP05 Exportin-5	K.C*PICVPCGLR.L	441
Q8ND24_C655	RNF214 RING finger protein 214	R.SSHAPATC*K.L	442
Q9HB90_C358	RRAGC Ras-related GTP-binding protein C	R.KGLIDYNFHC*FR.K	443
Q92878_C1296	RAD50 DNA repair protein RAD50	K.NIDQC*SEIVK.C	444
Q14149_C15	MORC3 MORC family CW-type zinc finger protein 3	R.LSALC*PK.F	445
P13798_C641	APEH Acylamino-acid-releasing enzyme	R.NPVINIASMLGSTDIPDWCWEAGFPFS S DC*LPDLSVWAEMLDK. S	446
Q01813_C563	PFKP 6-phosphofructokinase type C	K.HEEFCVPMVMVPATVSNNVPGSDFSIGA DTALNTITDTC*DRIK.Q	447
Q96T76_C549	MMS19 MMS19 nucleotide excision repair protein homolog	RVGESNLNNGDEPTQC*SR.H	448
Q9BTE6_C209	AARSD1 Alanyl-tRNA editing protein Aarsd1	R.VVNIEGVDSNMC*CGTHVSNI.SDLQVIK.I	449
Q9C011_C	MTMR12 Myotubularin-related	R.HHSQQAPQAEAPC*LLR.N	450

694	protein 12		
P32320_C 14	CDA Cytidine deaminase	K.RPACTLKPEC*VQQLLVCSQEAK.K	451
Q9P2E9_ C1323	RRBP1 Ribosome-binding protein 1	K.LTAEFEFAQTSAC*R.L	452
P30876_C 1093	POLR2B DNA-directed RNA polymerase II subunit RPB2	R.DC*QIAHGAAQFLR.E	453
P07237_C 53	P4HB Protein disulfide-isomerase	K.YLLVEFYAPWC*GHCK.A	454
Q8IZ73_C 431	RPUSD2 RNA pseudouridylate synthase domain-containing protein 2	K.QSLDVL DLC*EGDLSPLTDSTAPSSSELG KDDLEELAAAAQK.M	455
Q6NZY4_ C393	ZCCHC8 Zinc finger CCHC domain-containing protein 8	R.IFGSIPMQAC*QQK.D	456
Q96EB1_ C218	ELP4 Elongator complex protein 4	K.VEPC*SLTPGYTK.L	457
060568_C 691	PLOD3 Procollagen-lysine,2-oxoglutarate 5-dioxygenase 3	K.GLDYEGGGC*R.F	458
Q8WV74_ C207	NUDT8 Nucleoside diphosphate-linked moiety X motif 8, mitochondrial	R.LAGLTC*SGAEGLARPK.Q	459
Q7Z6Z7_ C4341	HUWE1 E3 ubiquitin-protein ligase HUWE1	R.STDRLPSAHTC*FNQLDLPAYESFEK.L	460
PI6455_C 145	MGMT Methylated-DNA-protein-cysteine methyltransferase	R.GNPVILIPC*HR.V	461
Q86X76_ C203	NIT1 Nitrilase homolog 1	K.IGLAVC*YDMR.F	462
Q9BR61_ C267	ACBD6 Acyl-CoA-binding domain-containing protein 6	RJDQDGCLPEEVTGC*K.T	463
Q8IU81_ C363	IRF2BP1 Interferon regulatory factor 2-binding protein 1	R.EPAPAEALPQQYPEPAPAALC*GPPPRAP SR.N	464
Q9Y5T5_ C205	USP16 Ubiquitin carboxyl-terminal hydrolase 16	K.GLSNLGNTC*FFNAVMQNLSQTPVLR.E	465
Q8IWZ3_ C615	ANKHD1 Ankyrin repeat and KH domain-containing protein 1	R.AGHLC*TVQFLISK.G	466
Q13158_C 105	FADD Protein FADD	R.RVDDFEAGAAAGAAPGEEDLCAAFNVIC *DNVKGDWRR.L	467
P29590_C 213	PML Protein PML	R.GCSKPLCC*SCALLDSSHSELK.C	468
Q00653_C 57	NFKB2 Nuclear factor NF-kappa-B p100 subunit	R.YGC*EGPSHGGLPGASSEK.G	469
Q9BVA1_ C129	TUBB2B Tubulin beta-2B chain	K.ESESCDC*LQGFQLTHSLGGGTGSGMGT LLISK.I	470
Q9NZA1_ C191	CLIC5 Chloride intracellular channel protein 5	K.AGIDGESIGNC*PFSQR.L	471
060551_C 104	NMT2 Glycylpeptide N-tetradecanoyltransferase 2	R.AMELLSAC*QGPARN	472
Q16667_C 39	CDKN3 Cyclin-dependent kinase inhibitor 3	R.VNC*SQFLGLCALPGCK.F	473
A3KN83_ C445	SBNO1 Protein strawberry notch homolog 1	K.NLC*PVGSSKPTK.T	474
Q8N999_ C302	C12orf29 Uncharacterized protein C12orf29	K.C*LFNHFLK.I	475
Q6YN16_ C302	HSDL2 Hydroxysteroid	K.QHC*AYTIK.Y	476

C166	dehydrogenase-like protein 2		
Q9HB19_C332	PLEKHA2 Pleckstrin homology domain-containing family A member 2	R.SISLTRPGSSSLSSGPNILC*R.G	477
Q8WW9_C464	HNRPLL Heterogeneous nuclear ribonucleoprotein L-like	K.NnQPPSCVLHYYNVPLC*VTEETFTK.L	478
075175_C600	CNOT3 CCR4-NOT transcription complex subunit 3	R.DIILSSTSAPPASAQPLQLSEVNIPLSLGV C*PLGPVPLTK.E	479
Q7L2J0_C419	MEPCE 7SK snRNA methylphosphate capping enzyme	K.FQYGNYC*K.Y	480
P36405_C174	ARL3 ADP-ribosylation factor-like protein 3	R.VWQIQSCSALTGEGVQDGMNWVC*K.N	481
Q9Y4X0_C175	AMMECR1 AMME syndrome candidate gene 1 protein	R.GC*IGTFSAMNLHSGLR.E	482
Q9NZB2_C531	FAM120A Constitutive coactivator of PPAR-gamma-like protein	K.GSQMGTVQPIPC *LLSMFrR.N	483
P26358_C1478	DNMT1 DNA (cytosine-5)-methyltransferase 1	R.GVCSC*VEAGK.A	484
Q8TB03_C12	CXorf38 Uncharacterized protein CXorf38	R.LNC*AEYK.N	485
Q9Y676_C128	MRPS18B 28S ribosomal protein S18b, mitochondrial	K.LLEQFVC*AHTGIIFYAPYTGVCVK.Q	486
Q9Y613_C502	FHOD1 FH1/FH2 domain-containing protein 1	R.TPQSPAPC*VLLR.A	487
Q99986_C50	VRK1 Serine/threonine-protein kinase VRK1	K.VGLPIGQGGFGC*IYLADMNSSES VGSDA PCVVK.V	488
P53992_C78	SEC24C Protein transport protein Sec24C	R.APPSSGAPPASTAQAPC*GQAA YGQFGQ GDVQNGPSSTVQMQR.L	489
Q96RN5_C660	MED15 Mediator of RNA polymerase II transcription subunit	R.TFVPAMTAIHGPPITAPWC*TR.K	490
Q27J81_C332	INF2 Inverted formin-2	R.AVLLASDAQEC*TLEEVVER.L	491
Q27J81_C971	INF2 Inverted formin-2	K.QEEVC *VIDALLADIR.K	492
Q9UBB4_C356	ATXN10 Ataxin-10	K.ETTNIFSNCGC*VR.A	493
Q08378_C1403	GOLGA3 Golgin subfamily A member 3	K.GEASSSNPATPIKIPDC*PVPASLLEELLRP PPAVSKEPLK.N	494
Q8WWI1_C228	LM07 LIM domain only protein 7	R.DSGYGDIWC*PER.G	495
P10398_C597	ARAF Serine/threonine-protein kinase A-Raf	R.TQADELPAC*LLSAAR.L	496
Q9NZ32_C388	ACTR10 Actin-related protein 10	R.-PDWC*SLNNPPLEMMFDVVGK.T	497
Q9Y2X3_C106	NOP58 Nucleolar protein 58	K.LNLSC*IHSPWNELMR.G	498
P53396_C764	ACLY ATP-citrate synthase	R.LTKPIVCWCIGTCATMFSSEVQFGHAGAC *ANQASETAVAK.N	499
P18124_C186	RPL7 60S ribosomal protein L7	K.YGnC*MEDLIHFJYTVGK.R	500
Q9BUK6_C485	MSTO1 Protein misato homolog 1	R.VAPPYPHLLFSSC*SPPGMVLDGSPK.G	501
O00541_C	PES1 Pescadillo homolog	K.AGEGTYALDSESC*MEK.L	502

272			
Q9Y277_C65	VDAC3 Voltage-dependent anion-selective channel protein	K.VC*NYGLTFTQK.W	503
Q02556_C306	IRF8 Interferon regulatory factor 8	R.VFCSGNAVVC*K.G	504
Q01082_C112	SPTBN1 Spectrin beta chain, non-erythrocytic 1	R.IHC*LENVDK.A	505
A2A288_C367	ZC3H12D Probable ribonuclease ZC3H12D	R.LAFSDDLGLGPLPVPAC*SLTPR.L	506
O14936_C914	CASK Peripheral plasma membrane protein CASK	R.HLEEAVELVC*TAPQWVPVSWVY	507
O43290_C645	SART1 U4/U6.U5 tri-snRNP-associated protein 1	R.GLAAALLLC*QNK.G	508
Q9UBV8_C146	PEF1 Peflin	K.QALVNC*NWSSFNDETCLMMINMFDK.T	509
Q6PCB5_C280	RSBN1L Round spermatid basic protein 1-like protein	K.SIQTIC*SGLLTDVEDQAAK.G	510
Q08380_C561	LGALS3BP Galectin-3-binding protein	K.STSSFPC*PAGHFNGFR.T	511
P57737_C34	CORO7 Coronin-7	R.AGTAPSC*R.N	512
Q92616_C1235	GCN1L1 Translational activator GCN1	R.C*GLALALNK.L	513
P24468_C326	NR2F2 COUP transcription factor 2	K.AIVLFTSDAC*GLSDVAHVESLQEK.S	514
Q96RP9_C153	GFM1 Elongation factor G, mitochondrial	R.VLDGAVLVLCVGGVQC*QTMTVNR.Q	515
Q9NRF9_C51	POLE3 DNA polymerase epsilon subunit 3	R.AASVFLYATSC*ANNFAMK.G	516
P30837_C179	ALDH1B1 Aldehyde dehydrogenase X, mitochondrial	R.HEPVGVC*GQIIPWNFPLVMQGWK.L	517
Q8WUM4_C90	PDCD6IP Programmed cell death 6-interacting protein	K.PPFSNQIC*LTFTWK.D	518
Q9NP73_C86	ALG13 UDP-N-acetylglucosamine transferase subunit ALG13	K.ADLVISHAGAGSC*LETLEK.G	519
P13667_C91	PDIA4 Protein disulfide-isomerase A4	K.EENGVLVLNDANFDNFVADKDTVLLEFYAPWC*GHCK.Q	520
P09884_C1403	POLA1 DNA polymerase alpha catalytic subunit	R.YIFDAEC*ALEK.L	521
O95833_C22	CLIC3 Chloride intracellular channel protein 3	K.ASEDGESVGHK*PSCQR.L	522
Q9NTX5_C133	ECHDC1 Ethylmalonyl-CoA decarboxylase	K.SLGTPEGMAVC*MFMQNTLTR.F	523
Q14289_C899	PTK2B Protein-tyrosine kinase 2-beta	K.NELC*QLPPEGYVVVVK.N	524
P49792_C815	RANBP2 E3 SUMO-protein ligase RanBP2	K.MIC*QQVEAIK.E	525
Q14137_C404	BOP1 Ribosome biogenesis protein BOP1	R.DLQPFPPTC*QALVYR.G	526
Q15345_C297	LRRC41 Leucine-rich repeat-containing protein 41	R.C*AAALMASR.R	527
Q99538_C219	LGMN Legumain	R.ESSYAC*YYDEK.R	528

Q96EK4_C48	THAP11 THAP domain-containing protein 11	R.AGVSGC*FSTFQPTTGHR.L	529
060488_C420	ACSL4 Long-chain-fatty-acid—CoA ligase 4	K.GYDAPLC*NLFFFK.K	530
Q96EY5_C231	FAM125A Multivesicular body subunit 12A	K.SC*SPLAFSAFGDLTIK.S	531
P22307_C307	SCP2 Non-specific lipid-transfer protein	K.SGLTPNDEDVIELHDC*FSTNELLYEALGLX-TEGQGATLVDR.G	532
Q969Z0_C335	TBRG4 Protein TBRG4	R.LATDLLSLMPSLTSGEVAHC *AK.S	533
P46734_C29	MAP2K3 Dual specificity mitogen-activated protein kinase	R.ISC*MSKPPAPNPTPPR.N	534
Q5JPI3_C308	C3orf38 Uncharacterized protein C3orf38	K.FEQSDLEAFYNVITVC*GTNEVR.H	535
Q9NRA8_C318	EIF4ENIF1 Eukaryotic translation initiation factor 4E transporter	R.DAVLPEQSPGDFDFNEFFNLDKVPCLAS MIEDVLGEGSVSASR.F	536
Q15648_C135	MED1 Mediator of RNA polymerase II transcription subunit	K.VAHHGENPVSC*PELVQQLR.E	537
Q8IZ69_C463	TRMT2A tRNA (uracil-5-)-methyltransferase homolog A	R.VIGVELC*PEAVEDAR.V	538
Q04206_C38	RELA Transcription factor p65	R.YKC*EGR.S	539
015533_C115	TAPBP Tapasin	K.WASGLTPAQNC+PR.A	540
Q9UNI6_C23	DUSP12 Dual specificity protein phosphatase 12	R.VSC*AGQMLEVQPGLYFGGAAVAEPDHLR.E	541
Q9BUP3_C172	HTATIP2 Oxidoreductase HTATIP2	R.YSWRPGVLLC*DR.Q	542
P53384_C235	NUBP1 Cytosolic Fe-S cluster assembly factor NUBP1	K.LPnGVVENMSGFIC*PK.C	543
Q7Z5K2_C293	WAPAL Wings apart-like protein homolog	R.LENLNEAIEEDIVQSVLRPTNC *R.T	544
Q9Y5S2_C1517	CDC42BPB Serine/threonine-protein kinase MRCK beta	R.IRPLNSEGLNLLNC*EPPR-L	545
Q15024_C238	EXOSC7 Exosome complex component RRP42	K.GWTC*MR.K	546
P40855_C128	PEX19 Peroxisomal biogenesis factor 19	R.VGSDMTSQQEFTSC*LK.E	547
Q15910_C503	EZH2 Histone-lysine N-methyltransferase EZH2	R.LWAAHC*R.K	548
Q15149_C4071	PLEC Plectin	K.FLEGTSC*IAGVFVDATK.E	549
P22307_C94	SCP2 Non-specific lipid-transfer protein	R.AIYHSLGMTGIPnNVI VNNC*ATGSTALFMAR.O	550
Q12789_C42	GTF3C1 General transcription factor 3C polypeptide 1	R.VPPFPLPLEPC*TQEFLWR-A	551
Q15796_C81	SMAD2 Mothers against decapentaplegic homolog 2	K.CVTIPSTC*SEIWGLSTPNTIDQWDTTGLYSFSEQTR.S	552
Q9UL15_C327	BAG5 BAG family molecular chaperone regulator 5	K.TELQGLIGQLDEVSLEKNPC*IR.E	553
Q8N9T8_C673	KRI1 Protein KRI1 homolog	R.LLGPTVMLGGC*EFSR.Q	554
Q9Y679_	AUP1 Ancient ubiquitous protein 1	K.TGC*VDLTITNLLGAVAFMPEDITK.G	555

C391			
O14733_C 260	MAP2K7 Dual specificity mitogen-activated protein kinase	K.LC*DFGISGR.L	556
O75179_C 644	ANKRD17 Ankyrin repeat domain-containing protein 17	R.AGHVC*TVQFLISK.G	557
P31323_C 388	PRKAR2B cAMP-dependent protein kinase type II-beta regulatory subunit	R.LLGPC*MEIMK.R	558
Q9HBL8_C 154	NMRAL1 NmrA-like family domain-containing protein 1	R.LPC*YFENLLSHFLPQK.A	559
Q96RU2_C 171	USP28 Ubiquitin carboxyl-terminal hydrolase 28	K.NVGNTC*WFSAVIQSLFQLPEFR.R	560
Q96T76_C 750	MMS19 MMS19 nucleotide excision repair protein homolog	R.ELLELSCCHSC*PFSSTAAAK.C	561
P17858_C 89	PFKL 6-phosphofructokinase, liver type	R.C*KAFITRE	562
Q96F07_C 1112	CYFIP2 Cytoplasmic FMR1-interacting protein 2	R.LCC*GLSMFEVILTR.I	563
P42695_C 541	NCAPD3 Condensin-2 complex subunit D3	R.C*VMAMLR.R	564
Q9Y2S7_C 143	POLDIP2 Polymerase delta-interacting protein 2	R.DC*PHISQR.S	565
P52948_C 1312	NUP98 Nuclear pore complex protein Nup98-Nup96	R.WLSC*TATPQIEEEVSLTQK.N	566
Q9UER7_C 664	DAXX Death domain-associated protein 6	K.IC*TLPPSPPLASLAPVADSSTR.V	567
Q9H4L7_C 772	SMARCA1 SWI/SNF-related matrix-associated actin-dependent	K.NTEMC*NVMMLQR.K	568
Q9Y570_C 381	PPME1 Protein phosphatase methylesterase 1	R.FAEPGGFQC*VFPGC	569
P52701_C 1117	MSH6 DNA mismatch repair protein Msh6	K.TFFGDDFIPNDILIGC*EEEEQENGK.A	570
P33992_C 482	MCM5 DNA replication licensing factor MCM5	R.C*SVLAAANSVFGR.W	571
E2QRD5_C 183	C15orf38-AP3S2 Protein C15orf38-AP3S2	K.C*NFTGDGK.T	572
Q16877_C 159	PFKFB4 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase 4	K.TFFVESIC*VDPEVIAANIVQVK.L	573
Q9BSQ5_C 211	CCM2 Malcavernin	K.VAAEELCC*LLGQVFQVYTESTIDFLDR.A	574
Q00013_C 179	MPP1 55 kDa erythrocyte membrane protein	K.KDNLIPC*K.E	575
Q6UWP2_C 226	DHRS11 Dehydrogenase/reductase SDR family member 11	K.C*LKPEDVAEAVIYVLSTPAHIQIGDIQMR.PTEQVT	576
Q8N556_C 713	AFAP1 Actin filament-associated protein 1	K.SQAAPGSSPC*R.G	577
Q9NXJ5_C 149	PGPEP1 Pyroglutamyl-peptidase 1	R.YLC*DFTYYTSLYQSHGR.S	578
Q8IYS1_C 14	PM20D2 Peptidase M20 domain-containing protein 2	MRPGERPVEGGAC*NGR.S	579
Q92878_C 48	RAD50 DNA repair protein RAD50	K.TTIIEC*LK.Y	580
Q68CZ2_C 888	TNS3 Tensin-3	R.SC*PETLTHAVGMSESPGPK.S	581

075592_C 1131	MYCBP2 Probable E3 ubiquitin-protein ligase MYCBP2	R.C*SILSPELALPTGSR.A	582
Q5VUA4_C C1860	ZNF318 Zinc finger protein 318	K.LSPQAC*SFTK.A	583
Q9H3M7_C C170	TXNIP Thioredoxin-interacting protein	K.VSC*MFIPDGR.V	584
Q92619_C 278	HMHA1 Minor histocompatibility protein HA-1	R.C*EGGVDAALLYAK.N	585
P46013_C 903	MKI67 Antigen KI-67	K.SEETNTEIVEC*ILK.R	586
Q9UD0_C C100	TRMT1 12 tRNA methyltransferase 112 homolog	K.GPVEGYEENEEFLRTMHLLUEVEVIEGT LQC*PESGR.M	587
Q92797_C 848	SYMPK Symplekin	R.GMGMNSPELLLLVENC*PK.G	588
P50990_C 36	CCT8 T-complex protein 1 submit theta	R.NIQAC*K.E	589
076075_C 194	DFFB DNA fragmentation factor subunit beta	R.VLGSMC*QR.L	590
P04150_C 302	NR3C1 Glucocorticoid receptor	K.LGTVYC*QASFPGANIIGNK.M	591
Q96JH7_C C219	VCPIP1 Deubiquitinating protein VCIP135	K.SQECLIPVHVDGDGHC+LVHAVSR.A	592
Q8NEC7_C C140	GSTCD Glutathione S-transferase C-terminal domain-containing	K.AC*AEVSQWTR.L	593
P48200_C 137	IREB2 Iron-responsive element-binding protein 2	K.C*AIQNAPNPGGDLQK.A	594
Q8WTW3_C C513	COG1 Conserved oligomeric Golgi complex subunit 1	K.AQAISPC*VQNFCSALDSK.L	595
Q9BYX2_C C469	TBC1D2 TBC1 domain family member 2A	R.TQNC*FLNSEffIQVTK.I	596
P51991_C 85	HNRNPA3 Heterogeneous nuclear ribonucleoprotein A3	R.GFGFVTYSC*VEEVDAAMCAR.P	597
Q5UIP0_C C2298	RIF1 Telomeric-associated protein RIF1	K.ESIPCPTESVYPPLVNC*VAPVDIILPQITS NMWAR.G	598
Q5T440_C C170	IBA57 Putative transferase CAF17, mitochondrial	R.VWAVLPSSEAC*GAASLQER.A	599
P46821_C 293	MAP1B Microtubule-associated protein 1B	R.KSC*FWK.L	600
Q9BT09_C C166	CNPY3 Protein canopy homolog 3	K.QC*DVLVEEFEEVIEDW YR.N	601
Q8IXB1_C C480	DNAJC10 DnaJ homolog subfamily C member 10	K.ESVNSHVTTLX3PQNFPANDKEPWLVDFF APWC*PPCR.A	602
000622_C 39	CYR61 Protein CYR61	K.C*APGVGLVR.D	603
Q69YN2_C C288	CWF19L1 CWF 19-like protein 1	K.QILAPVEESAC*QFFFDLNEK.Q	604
Q8TEX9_C C708	rP04 Importin-4	K.LLEC*PHLNVR.K	605
Q9Y6W3_C C197	CAPN7 Calpain-7	R.AHFPLGANPFLERPQSFISPOQSC*DAQGQR .Y	606
Q9Y6Y8_C C604	SEC23IP SEC23-interacting protein	K.C*PGPLAVANGVVK.Q	607
Q9ULX6_C	AKAP8L A-kinase anchor protein 8-	R.GQC*MSGASR.L	608

C211	like		
Q13630_C116	TSTA3 GDP-L-fucose synthase	K.WSCLSTC*IFPDK.T	609
P13667_C94	PDIA4 Protein disulfide-isomerase A4	K.DTVLLEFYAP WCGHC *K.Q	610
Q5T1V6_C453	DDX59 Probable ATP-dependent RNA helicase DDX59	K.LFKPPVLVVFVDC*K.L	611
Q9GZR2_C382	REX04 RNA exonuclease 4	K.ILGLQVQQAHC*SIQDAQAAMR.L	612
Q8WXD5_C91	GEMIN6 Gem-associated protein 6	K.LMHLFTSGDC*K.A	613
Q15118_C71	PDK1	K.QFLDFGSVNAC*EK.T	614
Q8WXE1_C585	ATRIP ATR-interacting protein	RFQC*VFQVLPKC	615
Q8N2W9_C326	PIAS4 E3 SUMO-protein ligase PIAS4	R.VSLIC*PLVK.M	616
Q14141_C269	SEPT6 Septin-6	R.QYPWGTVQVENEHC*DFVK.L	617
P26358_C1071	DNMT1 DNA (cytosine-5)-methyltransferase 1	R.CTVEYGEDLPEC*VQVYSMGGPNR.F	618
Q8IYQ7_C324	THNSL1 Threonine synthase-like 1	R.LGEMIETAYGENFAC*SK.I	619
P49419_C522	ALDH7A1 Alpha-aminoadipic semialdehyde dehydrogenase	R.STC*TINYSK.D	620
Q9ULJ3_C129	ZNF295 Zinc finger protein 295	K.TPQAPFPTC*PNR.K	621
Q9HB19_C232	PLEKHA2 Pleckstrin homology domain-containing family A member 2	K.C*EQDREPLR.T	622
076031_C538	CLPX ATP-dependent Clp protease ATP-binding subunit clp	K.C*ELNVTEDALK.A	623
Q01581_C129	HMGCS1 Hydroxymethylglutaryl-CoA synthase, cytoplasmic	K.TNLMQLFEESGNTDIEGIDTTNAC*YGGT AAVFNANWIESSWDGR.Y	624
Q96RS6_C402	NUDCD1 NudC domain-containing protein 1	R.LNiHLTSEELNPNPDKEKPPC*NAQELEEC DIFFEESSLCR.F	625
Q9UL45_C95	PLDN Pallidin	K.FKEC*HSMLDINALFAEAK.H	626
09HAU4_C706	SMURF2 E3 ubiquitin-protein ligase SMURF2	R.LFTIHQIDAC*TNNLPK.A	627
Q8TCG1_C337	KIAA1524 Protein CIP2A	K.C*LEPTVALLR.W	628
Q9POK7_C973	RAI14 Ankyrin	K.QILTMC*K.N	629
Q7Z2Z2_C124	EFTUD1 Elongation factor Tu GTP-binding domain-containing protein 1	R.ICDGCIIIVDAVEGVC*PQTQAVLR.Q	630
Q5JTD0_C350	TJAP1 Tight junction-associated protein 1	R.NSPLPNC *TYATR.Q	631
Q15022_C325	SUZ12 Polycomb protein SUZ12	R.LQLLDGEYEVAMQEMEEC*PISK-K	632
P30837_C320	ALDH1B1 Aldehyde dehydrogenase X, mitochondrial	K.SPSIVLADADMEHAVEQCHEALFFNMGQ CCC*AGSR.T	633
Q9H0L4_C	CSTF2T Cleavage stimulation factor	K.LC*VQNSHQEAR.N	634

C150	subunit 2 tau variant		
Q03169_C 45	TNFAIP2 Tumor necrosis factor alpha-induced protein 2	K.GLANVFC*VFTK.G	635
Q9UBB4_ C354	ATXN10 Ataxin-10	R.VffIVAGKETTNIIFSNC*GCVR.A	636
Q06187_C 481	BTK Tyrosine-protein kinase BTK	K.QRPIFDTEYMANGC*LLNYLR.E	637
Q96N21_ C302	ENTHD2 AP-4 complex accessory subunit tepsin	R.ALC*AIASLGSSDLLPQEHILLR.T	638
092878_C 102	RAD50 DNA repair protein RAD50	R.SMVC*TQK.S	639
Q7Z401_ C117	DENND4A C-myc promoter-binding protein	R.LKQGC*EIIQSTPYGRPANISGSTSSQR.I	640
Q9H307_ C249	PNN Pinin	RMC*PATQK.L	641
Q96DF8_ C263	DGCR14 Protein DGCR14	R.C*QLQQAALNAQHK.Q	642
Q7L8W6_ C88	ATPBD4 ATP-binding domain- containing protein 4	K.C*EGDEVEDLYELLK.L	643
Q13232_C 158	NME3 Nucleoside diphosphate kinase 3	R.ADELLC*WEDSAGHWLYE	644
Q9NWA0 C139	MED9 Mediator of RNA polymerase 11 transcription subunit	K.SLC*MFEPKE	645
Q9BZ67_ C191	FRMD8 FERM domain-containing protein 8	R.VQLGPYQGRPAAC*DLR.E	646
P51617_C 608	IRAK1 Interleukin-1 receptor- associated kinase 1	R.SWHLTPSC*PLDPAPLR.E	647
Q9Y4W2_ C140	LAS1L Ribosomal biogenesis protein LAS1L	K.C*LAQEVNIPDW1VDLR.H	648
Q9NX18_ C83	SDHAF2 Succinate dehydrogenase assembly factor 2, mitochondrial	R.GMLENC*ILLSLFAK.E	649
Q969H6_ C146	POP5 Ribonuclease P/MRP protein subunit POP5	R.SC*LLEEEEEESGEEAAEAME	650
Q96IV0_ C309	NGLY1 Peptide-N(4)-(N-acetyl-beta- glucosaminyl)asparagin	R.C*GEWANCFTLCCR.A	651
P42575_C 370	CASP2 Caspase-2	R.SDMICGYAC*LK.G	652
P51812_C 436	RPS6KA3 Ribosomal protein S6 kinase alpha-3	K.EDIGVGSYSVC*K.R	653
P09086_C 346	POU2F2 POU domain, class 2, transcription factor 2	R.VWFC*NR.R	654
Q8IWV7_ C1603	OBR1 E3 ubiquitin-protein ligase UBR1	RNSLIELPDDYSC*LLNQASHFRC	655
Q9H0W8_ C380	SMG9 Protein SMG9	RREDFC*PRK	656
096017_C 231	CHEK2 Serine/threonine-protein kinase Chk2	KTLGSGAC*GEVKL	657
Q96RU3_ C70	FNBP1 Formin-binding protein 1	K.KNSKEEEYKYTSC*K.A	658
095347_C 326	SMC2 Structural maintenance of chromosomes protein 2	KKNLAC*EESKR	659
015357_C 926	INPPL1 Phosphatidylinositol 3,4,5- trisphosphate 5-phosphatase 2	RKPAFTEASC*PLSRL	660

Q8N5L8_C131	RPP25L Ribonuclease P protein subunit p25-like protein	R.DPLDPNEC*GYQPPGAPPGLGSMPSSSCG PR.S	661
Q9C0I1_C152	MTMR12 Myotubularin-related protein 12	R.VFQFC*LRY	662
Q96F86_C137	EDC3 Enhancer of mRNA-decapping protein 3	K.SQDVA VSPQQQC*SK.S	663
060443_C45	DFNA5 Non-syndromic hearing impairment protein 5	R.FWC*WQRPK.Y	664
Q9NU22_C1011	MDN1 Midasin	K.LIC*QHIVPGNVK.S	665
Q14204_C1059	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	K.VWLQYQC*LWDMQAENIYNR.L	666
Q09472_C1738	EP300 Histone acetyltransferase p300	R.C*IQSLVHACQCR.N	667
P12532_C316	CKMT1B Creatine kinase U-type, mitochondrial	R.LGYILTC*PSNLGTGLR.A	668
Q9P2X3_C195	IMPACT Protein IMPACT	R.STFQAHLAPWC*PK.Q	669
Q92667_C147	AKAP1 A-kinase anchor protein 1, mitochondrial	K.SIPLEC*PLSSPK.G	670
014879_C283	IFIT3 Interferon-induced protein with tetra-riptide	R.VLESTPNNGYLYHQIGC*CYK.A	671
Q01201_C109	RELB Transcription factor RelB	R.GAASLSTVTLGPVAPPATPPPWGC*PLGR.L	672
Q9UPN9_C582	TRIM33 E3 ubiquitin-protein ligase TRIM33	R.GNMNC*GAFQAHQMR.L	673
Q9BSD7_C110	NTPCR Cancer-related nucleoside-triphosphatase	R.VC*V1DEIGK.M	674
Q8IV53_C174	DENND1C DENN domain-containing protein 1C	R.GNSKPLSC*FVAPDSGR.L	675
Q99798_C385	AC02 Aconitate hydratase, mitochondrial	R.VGLIGSC*TNSSYEDMGR.S	676
Q14204_C3089	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	R.C*VLNWFWDWSTEALYQVGKEFTSK.M	677
P49903_C31	SEPHS1 Selenide, water dikinase 1	R.FTELKGTGC*K.V	678
Q70CQ2_C741	USP34 Ubiquitin carboxyl-terminal hydrolase 34	R.TGDFLGE _n GNELFNC *R.Q	679
043439_C111	CBFA2T2 Protein CBFA2T2	R.FSNGPASSTSSALTNQQLPATC*GAR.Q	680
Q9BWH6_C1039	RPAP1 RNA polymerase II-associated protein 1	R.C*GQGTLAQAQDLPSIR.N	681
Q6AII2_C209	ANKRD40 Ankyrin repeat domain-containing protein 40	RTPESTKPGPVC*QPPVSQSR.S	682
Q5GLZ8_C60	HERC4 Probable E3 ubiquitin-protein ligase HERC4	R.HTVFVLDDGTVYTCGC*NDLGQLGHEK.S	683
Q9Y5A7_C52	NUB1 NEDD8 ultimate buster 1	R.LECC*ENEVEK.V	684
Q6PJG6_C326	BRAT1 BRCA1-associated ATM activator 1	R.TQAFQVXLQPLAC*VLK.A	685
Q6PJG6_C673	BRAT1 BRCA1-associated ATM activator 1	R.THC*PYAVALPEVAPAQPLTEALR.A	686
Q8NB90_	SPATA5 Spermatogenesis-associated	K.GVLLYGPPGC*SK.T	687

C672	protein 5		
Q9ULT8_ CI855	HECTD1 E3 ubiquitin-protein ligase HECTD1	K.LLQLSC*NGNVK.S	688
Q9NUI1_ C22	DECR2 Peroxisomal 2,4-dienoyl-CoA reductase	R.HLFC*PDLLR.D	689
Q9P0V9_ C293	SEPT10 Septin-10	RQYPWGWQVENENHC*DFVKL	690
Q8WX93_ C964	PALLD Palladin	K.VSSC*EQR.L	691
Q9Y4B4_ C820	RAD54L2 Helicase ARIP4	R.AGC*LGVNLIANR.V	692
P41226_C 599	UBA7 Ubiquitin-like modifier- activating enzyme 7	R.APASAAASEDAPYPVC*TVR.Y	693
Q9BZQ6_ C441	EDEM3 ER degradation-enhancing alpha-mannosidase-like 3	R.VPC*GFAAMK.D	694
P52732_C 87	KIF1 1 Kinesin-like protein KIF1 1	R.SWC*PILDEVIMGYNCTIFAYGQTGTGK. T	695
P14598_C 378	NCF1 Neutrophil cytosol factor 1	R.C*SESTK.R	696
Q9UL40_ C68	ZNF346 Zinc finger protein 346	K.NQC*LFTNTQCK.V	697
Q9C0C9_ C375	UBE20 Ubiquitin-conjugating enzyme E2 O	K.NC*AQGECSMAK.K	698
014733_C 280	MAP2K7 Dual specificity mitogen- activated protein kinase	R.SAGC*AAYMAPER.I	699
095239_C 269	KIF4A Chromosome-associated kinesin KIF4A	R.GLLC*LGNVISALGDDKK.G	700
Q8WYP5 C521	AHCTF1 Protein ELYS	R.C*LVAGLLSPR.F	701
Q93074_C 1188	MED12 Mediator of RNA polymerase II transcription subunit 12	K.TPQLNPC*QSDGNKPTVGIR.S	702
Q16610_C 284	ECM1 Extracellular matrix protein 1	R.AC*PSHQPD1SSGLELPFPPGVPTLDNIK.N	703
000622_C 134	CYR61 Protein CYR61	KHQCTCIDGAVGCIPI-C+PQELSIJNLGCPN PR.L	704
Q2VPK5_ C433	CTU2 Cytoplasmic tRNA 2-thiolation protein 2	R.TPPGPC>CSPGVGWAQR.C	705
Q9UII0_ C444	EIF2B4 Translation initiation factor eIF-2B subunit delta	R.AH>rVPVLVCCETYKFC*ER.V	706
Q9UPW5 CI164	AGTPBP1 Cytosolic carboxypeptidase 1	RLTSPLEYNLPSLLDFENDLISSC*KV	707
Q13613_C 117	MTMR1 Myotubularin-related protein 1	KDVMYIC*PFMGAVSGTLTVTDFKL	708
000541_C 361	PES1 Pescadillo homolog	K.SLC*IGATYDVTDSR.I	709
P39877_C 46	PLA2G5 Calcium-dependent phospholipase A2	K.VTGKNALTNYGFGC*YCGWGGR.G	710
Q14207_C 1059	NPAT Protein NPAT	K.SEETTVPFPEESrVPAKPC*HR.R	711
P42704_C 500	LRPPRC Leucine-rich PPR motif- containing protein, mitochondrial	R.AILQENGC*LSDSDMFSQAGLR.S	712
Q9Y5R8_ C115	TRAPP1 Trafficking protein particle complex subunit 1	K.NPLC*PLGQTVQSEFR.S	713

060566_C 504	BUB1B Mitotic checkpoint serine/threonine-protein kinase	K.IPGMTLSSSVCQVNCC*AR.E	714
Q5T440_C 259	IBA57 Putative transferase CAF17, mitochondrial	K.GC*YIGQELTAR.T	715
Q5TGY3_C 1540	AHDC1 AT-hook DNA-binding motif-containing protein 1	R.GPAAAAAGYGC*PLLSDLTLSPVPR.D	716
P43403_C 117	ZAP70 Tyrosine-protein kinase ZAP-70	R.PSGLEPQPGVFDC*LR.D	717
P07602_C 48	PSAP Proactivator polypeptide	KHC*LQTVWNKPTVK.S	718
Q93074_C 444	MED12 Mediator of RNA polymerase II transcription subunit 12	K.C*QEATAGFTIGR_V	719
Q96FA3_C 282	PELI1 E3 ubiquitin-protein ligase pellino homolog 1	R.QEINAARPQC*PVGFNTLAFPSMK.R	720
Q8IY17_C 1199	PNPLA6 Neuropathy target esterase	R.LAYVSC*VR.Q	721
Q8IY18_C 91	SMC5 Structural maintenance of chromosomes protein 5	K.SSIVC*AICLGLAGKPAFMGR.A	722
Q9NTJ3_C 110	SMC4 Structural maintenance of chromosomes protein 4	R.FSC*IIGPNGSGK.S	723
Q07065_C 100	CKAP4 Cytoskeleton-associated protein 4	K.SSSSSASAAAAAAAASSSASC*SR.R	724
P51812_C 599	RPS6KA3 Ribosomal protein S6 kinase alpha-3	R.QGYDAAC*DIWSLGVLLYTMLTGYPFA NGPDDTPEEILAR.I	725
Q86U44_C 500	METTL3 N6-adenosine-methyltransferase 70 kDa subunit	K.GNPQGFNQLDC*DVTVAEVR.S	726
Q9H479_C 24	FN3K Fructosamine-3-kinase	R.AFGGPGAGC*ISEGR.A	727
Q9UPT9_C 44	USP22 Ubiquitin carboxyl-terminal hydrolase 22	R.AIYQC*FVWSGTAEAR.K	728
P30042_C 244	C21orf33 ESI protein homolog, mitochondrial	K.WTTP AFMC*ETALHYTHDGIGAMVR.K	729
Q8NFY9_C 490	KBTBD8 Kelch repeat and BTB domain-containing protein 8	R.IQGLAAVYKDSIYYIAGTC*GNHQR.M	730
Q9UHQ1_C 99	NARF Nuclear prelamin A recognition factor	K.VLWSVC*PQSLPYFAAK.F	731
Q15042_C 218	RAB3GAP1 Rab3 GTPase-activating protein catalytic subunit	K.IGC*PLTPLPPVSIAR.F	732
Q9H0E9_C 26	BRD8 Bromodomain-containing protein 8	KXC*LASSVMR.S	733
P51878_C 315	CASP5 Caspase-5	K.VHVQAC*R.G	734
Q9UPQ9_C 600	TNRC6B Trinucleotide repeat-containing gene 6B protein	R.SYRPTHPC*QAVLQTLISR.T	735
P27540_C 119	ARNT Aryl hydrocarbon receptor nuclear translocator	K.MTAYITELSDMVPTC*SALAR.K	736
Q96C01_C 57	FAM136A Protein FAM136A	R.C*HVPLAQAQALVTSELEK.F	737
Q9NQZ5_C 302	STARD7 StAR-related lipid transfer protein 7, mitochondrial	R.YC*VSWMVSSGMPDFLEK.L	738
Q9H9P8_C 376	L2HGDH L-2-hydroxyglutarate dehydrogenase, mitochondrial	KAC*FLGATVK.Y	739
Q8NBX0_	SCCPDH Saccharopine	R.WPISYC*R.E	740

C238	dehydrogenase-like oxidoreductase		
Q8NFF5_C499	FLAD1 FAD synthase	R.TDPYSCSLC*PFSPTDPGWPAFMR.I	741
Q6PJG6_C228	BRAT1 BRCA1-associated ATM activator 1	R.C*QSPWTEALWVR.L	742
Q9C0C2_C749	TNKS1BP1 182 kDa tankyrase-1-binding protein	K.DLQSEFGITGDPQPSSFSPSSWC*QGASQDYGLGGASPR.G	743
Q9Y4C1_C251	KDM3A Lysine-specific demethylase 3A	K.IVDPSLIHVEVVHDNLVTC*GNSAR.I	744
Q8N5C7_C235	DTWD1 DTW domain-containing protein 1	K.IFTDERLQGLLQVELKTRKTC*FWRHQK.G	745
Q9BVP2_C131	GNL3 Guanine nucleotide-binding protein-like 3	K.KLYC*QELK.K	746
Q6ZS81_C1963	WDFY4 WD repeat- and FYVE domain-containing protein 4	R.DGKEPQPSAEAAAAPSLANISC*FTQK.L	747
O94829_C217	IPO13 Importin-13	R.TSLAVECGAVFPLLEQLLQQPSSPSC*VR.Q	748
Q9BRT3_C33	MIEN1 Migration and invasion enhancer 1	R.IVVEYCEPC*GFEATYLELASAVK.E	749
Q9BRJ7_C171	NUDT16L1 Protein syndesmos	K.C*QLLFALK.V	750
Q96NE9_C306	FRMD6 FERM domain-containing protein 6	R.KLIYYTGC*PMR.S	751
Q70CQ2_C1090	USP34 Ubiquitin carboxyl-terminal hydrolase 34	R.LATSAYDGC*SNSELCGMDQFWGIALR.A	752
O00622_C70	CYR61 Protein CYR61	TQPCDHTK K.TQPC*DHTK.G	753
Q6VMQ6_C612	ATF7IP Activating transcription factor 7-interacting protein 1	K.LCALQC*AVFDK.T	754
P68371_C213	TUBB4B Tubulin beta-4B chain	K.VSDTVVEPYNATLSVHQLVENTDETYC*I DNEALYDIC*FR.T	755
P04150_C622	NR3C1 Glucocorticoid receptor	R.QSSANLLC*FAPDLINEQR.M	756
Q8WVB6_C280	CHTF18 Chromosome transmission fidelity protein 18 homolog	R.SGEEEAQPLGAPEEPTDGQDASSHC*L WVDEFAPR.H	757
Q7Z401_C1289	DENND4A C-myc promoter-binding protein	R.LWSSPAFSPTC*PFR.E	758

[0406] Table 2 illustrates an exemplary list of liganded cysteines which are identified from isoTOP-ABPP experiments performed *in situ*. Table 2 further shows the accession number (or the protein identifier) of the protein, cysteine residue number, and an illustrative peptide fragment containing the cysteine of interest (denoted by C*).

Table 2

Identifier	Protein Name	Illustrative Cysteine Fragment	SEQ ID NO:
P04406_C152	GAPDH Glyceraldehyde-3-phosphate dehydrogenase	K.IISNASC*TTNCLAPLAK.V	759
P61978_C132	HNRNPK Heterogeneous nuclear ribonucleoprotein K	K.IIPTLEEGQLPSPTATSQPLESDAVE C*LNYQHYK.G	760

Q13526_C 113	PIN1 Peptidyl-prolyl cis-trans isomerase NIMA-interacting 1	K.IKSGEEDFESLASQFSDC*SSAK.A	761
P24752_C 119	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	R.QAVLGAGLPSTPC*TTENK.V	762
P24752_C 413	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	K.QGEYGLASIC*NGGGGASAMLIQK.L	763
Q9NUY8_C 283	TBC1D23 TBC1 domain family member 23	K.FLENTPSSLNIEDIEDLFLSLAQYYC*S K.T	764
P13667_C 206	PDIA4 Protein disulfide-isomerase A4	K.ENFDEWNDADILVEFYAPWC*GHC K.K	765
P12268_C 140	IMPDH2 Inosine-5-monophosphate dehydrogenase 2	R.HGFC*GIPITDTGR.M	766
Q15365_C 194	PCBP1 Poly(rC)-binding protein 1	R.VMTIPYQMPASSPVIC*AGGQDR.C	767
Q9NVC6_C 649	MED17 Mediator of RNA polymerase II transcription subunit	K.MELLMSALSPC*LL	768
P42166_C 561	TMPO Lamina-associated polypeptide 2, isoform alpha	K.VDDEILGFISEATPLGGIQAASTESC* NQQLDLALCR.A	769
Q9Y696_C 35	CLIC4 Chloride intracellular channel protein 4	K.AGSDGESIGNC*PFSQR.L	770
PI0599_C 32	TXN Thioredoxin	K.LVWDFSATWC*GPCK.M	771
P31943_C 267	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	R.DLNYC*FSGMSDHR.Y	772
Q86SX6_C 67	GLRX5 Glutaredoxin-related protein 5, mitochondrial	K.GTPEQPQC*GFSNAWQILR.L	773
P15121_C 299	AKR1B1 Aldose reductase	R.VCALLSCTSHK.D	774
P52597_C 267	HNRNPF Heterogeneous nuclear ribonucleoprotein F	R.DLSYC*LSGMYDHR.Y	775
Q9ULV4_C 420	COROIC Coronin-1C	K.KC*DLISIPK.K	776
P62888_C 92	RPL30 60S ribosomal protein L30	R.VC*TLAIDPGDSDIIR.S	777
Q9NQR4_C 153	NIT2 Omega-amidase NIT2	R.VGLGIC*YDMR.F	778
P42765_C 92	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	R.LC*GSGFQSIVNGCQEICVK.E	779
Q15084_C 55	PDIA6 Protein disulfide-isomerase A6	R.EVIQSDSLWLVEFYAPWC*GHCQR.L	780
Q96HE7_C 241	EROIL EROI-like protein alpha	K.RPLNPLASGQGTSEENTFYSWLEGLC *VEK.R	781
Q99439_C 164	CNN2 Calponin-2	K.AGQC*VIGLQMGTNK.C	782
P25205_C 119	MCM3 DNA replication licensing factor MCM3	R.TLTSC*FLSCWCVEGIVTK.C	783
Q9NS86_C 187	LANCL2 LanC-like protein 2	R.SWC*QESDLPDELLYGR.A	784
Q15233_C 145	NONO Non-POU domain-containing octamer-binding protein	R.FAC*HSASLTVR.N	785
Q9BRA2_C 43	TXNDC17 Thioredoxin domain- containing protein 17	K.SWC*PDCVQAEPWR.E	786
P35611_C	ADD1 Alpha-adducin	R.VSMILQSPAFC*EELESMIQEQFKJC	787

68			
075521_C 380	ECU Enoyl-CoA delta isomerase 2, mitochondrial	R.WLSDEC*TNAVVNFLSR.K	788
Q9BXW7 C392	CECR5 Cat eye syndrome critical region protein 5	R.DLC*FSPGLMEASHWNDVNEAVQL VFR.K	789
P30101_C 406	PDIA3 Protein disulfide-isomerase A3	K.SEPIPESNDGPVKVVAENFDEIVNN ENKDVLIIFYAPWC*GHCK.N	790
Q96AB3_C 114	ISOC2 Isochorismatase domain-containing protein 2, mitochondrial	R.SVLLCGIEAQAC*ILNTTLDLLDR.G	791
PI3667_C 555	PDIA4 Protein disulfide-isomerase A4	K.KDVLIEFYAPWC*GHCK.Q	792
Q09161_C 44	NCBP1 Nuclear cap-binding protein subunit 1	K.SAC*SLESNLEGLAGVLEADLPNYK. S	793
P78417_C 32	GSTO1 Glutathione S-transferase omega-1	R.FC*PFAER.T	794
Q9ULW0 C536	TPX2 Targeting protein for Xklp2	R.TVEIC*PFSFDSR.D	795
Q9NRG0_C 55	CHRAC1 Chromatin accessibility complex protein 1	K.ATELFVQC*LATYSYR-H	796
Q96T76_C 848	MMS19 MMS19 nucleotide excision repair protein homolog	RXMGLLSDPPELGPAAADGFSLLMSDC *TDVLTR.A	797
Q8TAQ2_C 145	SMARCC2 SWI/SNF complex subunit SMARCC2	K.SLVQNNCLSRPNIFLC*PEIEPK.L	798
Q9BVC5_C 10	C2orf49 Ashwin	R.SC*TDSELLHPELLSQEFLLLTI_EQK. N	799
Q7Z2W4_C 645	ZC3HAV1 Zinc finger CCCH-type antiviral protein 1	K.NSNVDSSYLESLYQSC*PR.G	800
Q9BQ69_C 186	MACROD1 O-aceryl-ADP-ribose deacetylase MACROD1	K.LEVDAIVNAANSSLLGGGGVDGC *IH R.A	801
Q16831_C 162	UPP1 Uridine phosphorylase 1	R.IGTSGGIGLEPGTWITEQAVDTC*FK. A	802
P30101_C 57	PDIA3 Protein disulfide-isomerase A3	R.ISDTGSAGLMLVEFFAPWC*GHCK.R	803
PI2268_C 331	IMPDH2 Inosine-5-monophosphate dehydrogenase 2	R.VMGSGSIC*ITQEV LACGRPQATAV YK.V	804
095571_C 170	ETHE1 Protein ETHE1, mitochondrial	R.TDFQQGC*AK.T	805
000299_C 24	CLIC1 Chloride intracellular channel protein 1	K.IGNC*PFSQR.L	806
014879_C 343	IFIT3 Interferon-induced protein with tetratricopeptide	K.GLNPLNAYSDLAEFLETEC*YQTPFN K.E	807
Q96CM8_C 64	ACSF2 Acyl-CoA synthetase family member 2, mitochondrial	R.MVSTPIGGLSYVQGC*TK.K	808
P51946_C 244	CCNH Cyclin-H	R.TC*LSQLLDIMK.S	809
P49588_C 773	AARS Alanine--tRNA ligase, cytoplasmic	K.C*LSVMEAK.V	810
Q96RN5_C 618	MED15 Mediator of RNA polymerase II transcription subunit	K.QQYLC*QPLLDVLANIR.S	811
015294_C 758	OGT UDP-N-acetylglucosamine-peptide N-acetylglucosaminyl transferase	K.C*PDGGDNADSSNTALNMPV1PMNTI AEAVIEMINR.G	812
P46734_C 207	MAP2K3 Dual specificity mitogen-activated protein kinase	K.MC*DFGISGYLVDSVAK.T	813

Q96S55_C272	WRNIP1 ATPase WRNIP1	R.SLLETNEIPSLILWGPPGC*GK.T	814
095229_C54	ZWINT ZW10 interactor	K.LLC*SQLQVADFLQNILAQEDTAK.G	815
060610_C1227	DIAPH1 Protein diaphanous homolog 1	K.AGC*AVTSLLESELTK.D	816
Q13428_C38	TCOF1 Treacle protein	K.C*FLAQPVTLLDIYTHWQQTSELGR. K	817
Q9Y277_C65	VDAC3 Voltage-dependent anion-selective channel protein	K.VC*NYGLTFTQK.W	818
P57764_C268	GSDMD Gasdermin-D	R.C*LHNFLTLDGVP AEGAFTEDFQGLR. A	819
Q9Y3A3_C134	MOB4 MOB-like protein phocein	R.HTLDGAAC*LLNSNK.Y	820
Q02252_C317	ALDH6A1 Methylmalonate-semialdehyde dehydrogenase	R.C*MALSTAVLVGEAK.K	821
Q9NYL9_C132	TMOD3 Tropomodulin-3	K.VSLDPELEEALTSASDTELC*DLAAIL GMHNLITNTK.F	822
P83731_C6	RPL24 60S ribosomal protein L24	K.VELC*SFSGYK.I	823
095336_C32	PGLS 6-phosphogluconolactonase	R.AAC*CLAGAR.A	824
Q13155_C291	AIMP2 Aminoacyl tRNA synthase complex-interacting multif	K.SPWLAGNELTVADWLWSVLQQIGG C*SVTVPANVQR.W	825
Q13418_C346	ILK Integrin-linked protein kinase	K.FSFQC*PGR.M	826
A6NDU8_C179	C5orf51 UPF0600 protein C5orf51	R.C*PIQLNEGVSFQDLDTAK.L	827
Q9UKF6_C498	CPSF3 Cleavage and polyadenylation specificity factor subunit	R.NFNYHILSPC*DLSNYTDLAMSTVK. Q	828
Q96F86_C413	EDC3 Enhancer of mRNA-decapping protein 3	KT)LPTSPVDLVINCLDC*PENVFLR.D	829
P42224_C492	STAT1 Signal transducer and activator of transcription 1	R.NLSFFLTPPC*AR.W	830
P11216_C326	PYGB Glycogen phosphorylase, brain form	R.TC*FETFPDK.V	831
P21980_C277	TGM2 Protein-glutamine gamma-glutamyltransferase 2	K.YGQC*WVFAAVACTVLR.C	832
Q9HAV7_C124	GRPEL1 GrpE protein homolog 1, mitochondrial	K.ATQC*VPKEEIKDDNPHLK.N	833
P24752_C126	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	K.VC*ASGMK.A	834
Q9NQ88_C161	TIGAR Fructose-2,6-bisphosphatase TIGAR	K.EADQKEQFSQGPSNC*LETSLAEIFP LGK.N	835
Q13155_C23	AIMP2 Aminoacyl tRNA synthase complex-interacting multif	R.VELPTC*MYR.L	836
Q9NQW6_C712	ANLN Actin-binding protein anillin	K.NNAFPC*QVNIK.Q	837
P51649_C340	ALDH5A1 Succinate-semialdehyde dehydrogenase, mitochondrial	R.NTGQTC*VCSNQFLVQR.G	838
Q15021_C439	NCAPD2 Condensin complex subunit 1	K.NAIQLLASFLANNPFSC*K.L	839
Q5T0N5_	FNBP1L Formin-binding protein 1-like	R.r*SC*VAFT^ra^L>fDYAGQR.E	840

C69			
P38606_C 138	ATP6V1A V-type proton ATPase catalytic subunit A	K.WDFTPC*K.N	841
Q9HCC0_ C216	MCCC2 Methylcrotonoyl-CoA carboxylase beta chain, mitoch	K.NIAQIAVVMGSC*TAGGAYVPAMAD ENIIVR.K	842
Q9NQC3_ CHOI	RTN4 Reticulon-4	K.YSNSALGHVNC*T1K.E	843
P35754_C 23	GLRX Glutaredoxin-i	K.VWFIKPTC*PYCR.R	844
Q99757_C 90	TXN2 Thioredoxin, mitochondrial	R.WNSETPVWDFHAQWC*GPCK.I	845
Q9Y3D0_ C93	FAM96B Mitotic spindle-associated MMXD complex subunit MI	R.VQVSDPESTVAVAFPTIPHC*SMAT LIGLSIK.V	846
Q9UMS0_ C213	NFU1 NFU1 iron-sulfur cluster scaffold homolog, mitochondrial	K.LQGSCSTSC*PSSIITLK.N	847
Q9NXV6_ C516	CDKN2AIP CDKN2A-interacting protein	K.SVYLGTC*GK.S	848
Q96RS6_ C376	NUDCD1 NudC domain-containing protein 1	R.DSAQC*AAIAER.L	849
Q14997_C 1840	PSME4 Proteasome activator complex subunit 4	K.QQFTDDQLLVLTDLLVSPC*YYA	850
P50570_C 27	DNM2 Dynamin-2	K.LQDAFSSIGQSC*HLDLPQIAWGGQ SAGK.S	851
Q86YH6_ C71	PDSS2 Decaprenyl-diphosphate synthase subunit 2	R.C*LLSDELSN1AMQVR.K	852
Q99497_C 106	PARK7 Protein DJ-1	K.GLIAAIC*AGPTALLAHEIGFGSK.V	853
Q9UJW0_ C258	DCTN4 Dynactin subunit 4	R.LLQPDFQPVC*ASQLYPRJ1	854
Q9BUH6_ C180	C9orf142 Uncharacterized protein C9orf142	R.C*PGESLINPGFK.S	855
P24752_C 196	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	K.IHMGSC*AENTAK.K	856
Q13162_C 51	PRDX4 Peroxiredoxin-4	R.EEFC*HFYAGGQVYPGEASR.V	857
Q9BTA9_ C553	WAC WW domain-containing adapter protein with coiled-coil	R.STC*SLTPAIJW!HFSENLIK.H	858
P48643_C 253	CCT5 T-complex protein 1 subunit epsilon	K.IAILTC*PFEPKPK.T	859
075362_C 286	ZNF217 Zinc finger protein 217	R.C*IPQLDPFTTFQAWQLATK.G	860
060825_C 158	PFKFB2 6-phosphofructo-2-ldnase/fructose-2,6-bisphosphatase 2	K.VFFVESVC*DDPDVIAANILEVK.V	861
Q8NBS9_ C350	TXNDC5 Thioredoxin domain-containing protein 5	K.FYAPWC>GHCK.T	862
Q9NYL2_ C22	MLTK Mitogen-activated protein kinase kinase kinase MLT	K.FDDLQFFENC*GGGSGSVYR.A	863
P27707_C 9	DCK Deoxycytidine kinase	R.SC*PSFSASSEGTR.I	864
Q93009_C 223	USP7 Ubiquitin carboxyl-terminal hydrolase 7	K.NQGATC*YMNSLLQTLFFTNQLR.K	865
014929_C 101	HAT1 Histone acetyltransferase type B catalytic subunit	K.VDENFDC*VEADDVEGKJ	866

Q9UPQ0_C140	LIMCH1 LIM and calponin homology domains-containing protein	K.AANSC*TSYSGTTLNLK.E	867
Q96NY7_C487	CLIC6 Chloride intracellular channel protein 6	R.AGYDGESIGNC*PFSQR.L	868
Q9NQ88_C114	TIGAR Fructose-2,6-bisphosphatase TIGAR	R.EEC*PVFTPPGGETLDQVK.M	869
Q14790_C360	CASP8 Caspase-8	K.VFFIQAC*QGDNYQK.G	870
P04183_C230	TK1 Thymidine kinase, cytosolic	K.LFAPQQILQC*SPAN.-	871
P68366_C54	TUBA4A Tubulin alpha-4A chain	K.TIGGGDDSFTTFFC*ETGAGK.H	872
Q13428_C1298	TCOF1 Treacle protein	K.GAGNPQASTLALQSNITQC*LLGQP WPLNEAQVQASVVK.V	873
Q5MNZ6_C63	WDR45L WD repeat domain phosphoinositide-interacting protein	R.C*NYLALVGGGK.K	874
O14980_C528	XPO1 Exportin-1	K.DLLGLC*EQK.R	875
Q86W42_C35	THOC6 THO complex subunit 6 homolog	R.LHMTIFSQSVSPC*GK.F	876
Q9Y6G9_C51	DYNC1LI1 Cytoplasmic dynein 1 light intermediate chain 1	R.VGSFGSSPPGLSSTYTGGPLGNEIASG NGGAAAGDDEDGQNLWSC*ILSEVSTR S	877
Q9NY27_C22	PPP4R2 Serine/threonine-protein phosphatase 4 regulatory	K.EVC*PVLDDQFLCHVAK.T	878
Q8NFH5_C255	NUP35 Nucleoporin NUP53	R.C*ALSSPSLAFTPPIK.T	879
Q9Y676_C128	MRPS18B 28S ribosomal protein S18b, mitochondrial	K.LLEQFVC*AHTGIIFYAPYTGVCVK.Q	880
P35658_C728	NUP214 Nuclear pore complex protein Nup214	K.AC*FQVGTSEEMK.M	881
Q9NTX5_C133	ECHDC1 Ethylmalonyl-CoA decarboxylase	K.SLGTPEGDMAVC*MFMQNTLTR.F	882
Q15118_C71	PDK1	K.QFLDFGSVNAC*EK.T	883
Q00765_C18	REEP5 Receptor expression-enhancing protein 5	K.NC*MTDLLAK.L	884
P22307_C71	SCP2 Non-specific lipid-transfer protein	K.ALADAQIPYSAVDQACVGYVFGDST C*GQR.A	885
O75521_C312	ECI2 Enoyl-CoA delta isomerase 2, mitochondrial	K.KLTAGEAC*AQGLVTEVFPDSTFQK. E	886
P49189_C288	ALDH9A1 4-trimethylaminobutyraldehyde dehydrogenase	K.GALMANFLTQGGVC*CNGTR.V	887
Q5T440_C170	IBA57 Putative transferase CAF17, mitochondrial	R.VWAVLPSSPEAC*GAASLQER.A	888
Q15084_C190	PDIA6 Protein disulfide-isomerase A6	K.DVIELTDDSFDKNVLDSVDVWMVEF YAPWC*GHCK.N	889
Q96C19_C172	EFHD2 EF-hand domain-containing protein D2	K.AAAGELQEDSGLC*VLAR.L	890
P22061_C102	PCMT1 Protein-L-isoaspartate(D-aspartate) O-methyltransferase	R.MVGC*TGK.V	891
Q9NP73_C86	ALG13 UDP-N-acetylglucosamine transferase subunit ALG13	K.ADLVISHAGAGSC*LETLEK.G	892

Q9BRF8_C54	CPPED1 Calcineurin-like phosphoesterase domain-containing	K.AWSTGDC*DNGGDEWEQEIR.L	893
Q6ICB0_C108	DESII Desumoylating isopeptidase 1	R.GEAYNLFEHNC*NTFSNEVAQFLTGR.K	894
P29590_C389	PML Protein PML	R.LQDLSSC*ITQGK.D	895
P07858_C211	CTSB Cathepsin B	K.IC*EPGYSPTYK.Q	896
Q9NX18_C83	SDHAF2 Succinate dehydrogenase assembly factor 2, mitochondrial	R.GMLENC*ILLSLFAK.E	897
P46109_C249	CRKL Crk-like protein	K.RVPC*AYDK.T	898
P45984_C177	MAPK9 Mitogen-activated protein kinase 9	R.TAC*TNFMMPYVTR.Y	899
P19447_C342	ERCC3 TFIIH basal transcription factor complex helicase	R.SGVIVLPC*GAGK.S	900
P42166_C341	TMPO Lamina-associated polypeptide 2, isoform alpha	K.SGIQPLC*PER.S	901
Q8N1F7_C522	NUP93 Nuclear pore complex protein Nup93	K.SSQSAQLLSHEPGDPPC*LR.R	902
Q86UY8_C276	NT5DC3 5-nucleotidase domain-containing protein 3	K.YIC*YAEQTR.A	903
Q8WWI1_C228	LMO7 LIM domain only protein 7	R.DSGYGDIWC*PER.G	904
Q9NWA0_C139	MED9 Mediator of RNA polymerase II transcription subunit	K.SLC*MFEIPKE	905
P09110_C381	ACAA1 3-ketoacyl-CoA thiolase, peroxisomal	K.VNPLGGAVALGHPLGC*TGAR.Q	906
Q2NL82_C126	TSR1 Pre-rRNA-processing protein TSR1 homolog	R.DTGTVHLNELGNTQNFMLLC*PR.L	907
Q5JPI3_C308	C3orf38 Uncharacterized protein C3orf38	K.FEQSDLEAFYNVITVC*GTNEVR.H	908
P23919_C163	DTYMK Thymidylate kinase	R.C*FHQLMK.D	909
Q96EB1_C218	ELP4 Elongator complex protein 4	K.VEPC*SLTPGYTK.L	910
Q96FX7_C209	TRMT61A tRNA (adenine(58)-N(1))-methyltransferase catalytic subunit TRMT61A	R.FCSFSPC*IEQVQR.T	911
O14933_C98	UBE2L6 Ubiquitin/ISG15-conjugating enzyme E2 L6	K.IYHPNVDENGQICLPIISSENWKPC*TK.T	912
Q29RF7_C242	PDS5A Sister chromatid cohesion protein PDS5 homolog A	R.TVQTIEAC*IANFFNQVLVLR.S	913
Q96T76_C819	MMS19 MMS19 nucleotide excision repair protein homolog	R.YHPLSSC*LTAR.L	914
P23919_C117	DTYMK Thymidylate kinase	K.ENFSLDWC*K.Q	915
Q15149_C4574	PLEC Plectin	K.YLTC*PK.T	916
Q96RP9_C153	GFM1 Elongation factor G, mitochondrial	R.VLDGAVLVLCVAVGGVQC*QTMTVN.R.Q	917
P04818_C199	TYMS Thymidylate synthase	R.DLPLMALPPCHALC*QFYVVNSELSC.QLYQR.S	918

P27708_C 73	CAD CAD protein	K.AQILVLTYPPLIGNYGIPPDEMDEFGL C*K.W	919
P55265_C 1224	ADAR Double-stranded RNA-specific adenosine deaminase	K.NFYLC*PV	920
Q9Y3D2_ C105	MSRB2 Methionine-R-sulfoxide reductase B2, mitochondrial	K.YC*SGTGWPSFSEAHGTSGSDESHTG ILR.R	921
000244_C 12	ATOX1 Copper transport protein ATOX1	K.HEFSVDMTC*GGCAEAVSR.V	922
Q8WV74_ C207	NUDT8 Nucleoside diphosphate-linked moiety X motif 8, mitochondrial	R.LAGLTC*SGAEGRLARPK.Q	923
Q9NRW3 CI30	APOBEC3C Probable DNA dC- dU- editing enzyme APOBEC-3C	R.LYYFQYPC*YQEGLR.S	924
P24468_C 326	NR2F2 COUP transcription factor 2	K.A1VLFTSDAC*GLSDVAHVESLQEK.S	925
P42166_C 684	TMPO Lamina-associated polypeptide 2, isoform alpha	K.GGTLFGGEVC*K.V	926
Q96EY5_ C231	FAM125A Multivesicular body subunit 12A	K.SC*SPLAFSAFGDLTIK.S	927
P14635_C 238	CCNB1 G2/mitotic-specific cyclin-B1	R.FMQNNC*VPK.K	928
Q8NDH3_ C81	NPEPL1 Probable aminopeptidase NPEPL1	R.VTEELWQAALSTLNPNTDSCPLYLN YATVAALPC*R.V	929
Q9P0J1_C 149	PDP1	R.GMLLGVFDFGHAGC*ACSQAVSER.L	930
Q96P48_ C900	ARAF1 Arf-GAP with Rho-GAP domain, ANK repeat and PH domain-containing protein 1	R.AVFPEGPC*EEPLQLR.K	931
Q96HE7_ C37	EROIL EROI-like protein alpha	R.CFC*QVSGYLDDCTCDVETIDR.F	932
Q07065_C 100	CKAP4 Cytoskeleton-associated protein 4	K.SSSSSASAAAAAAAASSSASC*SR.R	933
Q9BRJ7_ C88	NUDT16L1 Protein syndesmos	R.VLGLGLGC*LR.L	934
075439_C 265	PMPCB Mitochondrial-processing peptidase subunit beta	K.FHFGLSLC*THK.G	935
043175_C 369	PHGDH D-3-phosphoglycerate dehydrogenase	K.NAGNC*LSPAVfVGLLK.E	936
Q9UNI6_ C265	DUSP12 Dual specificity protein phosphatase 12	R.QAOC*TSYFIEPVQWMESALLGVMD GQLLCPK.C	937
Q06203_C 100	PPAT Amidophosphoribosyltransferase	K.C*ELENQPFWETLHGK.I	938
A0AVT1_ C347	UBA6 Ubiquitin-like modifier-activating enzyme 6	R.KPNVGC*QQDSEELLK.L	939
Q86X76_ C203	NTT1 Nitrilase homolog 1	K.IGLAVC*YDMR.F	940
Q6XZF7_ C691	DNMBP Dynarriin-binding protein	R.SLDQTSPC*PLVLR.I	941
Q15398_C 129	DLGAP5 Disks large-associated protein 5	R.YRPDMPC*FLLSNQNAVK.A	942
075717_C 773	WDHD1 WD repeat and HMG-box DNA- binding protein 1	K.MLALSC*K.L	943
Q01433_C 107	AMPD2 AMP deaminase 2	R.SLPGPAPC*LK.H	944

Q8WVV9_C464	HNRPLL Heterogeneous nuclear ribonucleoprotein L-like	K.NIIQPPSCVLHYYNVPLC*VTEETFTK.L	945
O14733_C131	MAP2K7 Dual specificity mitogen-activated protein kinase	R.YQAEINDLENLGEMGSGTC*GQVWK.M	946
Q14137_C404	BOP1 Ribosome biogenesis protein BOP1	R.DLQPFPTC*QALVYR.G	947
Q96RU2_C171	USP28 Ubiquitin carboxyl-terminal hydrolase 28	K.NVGNTC*WFSAVIQSLFQLPEFR.R	948
Q9Y679_C391	AUP1 Ancient ubiquitous protein 1	K.TGC*VDLTITNLEGAVAFMPEDITK.G	949
P51610_C1872	HCFC1 Host cell factor 1	R.VAGINAC*GR.G	950
P22307_C307	SCP2 Non-specific lipid-transfer protein	K.SGLTPNDIDVIELHDC*FSTNELLTYEALGLCPEGQGATLVDR.G	951
Q9BTE3_C325	MCMBP Mini-chromosome maintenance complex-binding protein	K.LQHINPLLPAC*LNK.E	952
Q9HA64_C24	FN3KRP Ketosamine-3-kinase	R.ATGHSGGGC*ISQGR.S	953
Q5TFE4_C119	NT5DC1 5-nucleotidase domain-containing protein 1	K.HFLSDTGMAC*R.S	954
Q96N67_C2125	DOCK7 Deducator of cytokinesis protein 7	K.AVLPVTC*HR.D	955
P52948_C1312	NUP98 Nuclear pore complex protein Nup98-Nup96	R.WLSC*TATPQIEEEVSLTQK.N	956
Q5UIP0_C2298	RIF1 Telomere-associated protein RIF1	K.ESIPCPTESVYPPLVNC*VAPVDIILPQITSNMWAR.G	957
P51812_C436	RPS6KA3 Ribosomal protein S6 kinase alpha-3	K.EDIGVGSYSVC*K.R	958
Q92616_C1692	GCN1L1 Translational activator GCN1	K.GMGESC*FEDLLPWLMTLTYEQSSVDR.S	959
Q15345_C297	LRRC41 Leucine-rich repeat-containing protein 41	R.C*AAALMASR.R	960
Q9NPH0_C267	ACP6 Lysophosphatidic acid phosphatase type 6	R.MGIDSSDKVDFFILLDNVAEQAHNLPSC*PMLK.R	961
P04183_C66	TK1 Thymidine kinase, cytosolic	R.YSSSFC*THDR.N	962
P42166_C629	TMPO Lamina-associated polypeptide 2, isoform alpha	K.TYDAASYIC*EAADFDEVK.M	963
Q15013_C124	MAD2L1BP MAD2L1-binding protein	K.C*QQALAELESVLSHLEDFAR.T	964
Q9Y5Y2_C72	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	R.AVHQC*DR.G	965
O15446_C86	CD3EAP DNA-directed RNA polymerase I subunit RPA34	R.VLSSC*PQAGEATLLAPSTEAGGGLT CASAPQGTLR.I	966
Q13630_C116	TSTA3 GDP-L-fucose synthase	R.KVVSCLSTC*IFPDK.T	967
Q8IYQ7_C324	THNSL1 Threonine synthase-like 1	R.LGEMIETAYGENFAC*SK.I	968
P05091_C319	ALDH2 Aldehyde dehydrogenase, mitochondrial	K.SPNIIMSDADMWAVEQAHFALFFNQGQCC*CAGSR.T	969
Q29RF7_C532	PDS5A Sister chromatid cohesion protein PDS5 homolog A	R.ELLDLHKQPTSEANC*SAMFGK.L	970
Q9Y570_	PPME1 Protein phosphatase	R.FAEPGGFQC*VFPGC-	971

C381	methylesterase 1		
Q14980_C 961	NUMA1 Nuclear mitotic apparatus protein 1	R.QFC*STQAALQAMER.E	972
P53384_C 235	NUBP1 Cytosolic Fe-S cluster assembly factor NUBP1	K.LPIIGVVENMSGFIC*PK.C	973
Q15003_C 418	NCAPH Condensin complex subunit 2	R.TMC*PLLSMKPGEYSYFSPR.T	974
P53634_C 258	CTSC Dipeptidyl peptidase 1	R.NQASCGSC*YSFASMGMLEAR.I	975
Q8NFF5_C 499	FLAD1 FAD synthase	R.TDPYSCSLC*PFSPTDPGWPAFMR.I	976
Q9ULA0_C 144	DNPEP Aspartyl aminopeptidase	K.C*PTSGR.L	977
P22307_C 94	SCP2 Non-specific lipid-transfer protein	R.AIYHSLGMTGIPINNVNNNC*ATGSTA LFMAR.Q	978
O15294_C 620	OGT UDP-N-acetylglucosamine--peptide N-acetylglucosaminyl transferase	K.VMAEANHFIDLSQIPC*NGK.A	979
Q9Y5S2_C 1517	CDC42BPB Serine/threonine-protein kinase MRCK beta	R.IRPLNSEGTLNLLNC*EPPR.L	980
Q8TD19_C 623	NEK9 Serine/threonine-protein kinase Nek9	R.LLTFGC*NK.C	981
Q8N2W9_C 326	PIAS4 E3 SUMO-protein ligase PIAS4	R.VSLIC*PLVK.M	982
Q13158_C 98	FADD Protein FADD	R.VDDFEAGAAAGAAPGEEDLC*AAFN VICDNVVGK.D	983
Q9UKX7_C 151	NUP50 Nuclear pore complex protein Nup50	K.AC*VGNAYHK.Q	984
Q6PCB5_C 280	RSBN1L Round spermatid basic protein 1-like protein	K.SIQTIC*SGLLTDVEDQAAK.G	985
P10398_C 597	ARAF Serine/threonine-protein kinase A-Raf	R.TQADELPAC*LLSAAR.L	986
Q9UL40_C 68	ZNF346 Zinc finger protein 346	K.NQC*LFTNTQCK.V	987
P46013_C 903	MKI67 Antigen KI-67	K.SEETNTEIVEC*ILK.R	988
Q16667_C 39	CDKN3 Cyclin-dependent kinase inhibitor 3	R.VNC*SQFLGLCALPGCK.F	989
O75150_C 890	RNF40 E3 ubiquitin-protein ligase BRE1B	R.EIQPC*LAESR.A	990
Q00610_C 870	CLTC Clathrin heavy chain 1	R.IHEGC*EEPATHNALAK.I	991
Q9Y5T5_C 205	USP16 Ubiquitin carboxyl-terminal hydrolase 16	K.GLSNLGNTC*FFNAVQNLSTPVL R.E	992
O95881_C 66	TXNDC12 Thioredoxin domain-containing protein 12	K.SWC*GACK.A	993
Q7Z5K2_C 160	WAPAL Wings apart-like protein homolog	R.IVEDDASISSC*NK.L	994
P42166_C 518	TMPO Lamina-associated polypeptide 2, isoform alpha	R.QLPSLAC*K.Y	995
Q9Y2S7_C 143	POLDIP2 Polymerase delta-interacting protein 2	R.DC*PHISQR.S	996
E2QRD5_C 183	C15orf38-AP3S2 Protein C15orf38-AP3S2	K.C*NFTGDGK.T	997

095833_C 22	CLIC3 Chloride intracellular channel protein 3	K.ASEDGESVGHGHPSCQRX	998
094953_C 694	KDM4B Lysine-specific demethylase 4B	R.TEPYCAICTLFYPPYC*QALQTEK.E	999
000541_C 272	PES1 Pescadillo homolog	K.AGEGTYALDSESC*MEK.L	1000
Q9NXJ5_C 149	PGPEP1 Pyroglutamyl-peptidase 1	R.YLC*DFTYYTSLYQSHGR.S	1001
Q8N5L8_C 131	RPP25L Ribonuclease P protein subunit p25-like protein	R.DPLDPNEC*GYQPPGAPPGLGSMPS SCGPR.S	1002
Q8IZ73_C 246	RPUSD2 RNA pseudouridylate synthase domain-containing protein	R.LLAENEDWWDKPSSIPVHPC*GR.F	1003
Q99798_C 385	AC02 Aconitate hydratase, mitochondrial	R.VGLIGSC*TNSSYEDMGR.S	1004
Q9GZR2_C 382	REX04 RNA exonuclease 4	K.ILGLQVQQAHEC*SIQDAQAAMR.L	1005
Q13613_C 117	MTMR1 Myotubularin-related protein 1	K.DVMYIC*PFMGA VSGTLTVTDFK.L	1006
Q9NUI1_C 22	DECR2 Peroxisomal 2,4-dienoyl-CoA reductase	R.HLFC*PDLLR.D	1007
Q02556_C 306	IRF8 Interferon regulatory factor 8	R.VFCSGNAVVC*K.G	1008
Q9UPT9_C 171	USP22 Ubiquitin carboxyl-terminal hydrolase 22	K.ITSNC*TIGLR.G	1009
Q8N999_C 302	C12orf29 Uncharacterized protein C12orf29	K.C*LFNHFLK.I	1010
Q81U81_C 363	IRF2BP1 Interferon regulatory factor 2-binding protein 1	R.SFREPAEALPQQYPEPAPAALC*G PPPR.A	1011
Q9C011_C 152	MTMR12 Myotubularin-related protein 12	R.VFQFC*LR.Y	1012
Q9P2X3_C 195	IMPACT Protein IMPACT	R.STFQAHLAPVVC*PK.Q	1013
Q6QNY0_C 168	BLOC 1S3 Biogenesis of lysosome-related organelles complex	R.GDLC*ALAER.L	1014
Q15796_C 81	SMAD2 Mothers against decapentaplegic homolog 2	K.CVTIPSTC*SErWGLSTPNTIDQWDTT GLYSFSEQTR.S	1015
Q9NZB2_C 531	FAM120A Constitutive coactivator of PPAR-gamma-like protein	K.GSQMGTVQPIPC*LLSMPTR.N	1016
Q9HB90_C 377	RRAGC Ras-related GTP-binding protein C	R.SC*GHQTSASSLK.A	1017
Q9BR61_C 267	ACBD6 Acyl-CoA-binding domain-containing protein 6	R.DQDGCLPEEVTGC*K.T	1018
P16455_C 145	MGMT Methylated-DNA-protein-cysteine methyltransferase	R.GNPVPILIPC+HR.V	1019
Q86UV5_C 39	USP48 Ubiquitin carboxyl-terminal hydrolase 48	R.rWLEPC*IR.G	1020
A2A288_C 367	ZC3H12D Probable ribonuclease ZC3H12D	R.LAFSDDLGLPPLPVPAC*SLTPR.L	1021
Q8NEC7_C 140	GSTCD Glutathione S-transferase C-terminal domain-containing	K.AC*AEVSQWTR.L	1022
Q6PJG6_C 673	BRAT1 BRCA1-associated ATM activator I	R.THC*PYAVALPEVAPAQPLTEALR.A	1023
Q13232_C	NME3 Nucleoside diphosphate kinase 3	R.ADELLC*WEDSAGHWLYE	1024

158			
Q86X76_C165	NITI Nitrilase homolog 1	K.THLC*DVEIPGQGPMCESNSTMPGPS LESPVSTPAGK.I	1025
P42695_C541	NCAPD3 Condensin-2 complex subunit D3	R.C*VMAMLR.R	1026
P41226_C599	UBA7 Ubiquitin-like modifier-activating enzyme 7	R.APASAAASEDAPYPVCTVR.Y	1027
Q99986_C50	VRK1 Serine/threonine-protein kinase VRK1	K.VGLPIGQGGFGC*YFLADMNSSESVG SDAPCWK.V	1028
Q8WUM4_C90	PDCD6IP Programmed cell death 6-interacting protein	K.FPFSENQIC*LTFTWK.D	1029
P29590_C213	PML Protein PML	R.GCSKPLCC*SCALLDSSHSELK.C	1030
Q9P0K7_C973	RAI14 Ankycorbin	K.QILTMC*K.N	1031
P53992_C78	SEC24C Protein transport protein Sec24C	R.APPSSGAPPASTAQAPC*GQAAYGQF GQGDVQNGPSSTVQMQR.L	1032
013867_C73	BLMH Bleomycin hydrolase	R.C*WIFSLNVMR.L	1033
Q8ND24_C655	RNF2 14 RING finger protein 2 14	R.SSHAPATC*K.L	1034
Q96EK4_C48	THAP1 1 THAP domain-containing protein 11	R.AGVSGC*FSTFQPTTGHR.L	1035
Q96IV0_C309	NGLY1 Peptide-N(4)-(N-acetyl-beta-glucosaminy)l asparagin	R.C*GEWANCFTLCCR.A	1036
Q5T1V6_C414	DDX59 Probable ATP-dependent RNA helicase DDX59	DDX59 K.NLPC*ANVR.Q	1037
Q9UHQ1_C99	NARF Nuclear prelamin A recognition factor	K.VLWSVC*PQSLPYFAAK.F	1038
043396_C34	TXNL1 Thioredoxin-like protein 1	R.GC*GPCLR.I	1039
Q8IV53_C174	DENND1C DENN domain-containing protein 1C	R.GNSKPLSC*FVAPDSGRLPSIPENR.N	1040
Q8N9T8_C673	KRI1 Protein KRI1 homolog	R.LLGPTVMLGGC*EFSR.Q	1041

[0407J Table 3 illustrates a list of unliganded cysteines. Table 3 further shows the accession number (or the protein identifier) of the protein, cysteine residue number, and the respective SEQ ID NO.

Table 3

Identifier	Protein Name	SEQ ID NO:	Identifier	Protein Name	SEQ ID NO:
P26641_C266	EEF1G Elongation factor 1-gamma	1042	P61981_C194	YWHAG 14-3-3 protein gamma	3742
P07900_C374	HSP90AA1 Heat shock protein HSP 90-alpha	1043	P01871_C134	IGHM Ig mu chain C region	3743
P23528_C139	CFL1 Cofilin-1	1044	P01871_C451	IGHM Ig mu chain C region	3744
P68104_C411	EEF1A1 Elongation factor 1-alpha 1	1045	Q5T6F2_C104	UBAP2 Ubiquitin-associated protein 2	3745

P08238_C 366	HSP90AB1 Heat shock protein HSP 90-beta	1046	Q96TA1_ C154	FAMI29B Niban-like protein 1	3746
P60981_C 163	DSTN Destrin	1047	P31040_ C305	SDHA Succinate dehydrogenase	3747
P61978_C 132	HNRNPK Heterogeneous nuclear ribonucleoprotein K	1048	Q96CD2_ C7	PPCDC Phosphopantothencysteine decarboxylase	3748
P60709_C 217	ACTB Actin, cytoplasmic 1	1049	Q9NVU0 C553	POLR3E DNA-directed RNA polymerase HI subunit RPC5	3749
Q15365_C 54	PCBP1 Poly(rC)-binding protein 1	1050	Q92888_ C911	ARHGEF1 Rho guanine nucleotide exchange factor 1	3750
P60709_C 272	ACTB Actin, cytoplasmic 1	1051	Q15020_ C537	SART3 Squamous cell carcinoma antigen recognized by T-cells 3	3751
P27348_C 134	YWHAQ 14-3-3 protein theta	1052	Q15022_ C46	SUZ12 Polycomb protein SUZ12	3752
P55769_C 30	NHP2L1 NHP2-like protein 1	1053	Q9UQR0 C559	SCML2 Sex comb on midleg-like protein 2	3753
Q6IS14_C 129	EIF5AL1 Eukaryotic translation initiation factor 5A- 1-like	1054	Q14315_ CI653	FLNC Filamin-C	3754
P11413_C 13	G6PD Glucose-6-phosphate 1- dehydrogenase	1055	094925_ C266	GLS Glutaminase kidney isofonn, mitochondrial	3755
P04406_C 247	GAPDH Glyceraldehyde-3- phosphate dehydrogenase	1056	Q8NFF5_ C561	FLAD1 FAD synthase	3756
P37802_C 124	TAGLN2 Transgelin-2	1057	Q99967_ C261	CITED2 Cbp/p300-interacting transactivator 2	3757
Q13185_C 177	CBX3 Chromobox protein homolog 3	1058	Q9P287_ C141	BCCIP BRCA2 and CDKN1A- interacting protein	3758
Q9Y3F4_ C340	STRAP Serine-threonine kinase receptor-associated protein	1059	Q7LBC6 _C529	KDM3B Lysine-specific demethylase 3B	3759
Q9NTK5_ C55	OLA1 Obg-like ATPase 1	1060	Q7LBC6 C569	KDM3B Lysine-specific demethylase 3B	3760
P53396_C 20	ACLY ATP-citrate synthase	1061	Q9UGU0 C868	TCF20 Transcription factor 20	3761
P62826_C 112	RAN GTP-binding nuclear protein Ran	1062	Q14683_ C1073	SMC1A Structural maintenance of chromosomes protein 1A	3762
P15880_C 229	RPS2 40S ribosomal protein S2	1063	P61513_ C39	RPL37A 60S ribosomal protein L37a	3763
P08238_C 589	HSP90AB1 Heat shock protein HSP 90-beta	1064	Q15796_ C380	SMAD2 Mothers against decapentaplegic homolog 2	3764
P30084_C 62	ECHS1 Enoyl-CoA hydratase, mitochondrial	1065	Q13547_ C100	HDAC1 Histone deacetylase 1	3765
P47756_C 36	CAPZB F-actin-capping protein subunit beta	1066	Q9NNT2 C330	OGFR Opioid growth factor receptor	3766
P52292_C 223	KPNA2 Importin subunit alpha-2	1067	P55795_ C22	HNRNPH2 Heterogeneous nuclear ribonucleoprotein H2	3767
Q15366_C 109	PCBP2 Poly(rC)-bindmg protein 2	1068	P51812_ C229	RPS6KA3 Ribosomal protein S6 kinase alpha-3	3768
P14174_C 81	MIF Macrophage migration inhibitory factor	1069	015294_ C158	OGT UDP-N-acetylglucosamine-- peptide N-acetylglucosamine (GlcNAc) transferase	3769
P61981_C 97	YWHAG 14-3-3 protein gamma	1070	Q08211_ C242	DHX9 ATP-dependent RNA helicase A	3770
P00338_C 163	LDHA L-lactate dehydrogenase A chain	1071	043823_ C631	AKAP8 A-kinase anchor protein 8	3771

Q15019_C 111	SEPT2 Septin-2	1072	O95819_ C883	MAP4K4 Mitogen-activated protein kinase kinase kinase 4	3772
P84243_C 111	H3F3B Histone H3.3	1073	Q96AE4_ C332	FUBP1 Far upstream element-binding protein 1	3773
P18085_C 62	ARF4 ADP-ribosylation factor 4	1074	Q99798_ C592	ACO2 Aconitate hydratase, mitochondrial	3774
P10599_C 73	TXN Thioredoxin	1075	Q99797_ C518	MIPEP Mitochondrial intermediate peptidase	3775
P13639_C 466	EEF2 Elongation factor 2	1076	O43776_ C511	NARS Asparagine--tRNA ligase, cytoplasmic	3776
P00338_C 293	LDHA L-lactate dehydrogenase A chain	1077	P35579_ C931	MYH9 Myosin-9	3777
P49721_C 91	PSMB2 Proteasome subunit beta type-2	1078	Q9H078_ C572	CLPB Caseinolytic peptidase B protein homolog	3778
P28062_C 160	PSMB8 Proteasome subunit beta type-8	1079	Q02962_ C52	PAX2 Paired box protein Pax-2	3779
P10809_C 237	HSPD1 60 kDa heat shock protein, mitochondrial	1080	Q9NUG6 C60	PDRG1 p53 and DNA damage- regulated protein 1	3780
P60981_C 23	DSTN Destrin	1081	P22692_ C174	IGFBP4 Insulin-like growth factor- binding protein 4	3781
P31943_C 267	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	1082	Q9BW19 C95	KIFC1 Kinesin-like protein KIFC1	3782
P49321_C 708	NASP Nuclear autoantigenic sperm protein	1083	P62879_ C294	GNB2 Guanine nucleotide-binding protein G(I)/G(S)/G(T)	3783
Q99829_C 53	CPNE1 Copine-1	1084	Q9C0C2_ C631	TNKS1BP1 182 kDa tankyrase-1- binding protein	3784
P68104_C 111	EEF1A1 Elongation factor 1- alpha 1	1085	Q9UKG1 C462	APPL1 DCC-interacting protein 13- alpha	3785
Q02750_C 207	MAP2K1 Dual specificity mitogen-activated protein kinase	1086	Q12841_ C113	FSTL1 Follistatin-related protein 1	3786
O14950_C 109	MYL12B Myosin regulatory light chain 12B	1087	O43837_ C232	IDH3B Isocitrate dehydrogenase	3787
P47756_C 206	CAPZB F-actin-capping protein subunit beta	1088	P22102_ C291	GART Trifunctional purine biosynthetic protein adenosine	3788
P49327_C 1448	FASN Fatty acid synthase	1089	P22102_ C322	GART Trifunctional purine biosynthetic protein adenosine	3789
P14868_C 349	DARS Aspartate--tRNA ligase, cytoplasmic	1090	P46940_ C1534	IQGAP1 Ras GTPase-activating-like protein IQGAP1	3790
P07437_C 201	TUBB Tubulin beta chain	1091	P11586_ C326	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	3791
P07437_C 303	TUBB Tubulin beta chain	1092	P27816_ C181	MAP4 Microtubule-associated protein 4	3792
P61077_C 111	UBE2D3 Ubiquitin- conjugating enzyme E2 D3	1093	Q9NR46_ C252	SH3GLB2 Endophilin-B2	3793
P15153_C 178	RAC2 Ras-related C3 botulinum toxin substrate 2	1094	P55060_ C387	CSE1L Exportin-2	3794
Q04637_C 662	EIF4G1 Eukaryotic translation initiation factor 4 gamma 1	1095	Q9UQ80 C179	PA2G4 Proliferation-associated protein 2G4	3795
P78347_C 215	GTF2I General transcription factor II-I	1096	Q9NQR4 C170	NIT2 Omega-amidase NIT2	3796
Q15370_C 89	TCEB2 Transcription elongation factor B polypeptide 2	1097	P52306_ C85	RAP1GDS1 Rap1 GTPase-GDP dissociation stimulator 1	3797

P62753_C 12	RPS6 40S ribosomal protein S6	1098	000571 C298	DDX3X ATP-dependent RNA helicase DDX3X	3798
P31948_C 461	STIP1 Stress-induced- phosphoprotein 1	1099	Q7L5N1 C283	COPS6 COP9 signalosome complex subunit 6	3799
Q9UL46_C 91	PSME2 Proteasome activator complex subunit 2	1100	Q01082 C604	SPTBN1 Spectrin beta chain, non- erythrocytic 1	3800
P63220_C 56	RPS21 40S ribosomal protein S21	1101	043719 C480	HTATSF1 HIV Tat-specific factor 1	3801
P55809_C 67	OXCT1 Succinyl-CoA:3- ketoacid coenzyme A transferase 1,	1102	Q9NPB8 _C640	GPCPD1 Glycerophosphocholine phosphodiesterase GPCPD1	3802
P30153_C 377	PPP2R1 A Serine/threonine- protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform	1103	P34932 C417	HSPA4 Heat shock 70 kDa protein 4	3803
P30153_C 390	PPP2R1 A Serine/threonine- protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform	1104	P34932 C779	HSPA4 Heat shock 70 kDa protein 4	3804
P60866_C 70	RPS20 40S ribosomal protein S20	1105	P21291 C58	CSRPI Cysteine and glycine-rich protein 1	3805
Q9P258_C 428	RCC2 Protein RCC2	1106	Q9UHR5 C172	SAP30BP SAP30-binding protein	3806
P60709_C 285	ACTB Actin, cytoplasmic 1	1107	P31937 C211	HIBADH 3-hydroxyisobutyrate dehydrogenase, mitochondrial	3807
P22234_C 81	PAICS Multifunctional protein ADE2	1108	P04843 C477	RPNI Dolichyl- diphosphooligosaccharide—protein glycosyltransferase subunit 1	3808
P27348_C 237	YWHAQ 14-3-3 protein theta	1109	Q14980 C658	NUMA1 Nuclear mitotic apparatus protein 1	3809
P12004_C 81	PCNA Proliferating cell nuclear antigen	1110	Q9BYV8 C171	CEP41 Centrosomal protein of 41 kDa	3810
P68104_C 234	EEF1A1 Elongation factor 1- alpha 1	1111	Q8IUC6 C485	TICAM1 TIR domain-containing adapter molecule 1	3811
Q96FW1_C 23	OTUB1 Ubiquitin thioesterase OTUB1	1112	Q08378 C769	GOLGA3 Golgin subfamily A member 3	3812
Q13200_C 779	PSMD2 26S proteasome non- ATPase regulatory subunit 2	1113	Q12912 C72	LRMP Lymphoid-restricted membrane protein	3813
P22314_C 632	UBA1 Ubiquitin-like modifier- activating enzyme 1	1114	Q9UBD5 C711	ORC3 Origin recognition complex subunit 3	3814
P37802_C 38	TAGLN2 Transgelin-2	1115	000743 C262	PPP6C Serine/threonine-protein phosphatase 6 catalytic subunit	3815
P37802_C 63	TAGLN2 Transgelin-2	1116	Q6PIJ9 C145	CDC73 Parafibromin	3816
P46782_C 172	RPS5 40S ribosomal protein S5	1117	Q1KMD3 C518	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein	3817
P04075_C 339	ALDOA Fructose- bisphosphate aldolase A	1118	Q9P2J5 C70	LARS Leucine-tRNA ligase, cytoplasmic	3818
P05386_C 61	RPLP1 60S acidic ribosomal protein P1	1119	Q9P2J5 C83	LARS Leucine-tRNA ligase, cytoplasmic	3819
P63000_C 178	RAC1 Ras-related C3 botulinum toxin substrate 1	1120	P14678 C19	SNRNPB Small nuclear ribonucleoprotein-associated protein	3820
P07195_C 294	LDHB L-lactate dehydrogenase B chain	1121	Q9H845 C613	ACAD9 Acyl-CoA dehydrogenase family member 9, mitochondrial	3821

Q13148_C 244	TARDBP TAR DNA-binding protein 43	1122	Q6KB66_ C49	KRT80 Keratin, type II cytoskeletal 80	3822
P30048_C 229	PRDX3 Thioredoxin- dependent peroxide reductase, mitochondrial	1123	043143_ C190	DHX15 Putative pre-mRNA-splicing factor ATP-dependent RN	3823
P62306_C 66	SNRPF Small nuclear ribonucleoprotein F	1124	P67775_ C20	PPP2CA Serine/threonine-protein phosphatase 2A catalytic	3824
015371_C 19	EIF3D Eukaryotic translation initiation factor 3 sub-unit	1125	P04062_ C287	GBA Glucosylceramidase	3825
P17987_C 397~	TCP1 T-complex protein 1 subunit alpha	1126	Q05086_ C108	UBE3A Ubiquitin-protein ligase E3A	3826
Q9Y5P6_ C245	GMPPB Mannose-1-phosphate guanyltransferase beta	1127	Q9NPA8 C40	ENY2 Enhancer of yellow 2 transcription factor homolog	3827
Q9BW61_ C25	DDA1 DET1- and DDB1- associated protein 1	1128	Q9NWZ3 C13	IRAK4 Interleukin-1 receptor- associated kinase 4	3828
Q14974_C 585	KPNB1 Importin subunit beta- 1	1129	Q03001_ C2128	DST Dystonin	3829
Q9BUF5_ C303	TUBB6 Tubulin beta-6 chain	1130	P48634_ C437	PRRC2A Protein PRRC2A	3830
P52272_C 653	HNRNPM Heterogeneous nuclear ribonucleoprotein M	1131	P55196_ C1206	MLLT4 Afadin	3831
075940_C 214	SMNDC1 Survival of motor neuron-related-splicing factor 3	1132	P55196_ C1684	MLLT4 Afadin	3832
000233_C 59	PSMD9 26S proteasome non- ATPase regulatory subunit 9	1133	Q9P0W2 C177	HMG20B SWI/SNF-related matrix- associated actin-dependent	3833
P63208_C 160	SKP1 S-phase kinase- associated protein 1	1134	Q8WW11 C261	LM07 LIM domain only protein 7	3834
Q9Y224_ C19	C14orf166 UPF0568 protein C14orf166	1135	P49903_ C71	SEPHS1 Selenide, water dikinase 1	3835
P30626_C 194	SRI Sorcin	1136	P52435_ C31	POLR2J DNA-directed RNA polymerase II subunit RPB1 1-a	3836
Q9BXW7 C392	CECR5 Cat eye syndrome critical region protein 5	1137	043865_ C292	AHCYL1 Putative adenosylhomocysteinase 2	3837
P60842_C 134	EIF4A1 Eukaryotic initiation factor 4A-I	1138	Q92900_ C188	UPF1 Regulator of nonsense transcripts 1	3838
P63220_C 17	RPS21 40S ribosomal protein S21	1139	Q92871_ C57	PMM1 Phosphomannomutase 1	3839
P50990_C 149	CCT8 T-complex protein 1 subunit theta	1140	Q15942_ C433	ZYXZyxin	3840
P22234_C 63	PAICS Multifunctional protein ADE2	1141	Q6UB35_ C61	MTHFDIL Monofunctional C1- tetrahydrofolate synthase, mitochondrial	3841
Q13148_C 39	TARDBP TAR DNA-binding protein 43	1142	Q9BZF9_ C980	UACA Uveal autoantigen with coiled- coil domains and ankyrin repeats	3842
PI7987_C 357	TCP1 T-complex protein 1 subunit alpha	1143	Q9NYQ6 C1840	CELSR1 Cadherin EGF LAG seven- pass G-type receptor 1	3843
P31946_C 96	YWHAB 14-3-3 protein beta/alpha	1144	014936_ C633	CASK Peripheral plasma membrane protein CASK	3844
P61289_C 92	PSME3 Proteasome activator complex subunit 3	1145	Q96C36_ C95	PYCR2 Pyrroline-5-carboxylate reductase 2	3845
P26641_C 68	EEF1G Elongation factor 1- gamma	1146	Q2T9J0 C240	TYSND1 Peroxisomal leader peptide- processing protease	3846
P78371_C 395	CCT2 T-complex protein 1 subunit beta	1147	014980_ C119	XPO1 Exportin-1	3847

P14868_C 203	DARS Aspartate--tRNA ligase, cytoplasmic	1148	P31948 C471	ST1P1 Stress-induced-phosphoprotein 1	3848
Q92530_C 185	PSMF1 Proteasome inhibitor PI31 subunit	1149	Q9Y2L1 C194	DIS3 Exosome complex exonuclease RRP44	3849
P25398_C 92	RPS12 40S ribosomal protein S12	1150	Q96EB1 C412	ELP4 Elongator complex protein 4	3850
P25205_C 148	MCM3 DNA replication licensing factor MCM3	1151	P23921 C254	RRM1 Ribonucleoside-diphosphate reductase large subunit	3851
P60174_C 79	TPI1 Triosephosphate isomerase	1152	Q12802 C1232	AKAP13 A-kinase anchor protein 13	3852
P43487_C 132	RANBP1 Ran-specific GTPase-activating protein	1153	Q13404 C144	UBE2V1 Ubiquitin-conjugating enzyme E2 variant 1	3853
P62280_C 131	RPS1 140S ribosomal protein S11	1154	Q8TDX7 C224	NEK7 Serine/threonine-protein kinase Nek7.	3854
P13639_C 651	EEF2 Elongation factor 2	1155	P27708 C2092	CAD CAD protein	3855
P13639_C 751	EEF2 Elongation factor 2	1156	Q9Y4B6 C1227	VPRBP Protein VPRBP	3856
Q9NUQ9 CIO	FAM49B Protein FAM49B	1157	P23497 C96	SP100 Nuclear autoantigen Sp-100	3857
P62937_C 62	PP1A Peptidyl-prolyl cis-trans isomerase A	1158	075592 C2163	MYCBP2 Probable E3 ubiquitin- protein ligase MYCBP2	3858
P23528_C 39	CFL1 Cofilin-1	1159	Q12962 C174	TAFIO Transcription initiation factor TFIID subunit 10	3859
P46776_C 70	RPL27A 60S ribosomal protein L27a	1160	Q99700 C556	ATXN2 Ataxin-2	3860
P49915_C 456	GMPS GMP synthase	1161	Q9Y5L0 C912	TNP03 Transporting	3861
Q16851_C 123	UGP2UTP-glucose-1- phosphate uridylyltransferase	1162	A1KXE4 C63	FAM168B Myelin-associated neurite- outgrowth inhibitor	3862
P14618_C 358	PKM Pyruvate kinase isozymes M1/M2	1163	Q13671 C284	RIN1 Ras and Rab interactor 1	3863
P14618_C 474	PKM Pyruvate kinase isozymes M1/M2	1164	P62913 C150	RPL1 1 60S ribosomal protein L1 1	3864
P13489_C 409	RNH1 Ribonuclease inhibitor	1165	Q9H832 CIOO	UBE2Z Ubiquitin-conjugating enzyme E2 Z	3865
015355_C 241	PP1G Protein phosphatase 1G	1166	Q00796 C301	SORD Sorbitol dehydrogenase	3866
P68431_C 111	HIST1H3J Histone H3.1	1167	P00491 C206	PNP Purine nucleoside phosphorylase	3867
P08238_C 521	HSP90AB 1 Heat shock protein HSP 90-beta	1168	Q9Y5U2 C99	TSSC4 Protein TSSC4	3868
Q99439_C 175	CNN2 Calponin-2	1169	096017 C539	CHEK2 Serine/threonine-protein kinase Chk2	3869
000299_C 223	CUC1 Chloride intracellular channel protein 1	1170	096019 C152	ACTL6A Actin-like protein 6A	3870
Q96KB5 C22	PBK Lymphokine-activated killer T-cell-originated protein kinase	1171	P52701 C694	MSH6 DNA mismatch repair protein Msh6	3871
P00492_C 106	HPRT1 Hypoxanthine-guanine phosphoribosyl transferase	1172	P26440 C378	1VD Isovaleryl-CoA dehydrogenase, mitochondrial	3872
Q15631_C 225	TSN Translin	1173	Q16543 C308	CDC37 Hsp90 co-chaperone Cdc37	3873
P52565_C 79	ARHGDI1 Rho GDP- dissociation inhibitor 1	1174	Q9NUW8 C135	TDPI Tyrosyl-DNA phosphodiesterase 1	3874

P78417_C 237	GSTO1 Glutathione S-transferase omega-1	1175	Q14139_C 79	UBE4A Ubiquitin conjugation factor E4 A	3875
Q01518_C 93	CAP1 Adenylyl cyclase-associated protein 1	1176	Q96FV9_C 49	THOC1 THO complex subunit 1	3876
Q13148_C 50	TARDBP TAR DNA-binding protein 43	1177	P33992_C 397	MCM5 DNA replication licensing factor MCM5	3877
P51665_C 116	PSMD7 26S proteasome non-ATPase regulatory subunit 7	1178	Q15417_C 273	CNN3 Calponin-3	3878
P17987_C 147	TCP1 T-complex protein 1 subunit alpha	1179	P41567_C 69	EIF1 Eukaryotic translation initiation factor 1	3879
O00299_C 59	CLIC1 Chloride intracellular channel protein 1	1180	P30626_C 162	SRI Sorcin	3880
P61077_C 85	UBE2D3 Ubiquitin-conjugating enzyme E2 D3	1181	A6NHR9_C 1433	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	3881
Q06830_C 173	PRDX1 Peroxiredoxin-1	1182	O00410_C 348	IPO5 Importin-5	3882
P06733_C 389	ENO1 Alpha-enolase	1183	O00410_C 560	IPO5 Importin-5	3883
P28062_C 120	PSMB8 Proteasome subunit beta type-8	1184	O60563_C 630	CCNT1 Cyclin-T1	3884
Q96B23_C 57	C18orf25 Uncharacterized protein C18orf25	1185	P35580_C 678	MYH10 Myosin-10	3885
P05388_C 119	RPLP0 60S acidic ribosomal protein P0	1186	P60228_C 345	EIF3E Eukaryotic translation initiation factor 3 subunit	3886
Q14353_C 91	GAMT Guanidinoacetate N-methyltransferase	1187	P49116_C 387	NR2C2 Nuclear receptor subfamily 2 group C member 2	3887
P11142_C 17	HSPA8 Heat shock cognate 71 kDa protein	1188	P42330_C 242	AKR1C3 Aldo-keto reductase family 1 member C3	3888
Q9UI30_C 33	TRMT112 tRNA methyltransferase 112 homolog	1189	O60271_C 1155	SPAG9 C-Jun-amino-terminal kinase-interacting protein 4	3889
P27348_C 94	YWHAQ 14-3-3 protein theta	1190	Q96FA3_C 61	PEL1 E3 ubiquitin-protein ligase pellino homolog 1	3890
P51812_C 579	RPS6KA3 Ribosomal protein S6 kinase alpha-3	1191	Q96IF1_C 224	AJUBA LIM domain-containing protein ajuba	3891
P62304_C 46	SNRPE Small nuclear ribonucleoprotein E	1192	Q9ULK4_C 297	MED23 Mediator of RNA polymerase II transcription subunit	3892
P67936_C 247	TPM4 Tropomyosin alpha-4 chain	1193	Q9ULK4_C 1319	MED23 Mediator of RNA polymerase II transcription subunit	3893
Q9H3P7_C 129	ACBD3 Golgi resident protein GCP60	1194	O00622_C 359	CYR61 Protein CYR61	3894
P49589_C 27	CARS Cysteine-tRNA ligase, cytoplasmic	1195	O95985_C 217	TOP3B DNA topoisomerase 3-beta-1	3895
Q9BY32_C 146	ITPA Inosine triphosphate pyrophosphatase	1196	P33240_C 62	CSTF2 Cleavage stimulation factor subunit 2	3896
P25205_C 360	MCM3 DNA replication licensing factor MCM3	1197	P52272_C 694	HNRNPM Heterogeneous nuclear ribonucleoprotein M	3897
Q96GX9_C 147	APIP Probable methylthioribulose-1-phosphate dehydratase	1198	A0AVT1_C 721	UBA6 Ubiquitin-like modifier-activating enzyme 6	3898
P18669_C 153	PGAM1 Phosphoglycerate mutase 1	1199	Q9BZG1_C 116	RAB34 Ras-related protein Rab-34	3899
O75390_C 211	CS Citrate synthase, mitochondrial	1200	P53384_C 25	NUBP1 Cytosolic Fe-S cluster assembly factor NUBP1	3900

Q16555_C 504	DPYSL2 Dihydropyrimidinase-related protein 2	1201	Q15181_ CI14	PPA1 Inorganic pyrophosphatase	3901
P62993_C 32	GRB2 Growth factor receptor- bound protein 2	1202	Q9NPF4_ C73	OSGEP Probable tRNA threonylcarbamoyladenosine biosynthesis	3902
P63104_C 94	YWHAZ 14-3-3 protein zeta/delta	1203	Q96FF9_ C195	CDCA5 Sororin	3903
B0V043_ C112	VARS Valyl-tRNA synthetase	1204	Q8NFC6_ C74	BODILI Biorientation of chromosomes in cell division protein	3904
P62937_C 161	PPIA Peptidyl-prolyl cis-trans isomerase A	1205	Q9UPN7_ C37	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	3905
Q8N806_ C35	UBR7 Putative E3 ubiquitin- protein ligase UBR7	1206	Q9UPN9_ C447	TRIM33 E3 ubiquitin-protein ligase TRIM33	3906
PI0768_C 56	ESD S-formylglutathione hydrolase	1207	J3QR44_ C422	CDK11B Cyclin-dependent kinase 11B	3907
Q16630_C 159	CPSF6 Cleavage and polyadenylation specificity factor subunit	1208	Q641Q2_ C594	FAM21A WASH complex subunit FAM21A	3908
P47756_C 147	CAPZB F-actin-capping protein subunit beta	1209	075362_ C641	ZNF217 Zinc finger protein 217	3909
Q9UMR2 C393	DDX19B ATP-dependent RNA helicase DDX19B	1210	P78406_ C106	RAE1 mRNA export factor	3910
P00558_C 379	PGK1 Phosphoglycerate kinase 1	1211	Q6P2B_ C215	FAHD2B Fumarylacetoacetate hydrolase domain-containing protein	3911
Q9NZZ3_ C20	CHMP5 Charged multivesicular body protein 5	1212	P49770_ C310	EIF2B2 Translation initiation factor eIF-2B subunit beta	3912
P51610_C 1886	HCFC1 Host cell factor 1	1213	Q9Y5A9 C482	YTHDF2 YTH domain family protein 2	3913
P41250_C 471	GARS Glycine-tRNA ligase	1214	P25205_ C319	MCM3 DNA replication licensing factor MCM3	3914
000299_C 191	CLIC1 Chloride intracellular channel protein 1	1215	P36959_ C186	GMPTX GMP reductase 1	3915
Q9BV86_ C195	NTMT1 N-terminal Xaa-Pro- Lys N-methyltransferase 1	1216	000273_ C165	DFFA DNA fragmentation factor subunit alpha	3916
Q15369_C 112	TCEB1 Transcription elongation factor B polypeptide 1	1217	P49790_ C593	NUP153 Nuclear pore complex protein Nup153	3917
P14618_C 49	PKM Pyruvate kinase isozymes M1/M2	1218	Q00610_ C1528	CLTC Clathrin heavy chain 1	3918
043707_C 499	ACTN4 Alpha-actinin-4	1219	Q9BZ67_ C206	FRMD8 FERM domain-containing protein 8	3919
Q16576_C 97	RBBP7 Histone-binding protein RBBP7	1220	Q5VZ89_ C850	DENND4C DENN domain-containing protein 4C	3920
P28838_C 462	LAP3 Cytosol aminopeptidase	1221	Q8IY18_ C881	SMC5 Structural maintenance of chromosomes protein 5	3921
Q00839_C 607	HNRNPU Heterogeneous nuclear ribonucleoprotein U	1222	Q9BXP5_ C490	SRRT Serrate RNA effector molecule homolog	3922
095861_C 42	BPNT1 3(2),5-bisphosphate nucleotidase 1	1223	P29692_ C217	EEF1D Elongation factor 1-delta	3923
P40926_C 212	MDH2 Malate dehydrogenase, mitochondrial	1224	P29692_ C247	EEF1D Elongation factor 1-delta	3924
Q9Y2Z0_ C62	SUGT1 Suppressor of G2 allele of SKP1 homolog	1225	P62979_ C121	RPS27A Ubiquitin-40S ribosomal protein S27a	3925

060828_C 60	PQBP1 Polyglutamine-binding protein 1	1226	075083_C507	WDRI WD repeat-containing protein 1	3926
P09661_C 89	SNRPA1 U2 small nuclear ribonucleoprotein A	1227	Q13131_C185	PRKAA1 5-AMP-activated protein kinase catalytic subunit	3927
P63279_C 138	UBE2I SUMO-conjugating enzyme UBC9	1228	P23368_C441	ME2 NAD-dependent malic enzyme, mitochondrial	3928
P62258_C 98	YWHAE 14-3-3 protein epsilon	1229	P04637_C141	TP53 Cellular tumor antigen p53	3929
Q8WVJ2_C 99	NUDCD2 NudC domain-containing protein 2	1230	Q7Z6Z7_C1074	HUWE1 E3 ubiquitin-protein ligase HUWE1	3930
Q15365_C 158	PCBP1 Poly(rC)-binding protein 1	1231	Q16643_C632	DBN1 Drebrin	3931
P07900_C 597	HSP90AA1 Heat shock protein HSP 90-alpha	1232	Q9UPQ0_C55	LIMCH1 LIM and calponin homology domains-containing protein	3932
P21333_C 1157	FLNA Filamin-A	1233	Q9NS91_C64	RAD18 E3 ubiquitin-protein ligase RAD18	3933
P14618_C 326	PKM Pyruvate kinase isozymes M1/M2	1234	Q7Z3D6_C124	C14orf159 UPF03 17 protein C14orf159, mitochondrial	3934
Q13363_C 134	CTBP1 C-terminal-binding protein 1	1235	Q53EZ4_C236	CEP55 Centrosomal protein of 55 kDa	3935
P48643_C 181	CCT5 T-complex protein 1 subunit epsilon	1236	P62826_C85	RAN GTP-binding nuclear protein Ran	3936
P00338_C 35	LDHA L-lactate dehydrogenase A chain	1237	P18583_C2070	SON Protein SON	3937
P25789_C 107	PSMA4 Proteasome subunit alpha type-4	1238	Q92616_C932	GCNLI Translational activator GCN1	3938
P28838_C 335	LAP3 Cytosol aminopeptidase	1239	P22087_C99	FBL rRNA 2-O-methyltransferase fibrillarlin	3939
P00558_C 316	PGK1 Phosphoglycerate kinase 1	1240	Q96124_C460	FUBP3 Far upstream element-binding protein 3	3940
Q9BQ69_C 186	MACROD1 O-acetyl-ADP-ribose deacetylase MACROD1	1241	Q14657_C113	LAGE3 L antigen family member 3	3941
P23368_C 120	ME2 NAD-dependent malic enzyme, mitochondrial	1242	P49327_C2091	FASN Fatty acid synthase	3942
P07195_C 36	LDHB L-lactate dehydrogenase B chain	1243	P49327_C2468	FASN Fatty acid synthase	3943
Q92879_C 150	CELF1 CUGBP Elav-like family member 1	1244	Q9UDR5_C534	AASS Alpha-aminoacidic semialdehyde synthase, mitochondrial	3944
Q9Y696_C 100	CLIC4 Chloride intracellular channel protein 4	1245	Q15746_C83	MYLK Myosin light chain kinase, smooth muscle	3945
Q8NBF2_C 716	NHLRC2 NHL repeat-containing protein 2	1246	O14929_C120	HAT1 Histone acetyltransferase type B catalytic subunit	3946
P24534_C 50	EEF1B2 Elongation factor 1-beta	1247	Q9NS87_C862	KIF15 Kinesin-like protein KIF15	3947
P46782_C 155	RPS5 40S ribosomal protein S5	1248	Q8TBC4_C139	UBA3 NEDD8-activating enzyme E1 catalytic subunit	3948
H3BQZ7_C 57	Uncharacterized protein	1249	Q13596_C318	SNX1 Sorting nexin-1	3949
Q93052_C 364	LPP Lipoma-preferred partner	1250	P55160_C780	NCKAPIL Nck-associated protein 1-like	3950
P04075_C 202	ALDOA Fructose-bisphosphate aldolase A	1251	P31150_C202	GDI1 Rab GDP dissociation inhibitor alpha	3951
Q7KZF4_C 560	SND1 Staphylococcal nuclease domain-containing protein	1252	Q96BN8_C47	FAM105B Protein FAM105B	3952

P40227_C 406	CCT6A T-complex protein 1 subunit zeta	1253	Q12888_C1703	TP53BP1 Tumor suppressor p53-binding protein 1	3953
P60174_C 255	TPI1 Triosephosphate isomerase	1254	Q9NRY4_C814	ARHGAP35 Rho GTPase-activating protein 35	3954
Q08J23_C 321	NSUN2 tRNA (cytosine(34)-C(5))-methyltransferase	1255	Q9BV68_C15	RNF126 RING finger protein 126	3955
P15927_C 219	RPA2 Replication protein A 32 kDa subunit	1256	Q92974_C715	ARHGEF2 Rho guanine nucleotide exchange factor 2	3956
P09622_C 477	DLD Dihydrolipoyl dehydrogenase, mitochondrial	1257	Q9HAU4_C716	SMURF2 E3 ubiquitin-protein ligase SMURF2	3957
P28838_C 376	LAP3 Cytosol aminopeptidase	1258	P24928_C1470	POLR2A DNA-directed RNA polymerase II subunit RPB1	3958
P49915_C 523	GMPS GMP synthase	1259	P07858_C108	CTSB Cathepsin B	3959
Q9H3H3_C C222	Clorf68 UPF0696 protein Clorf68	1260	075190_C275	DNAJB6 DnaJ homolog subfamily B member 6	3960
P07737_C 128	PFN1 Profilin-1	1261	Q9Y6X8_C11	ZHX2 Zinc fingers and homeoboxes protein 2	3961
Q00839_C 594	HNRNPU Heterogeneous nuclear ribonucleoprotein U	1262	P62263_C85	RPS14 40S ribosomal protein S14	3962
Q14974_C 455	KPNB1 Importin subunit beta-1	1263	P31146_C195	CORO1A Coronin-1 A	3963
015067_C 66	PFAS Phosphoribosylformylglycinamide synthase	1264	Q9H2M9_C1336	RAB3GAP2 Rab3 GTPase-activating protein non-catalytic subunit	3964
Q01813_C 112	PFKP 6-phosphofructokinase type C	1265	060825_C105	PFKFB2 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase 2	3965
P11413_C 385	G6PD Glucose-6-phosphate 1-dehydrogenase	1266	Q9NTJ3_C271	SMC4 Structural maintenance of chromosomes protein 4	3966
Q13561_C 240	DCTN2 Dynactin subunit 2	1267	Q00577_C292	PURA Transcriptional activator protein Pur-alpha	3967
Q13162_C 245	PRDX4 Peroxiredoxin-4	1268	Q5VT52_C903	RPRD2 Regulation of nuclear pre-mRNA domain-containing protein	3968
P50991_C 252	CCT4 T-complex protein 1 subunit delta	1269	Q9UKV3_C733	ACINI Apoptotic chromatin condensation inducer in the nucleus	3969
P04899_C 112	GNAI2 Guanine nucleotide-binding protein G(i) subunit alpha 12	1270	Q92552_C49	MRPS27 28S ribosomal protein S27, [mitochondria]	3970
043765_C 153	SGTA Small glutamine-rich tetratricopeptide repeat-containing protein alpha	1271	Q96MG7_C283	NDNL2 Melanoma-associated antigen G1	3971
P34932_C 290	HSPA4 Heat shock 70 kDa protein 4	1272	Q7L5D6_C205	GET4 Golgi to ER traffic protein 4 homolog	3972
P61247_C 96	RPS3A 40S ribosomal protein S3a	1273	Q8N556_C471	AFAP1 Actin filament-associated protein 1	3973
P04075_C 73	ALDOA Fructose-bisphosphate aldolase A	1274	Q8N556_C506	AFAP1 Actin filament-associated protein 1	3974
Q96EP5_C C85	DAZAPI DAZ-associated protein 1	1275	P62987_C115	UBA52 Ubiquitin-60S ribosomal protein L40	3975
P27708_C 1889	CAD CAD protein	1276	Q96HE7_C35	ERO1L ERO1-like protein alpha	3976
Q16822_C 431	PCK2 Phosphoenolpyruvate carboxykinase	1277	Q6IBS0_C275	TWF2 Twinfilin-2	3977
Q96KB5_C C70	PBK Lymphokine-activated killer T-cell-originated protein	1278	Q04724_C89	TLE1 Transducin-like enhancer protein 1	3978

P00558_C 108	PGK1 Phosphoglycerate kinase 1	1279	Q9H3U1 C650	UNC45A Protein unc-45 homolog A	3979
Q15365_C 293	PCBP1 Poly(rC)-binding protein 1	1280	043374 C797	RASA4 Ras GTPase-activating protein 4	3980
P60174_C 164	TPI1 Triosephosphate isomerase	1281	Q9NUQ8 C628	ABCF3 ATP-binding cassette subfamily F member 3	3981
P62826_C 120	RAN GTP-binding nuclear protein Ran	1282	Q9UJF2 C443	RASAL2 Ras GTPase-activating protein nGAP	3982
075348_C 69	ATP6V1G1 V-type proton ATPase subunit G 1	1283	P61160 C11	ACTR2 Actin-related protein 2	3983
Q9Y2D5_C C296	AKAP2 A-kinase anchor protein 2	1284	Q7Z6M1 C115	RABEPK Rab9 effector protein with kelch motifs	3984
P61158_C 12	ACTR3 Actin-related protein 3	1285	Q13418 C422	ILK mtegrin-linked protein kinase	3985
P36405_C 118	ARL3 ADP-ribosylation factor-like protein 3	1286	P30153 C317	PPP2R1A Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform	3986
P62937_C 115	PPIA Peptidyl-prolyl cis-trans isomerase A	1287	P62273 C39	RPS29 40S ribosomal protein S29	3987
P35754_C 83	GLRX Glutaredoxin-1	1288	P61218 C76	POLR2F DNA-directed RNA polymerases I, II, and III subunit	3988
060664_C 341	PLIN3 Perilipin-3	1289	P58546 C83	MTPN Myotrophin	3989
Q12874_C 103	SF3A3 Splicing factor 3A subunit 3	1290	Q92888 C815	ARHGEF1 Rho guanine nucleotide exchange factor 1	3990
Q9H4M9_C C138	EHD1 EH domain-containing protein 1	1291	Q9BZX2 C241	UCK2 Uridine-cytidine kinase 2	3991
Q15185_C 76	PTGES3 Prostaglandin E synthase 3	1292	043815 C316	STRN Striatin	3992
P04632_C 190	CAPNS1 Calpain small subunit 1	1293	094925 C463	GLS Glutaminase kidney isoform, mitochondrial	3993
P13489_C 75	RNH1 Ribonuclease inhibitor	1294	P42224 C155	STAT1 Signal transducer and activator of transcription 1	3994
095372_C 213	LYPLA2 Acyl-protein thioesterase 2	1295	P30837 C169	ALDH1B1 Aldehyde dehydrogenase X, mitochondrial	3995
P84085_C 62	ARF5 ADP-ribosylation factor 5	1296	P62140 C139	PPP1CB Serine/threonine-protein phosphatase PPI-beta catalytic	3996
P55786_C 265	NPEPPS Puromycin-sensitive aminopeptidase	1297	Q6XQN6 C533	NAPRT1 Nicotinate phosphoribosyltransferase	3997
Q14204_C 1977	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	1298	Q96DM3 C333	C18orf8 Uncharacterized protein C18orf8	3998
P14866_C 581	HNRNPL Heterogeneous nuclear ribonucleoprotein L	1299	P33764 C53	S100A3 Protein S100-A3	3999
Q14980_C 160	NUMA1 Nuclear mitotic apparatus protein 1	1300	Q96F86 C91	EDC3 Enhancer of mRNA-decapping protein 3	4000
000743_C 192	PPP6C Serine/threonine-protein phosphatase 6 catalytic subunit	1301	000221 C187	NFKBIE NF-kappa-B inhibitor epsilon	4001
P07741_C 83	APRT Adenine phosphoribosyltransferase	1302	Q9ULC4 C144	MCTSI Malignant T-cell-amplified sequence 1	4002
075607_C 105	NPM3 Nucleoplasmin-3	1303	060841 C635	EIF5B Eukaryotic translation initiation factor 5B	4003
P09429_C 23	HMGB1 High mobility group protein B1	1304	Q5TFE4 C179	NT5DC1 5-nucleotidase domain-containing protein 1	4004

P26641_C 339	EEF1G Elongation factor 1-gamma	1305	Q9UNM6 C114	PSMD13 26S proteasome non-ATPase regulatory subunit 13	4005
060232_C 152	SSSCA1 Sjogren syndrome/scleroderma autoantigen 1	1306	043847 C1109	NRD1 Nardilysin	4006
Q66K74_C C342	MAP1S Microtubule-associated protein 1S	1307	Q9HAV4 C1157	XP05 Exportin-5	4007
Q52LJ0_C 63	FAM98B Protein FAM98B	1308	043172 C441	PRPF4 U4/U6 small nuclear ribonucleoprotein Prp4	4008
P62249_C 25	RPS16 40S ribosomal protein S16	1309	Q8IXW5 C105	RPAP2 Putative RNA polymerase II subunit B1 CTD phosphatase	4009
P35579_C 988	MYH9 Myosin-9	1310	Q6QNY0 C180	BLOC 1S3 Biogenesis of lysosome-related organelles complex	4010
P33316_C 222	DUT Deoxyuridine 5-triphosphate nucleotidohydrolase,	1311	Q14697 C423	GANAB Neutral alpha-glucosidase AB	4011
Q9Y6E0_C C89	STK24 Serine/threonine-protein kinase 24	1312	Q27J81 C394	INF2 Inverted formin-2	4012
P49411_C 222	TUFM Elongation factor Tu, mitochondrial	1313	P60900 C137	PSMA6 Proteasome subunit alpha type-6	4013
Q01813_C 360	PFKP 6-phosphofructokinase typeC	1314	P55786 C66	NPEPPS Puromycin-sensitive aminopeptidase	4014
Q7L2J0_C 177	MEPCE 7SK snRNA methylphosphate capping enzyme	1315	P62879 C317	GNB2 Guanine nucleotide-binding protein G(I)/G(S)/G(T)	4015
015355_C 164	PPM1G Protein phosphatase 1G	1316	Q9Y692 C274	GMEB1 Glucocorticoid modulatory element-binding protein	4016
Q6IBS0_C C141	TWF2 Twinfilin-2	1317	000567 C52	NOP56 Nucleolar protein 56	4017
Q9NVG8_C C387	TBC1D13 TBC1 domain family member 13	1318	Q9C0C2 C1296	TNKS1BP1 182 kDa tankyrase-1-binding protein	4018
015382_C 342	BCAT2 Branched-chain-amino-acid aminotransferase, mitochondrial	1319	Q15008 C58	PSMD6 26S proteasome non-ATPase regulatory subunit 6	4019
P12004_C 135	PCNA Proliferating cell nuclear antigen	1320	075533 C677	SF3B1 Splicing factor 3B subunit 1	4020
P60660_C 32	MYL6 Myosin light polypeptide 6	1321	E7EVK2 C23	MTG1 Mitochondrial GTPase 1	4021
P55072_C 522	VCP Transitional endoplasmic reticulum ATPase	1322	095336 C78	PGLS 6-phosphogluconolactonase	4022
Q99439_C 240	CNN2 Calponin-2	1323	Q9C0B1 C326	FTO Alpha-ketoglutarate-dependent dioxygenase FTO	4023
P05455_C 245	SSB Lupus La protein	1324	Q8TEU7 C1368	RAPGEF6 Rap guanine nucleotide exchange factor 6	4024
075131_C 54	CPNE3 Copine-3	1325	P35568 C923	IRS1 Insulin receptor substrate 1	4025
P26358_C 62	DNMT1 DNA (cytosine-5)-methyltransferase 1	1326	P04049 C637	RAF1 RAF proto-oncogene serine/threonine-protein kinase	4026
Q7Z4W1_C C138	DCXR L-xylulose reductase	1327	P60660 C138	MYL6 Myosin light polypeptide 6	4027
P10809_C 447	HSPD1 60 kDa heat shock protein, mitochondrial	1328	Q8NDH3 C189	NPEPL1 Probable aminopeptidase NPEPL1	4028
P84077_C 159	ARF1 ADP-ribosylation factor 1	1329	P25786 C182	PSMA1 Proteasome subunit alpha type-1	4029

Q15185_C 40	PTGES3 Prostaglandin E synthase 3	1330	Q7L591_ C385	DOK3 Docking protein 3	4030
Q16854_C 87	DGUOK. Deoxyguanosine kinase, mitochondrial	1331	Q9UJM3 C146	ERRF1 ERBB receptor feedback inhibitor 1	4031
Q9Y508_ C8	RNF114 RING finger protein 114	1332	000159_ C679	MYOIC Unconventional myosin-1c	4032
P63208_C 120	SKP1 S-phase kinase- associated protein 1	1333	P55060_ C61	CSE1 Exportin-2	4033
000148_C 164	DDX39A ATP-dependent RNA helicase DDX39A	1334	P14868_ C130	DARS Aspartate-tRNA ligase, cytoplasmic	4034
P25786_C 148	PSMA1 Proteasome subunit alpha type-1	1335	P14868_ C259	DARS Aspartate-tRNA ligase, cytoplasmic	4035
P61221_C 88	ABCE1 ATP-binding cassette sub-family E member 1	1336	P45954_ C261	ACADSB Short/branched chain specific acyl-CoA dehydrogenase	4036
060654_C 60	PLIN3 Perilipin-3	1337	Q01664_ C29	TFAP4 Transcription factor AP-4	4037
P15311_C 117	EZR Ezrin	1338	P08138_ C381	NGFR Tumor necrosis factor receptor superfamily member	4038
Q9UBW8 C110	COPS7A COP9 signalosome complex subunit 7a	1339	060671_ C239	RADI Cell cycle checkpoint protein RADI	4039
P42765_C 287	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	1340	P46379_ C856	BAG6 Large proline-rich protein BAG6	4040
Q99832_C 158	CCT7 T-complex protein 1 subunit eta	1341	P26022_ C103	PTX3 Pentraxin-related protein PTX3	4041
P61978_C 145	HNRNPK Heterogeneous nuclear ribonucleoprotein K	1342	Q9BYX2 C651	TBC1D2 TBC1 domain family member 2A	4042
Q13310_C 132	PABPC4 Polyadenylate- binding protein 4	1343	P23610_ C76	F8A3 Factor VIII intron 22 protein	4043
P35998_C 377	PSMC2 26S protease regulatory subunit 7	1344	Q9NZE8 C119	MRPL35 39S ribosomal protein L35, mitochondrial	4044
P52789_C 794	HK2 Hexokinase-2	1345	Q9UJZ1_ C167	STOML2 Stomatatin-like protein 2	4045
P35579_C 91	MYH9 Myosin-9	1346	P31937_ C251	HIBADH 3-hydroxyisobutyrate dehydrogenase, mitochondrial	4046
P13995_C 166	MTHFD2 Bifunctional methylene tetrahydrofolate dehydrogenase	1347	Q9NR56_ C34	MBNL1 Muscleblind-like protein 1	4047
P22102_C 41	GART Trifunctional purine biosynthetic protein adenosin	1348	Q9P0V9_ C100	SEPT10 Septin-10	4048
POCW22_ C35	RPS17L 40S ribosomal protein S17-like	1349	Q96AT9_ C23	RPE Ribulose-phosphate 3-epimerase	4049
Q9UK45_ C85	LSM7 U6 snRNA-associated Sm-like protein LSM7	1350	Q08378_ C1431	GOLGA3 Golgin subfamily A member 3	4050
Q12874_C 274	SF3A3 Splicing factor 3A subunit 3	1351	Q9Y4X5 C161	ARIH1 E3 ubiquitin-protein ligase ARIH1	4051
P34897_C 119	SHMT2 Serine hydroxymethyltransferase, mitochondrial	1352	P09417_ C161	QDPR Dihydropteridine reductase	4052
P15153_C 157	RAC2 Ras-related C3 botulinum toxin substrate 2	1353	Q7L014_ C377	DDX46 Probable ATP-dependent RNA helicase DDX46	4053
Q16186_C 88	ADRM1 Proteasomal ubiquitin receptor ADRM1	1354	Q7L014_ C501	DDX46 Probable ATP-dependent RNA helicase DDX46	4054
P15531_C 145	NME1 Nucleoside diphosphate kinase A	1355	Q92917_ C137	GPKOW G patch domain and KOW motifs-containing protein	4055

P49327_C 2202	FASN Fatty acid synthase	1356	P28340_C C1058	POLD1 DNA polymerase delta catalytic subunit	4056
P40926_C 275	MDH2 Malate dehydrogenase, mitochondrial	1357	P53350_C C212	PLK1 Serine/threonine-protein kinase PLK1	4057
P22314_C 23	UBA1 Ubiquitin-like modifier-activating enzyme 1	1358	Q86VP6_C C942	CAND1 Cullin-associated NEDD8-dissociated protein 1	4058
P52789_C 517	HK2 Hexokinase-2	1359	P35237_C C350	SERPENB6 Serpin B6	4059
Q12931_C 573	TRAP1 Heat shock protein 75 kDa, mitochondrial	1360	P67775_C C266	PPP2CA Serine/threonine-protein phosphatase 2A catalytic	4060
P39687_C 123	ANP32A Acidic leucine-rich nuclear phosphoprotein 32 family	1361	Q14152_C C478	EIF3A Eukaryotic translation initiation factor 3 subunit	4061
043865_C 272	AHCYL1 Putative adenosylhomocysteinase 2	1362	P19338_C C543	NCLNucleolin	4062
095456_C 157	PSMG1 Proteasome assembly chaperone 1	1363	Q16576_C C277	RBBP7 Histone-binding protein RBBP7	4063
P49005_C 384	POLD2 DNA polymerase delta subunit 2	1364	Q5UIP0_C C2274	RIF1 Telomere-associated protein RIF1	4064
Q96EY8_C C132	MMAB Cob(I)yrinic acid a,c-diamide adenosyltransferase,	1365	060566_C C578	BUB1B Mitotic checkpoint serine/threonine-protein kinase	4065
P28074_C 111	PSMB5 Proteasome subunit beta type-5	1366	060566_C C723	BUB1B Mitotic checkpoint serine/threonine-protein kinase	4066
075446_C 184	SAP30 Histone deacetylase complex subunit SAP30	1367	Q9UBU9_C C252	NXF1 Nuclear RNA export factor 1	4067
P05388_C 27	RPLP0 60S acidic ribosomal protein P0	1368	P41134_C C34	ID1 DNA-binding protein inhibitor ID-1	4068
Q15366_C 158	PCBP2 Poly(rC)-binding protein 2	1369	Q03001_C C5610	DST Dystonin	4069
075369_C 2501	FLNB Filamin-B	1370	P49720_C C19	PSMB3 Proteasome subunit beta type-3	4070
Q06124_C 259	PTPN11 Tyrosine-protein phosphatase non-receptor type 11	1371	Q15054_C C129	POLD3 DNA polymerase delta subunit 3	4071
P40926_C 285	MDH2 Malate dehydrogenase, mitochondrial	1372	Q9Y223_C C183	GNE Bifunctional UDP-N-acetylglucosamine 2-epimerase/N	4072
Q9BV79_C C263	MECR Trans-2-enoyl-CoA reductase, mitochondrial	1373	P31323_C C373	PRKAR2B cAMP-dependent protein kinase type II-beta regulatory subunit beta	4073
Q09666_C 1900	AHNAK Neuroblast differentiation-associated protein AHNA	1374	Q08257_C C145	CRYZ Quinone oxidoreductase	4074
Q9UBB5_C C359	MBD2 Methyl-CpG-binding domain protein 2	1375	P18031_C C344	PTPN1 Tyrosine-protein phosphatase non-receptor type 1	4075
P32322_C 262	PYCP1 Pyroline-5-carboxylate reductase 1, mitochondrial	1376	P04075_C C240	ALDOA Fructose-bisphosphate aldolase A	4076
P31939_C 241	ATIC Bifunctional purine biosynthesis protein PURH	1377	Q8WYP5_C C1261	AHCTF1 Protein ELYS	4077
Q04917_C 97	YWHAH 14-3-3 protein eta	1378	Q14145_C C319	KEAP1 Kelch-like ECH-associated protein 1	4078
P62753_C 100	RPS6 40S ribosomal protein S6	1379	Q14141_C C432	SEPT6 Septin-6	4079
Q9Y490_C C1353	TLN1 Talin-1	1380	P46821_C C261	MAP1B Microtubule-associated protein 1B	4080

P52701_C 615	MSH6 DNA mismatch repair protein Msh6	1381	000291 C249	HIP1 Himtingtin-iriteracting protein 1	4081
P49591_C 300	SARS Serine-tRNA ligase, cytoplasmic	1382	Q96A65 C106	EXOC4 Exocyst complex component 4	4082
P49411_C 127	TUFM Elongation factor Tu, mitochondrial	1383	P34896 C389	SHMT1 Serine hydroxymethyltransferase, cytosolic	4083
P51610_C 211	HCFC1 Host cell factor 1	1384	Q6XZF7 C327	DNMBP Dynamin-binding protein	4084
P60174_C 104	TPI1 Triosephosphate isomerase	1385	095671 C274	ASMTL N-acetylserotonin O-methyltransferase-like protein	4085
Q12982_C 295	BNIP2 BCL2/adenovirus E1B 19 kDa protein-interacting pro	1386	P09960 C147	LTA4H Leukotriene A-4 hydrolase	4086
Q9UHD8_C 375	SEPT9 Septin-9	1387	P09960 C200	LTA4H Leukotriene A-4 hydrolase	4087
P53618_C 888	COPB1 Coatomer subunit beta	1388	Q86WB0 C125	ZC3HC1 Nuclear-interacting partner of ALK	4088
Q8N163_C 644	KIAA1967 DBIRD complex subunit KIAA1967	1389	Q96EP5 C63	DAZAP1 DAZ-associated protein 1	4089
P61106_C 40	RAB14 Ras-related protein Rab-14	1390	Q9Y490 C732	TLN1 Talin-1	4090
P21291_C 167	CSRP1 Cysteine and glycine-rich protein 1	1391	Q9Y490 C1506	TLN1 Talin-1	4091
Q07020_C 134	RPL18 60S ribosomal protein L18	1392	P27708 C2161	CAD CAD protein	4092
Q86VP6_C 413	CAND1 Cullin-associated NEDD8-dissociated protein 1	1393	095628 C175	CNOT4 CCR4-NOT transcription complex subunit 4	4093
Q9Y3F4_C 305	STRAP Serine-threonine kinase receptor-associated protein	1394	Q02535 C16	1D3 DNA-binding protein inhibitor ED-3	4094
Q9Y5K6_C 540	CD2AP CD2-associated protein	1395	P23497 C238	SP100 Nuclear autoantigen Sp-100	4095
060361_C 130	NME2P1 Putative nucleoside diphosphate kinase	1396	P23497 C468	SP100 Nuclear autoantigen Sp-100	4096
Q9BWD1_C 65	ACAT2 Acetyl-CoA acetyltransferase, cytosolic	1397	Q81V63 C191	VRK3 Inactive serine/threoriine-protein kinase VRK3	4097
Q7L2J0_C 522	MEPCE 7SK snRNA methylphosphate capping enzyme	1398	Q7L5Y1 C307	ENOSF1 Mitochondrial enolase superfamily member 1	4098
P61158_C 307	ACTR3 Actm-related protein 3	1399	Q9UBW7 C1331	ZMYM2 Zinc finger MYM-type protein 2	4099
PI1142_C 603	HSPA8 Heat shock cognate 71 kDa protein	1400	015446 C86	CD3EAP DNA-directed RNA polymerase I subunit RPA34	4100
PI3639_C 728	EEF2 Elongation factor 2	1401	P54136 C312	RARS Arginine-tRNA ligase, cytoplasmic	4101
P04183_C 206	TK1 Thymidine kinase, cytosolic	1402	P49748 C215	ACADVL Very long-chain specific acyl-CoA dehydrogenase, mitochondrial	4102
P30153_C 294	PPP2R1A Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A	1403	Q9BRX2 C175	PELO Protein pelota homolog	4103
Q09666_C 2162	AHNAK Neuroblast differentiation-associated protein AHNA	1404	095544 C69	NADK NAD kinase	4104
P46779_C 13	RPL28 60S ribosomal protein L28	1405	Q969W3 C159	FAM104A Protein FAM104A	4105

Q9Y696_C234	CLIC4 Chloride intracellular channel protein 4	1406	P62917_C195	RPL8 60S ribosomal protein L8	4106
P08670_C328	VIM Vimentin	1407	Q00839_C335	HNRNPU Heterogeneous nuclear ribonucleoprotein U	4107
043684_C129	BUB3 Mitotic checkpoint protein BUB3	1408	P00568_C25	AK1 Adenylate kinase isoenzyme 1	4108
Q04917_C112	YWHAH 14-3-3 protein eta	1409	D6RAD4_C275	CDK7 Cyclin-dependent kinase 7	4109
P41252_C526	IARS Isoleucine-tRNA ligase, cytoplasmic	1410	P49368_C475	CCT3 T-complex protein 1 subunit gamma	4110
014980_C1070	XPO1 Exportin-1	1411	Q53S33_C59	BOLA3 BolA-like protein 3	4111
Q9Y3D5_C90	MRPS18C 28S ribosomal protein S18c, mitochondrial	1412	Q96A49_C283	SYAPI Synapse-associated protein 1	4112
Q15459_C244	SF3A1 Splicing factor 3A subunit 1	1413	Q6ZS81_C1665	WDFY4 WD repeat- and FYVE domain-containing protein 4	4113
P50552_C334	VASP Vasodilator-stimulated phosphoprotein	1414	P60981_C39	DSTN Destrin	4114
Q04637_C1265	EIF4G1 Eukaryotic translation initiation factor 4 gamma 1	1415	P51531_C1296	SMARCA2 Probable global transcription activator SNF2L2	4115
Q12824_C147	SMARCB1 SWI/SNF-related matrix-associated actin-dependent	1416	Q7Z417_C234	NUFIP2 Nuclear fragile X mental retardation-interacting protein	4116
P78346_C87	RPP30 Ribonuclease P protein subunit p30	1417	000410_C180	IP05 Importin-5	4117
Q99460_C806	PSMD1 26S proteasome non-ATPase regulatory subunit 1	1418	000410_C972	IP05 Importin-5	4118
P46060_C573	RANGAPI Ran GTPase-activating protein 1	1419	Q9NTK5_C187	OLA1 Olg-like ATPase 1	4119
Q6P1X6_C98	C8orf82 UPF0598 protein C8orf82	1420	P60228_C350	EIF3E Eukaryotic translation initiation factor 3 subunit	4120
P49189_C484	ALDH9A1 4-trimethylaminobutyraldehyde dehydrogenase	1421	Q96CP2_C132	FLYWCH2 FLYWCH family member 2	4121
Q9NVG8_C36	TBC1D13 TBC1 domain family member 13	1422	H0YGG7_C34	Uncharacterized protein	4122
P49841_C199	GSK3B Glycogen synthase kinase-3 beta	1423	Q92538_C1766	GBF1 Golgi-specific brefeldin A-resistance guanine nucleus	4123
Q09666_C1833	AHNAK Neuroblast differentiation-associated protein AHNAK	1424	O9508I_C39	AGFG2 Arf-GAP domain and FG repeat-containing protein 2	4124
P62241_C182	RPS8 40S ribosomal protein S8	1425	Q16531_C977	DDBI DNA damage-binding protein 1	4125
Q13620_C787	CUL4B Cullin-4B	1426	P28482_C254	MAPK1 Mitogen-activated protein kinase 1	4126
P26599_C23	PTBP1 Polypyrimidine tract-binding protein 1	1427	P36578_C208	RPL4 60S ribosomal protein L4	4127
Q14697_C502	GANAB Neutral alpha-glucosidase AB	1428	Q8NC26_C75	ZNF114 Zinc finger protein 114	4128
P08238_C564	HSP90AB1 Heat shock protein HSP 90-beta	1429	Q9BQ69_C199	MACRODI O-acetyl-ADP-ribose deacetylase MACRODI	4129
P53582_C14	METAP1 Methionine aminopeptidase 1	1430	B2RTY4_C2032	MYO9A Unconventional myosin-IXa	4130
Q9UBT2_C30	UBA2 SUMO-activating enzyme subunit 2	1431	Q9NZL9_C17	MAT2B Methionine adenosyltransferase 2 subunit beta	4131

P06733_C 119	ENO1 Alpha-enolase	1432	P30291_C C19	WEE1 Weel-like protein kinase	4132
P55884_C 384	EIF3B Eukaryotic translation initiation factor 3 subunit	1433	Q53ET0_C C675	CRTC2 CREB-regulated transcription coactivator 2	4133
P63167_C 24	DYNLL1 Dynein light chain 1, cytoplasmic	1434	P02765_C C219	AHSG Alpha-2-HS-glycoprotein	4134
Q15417_C 173	CNN3 Calponin-3	1435	Q96T60_C C353	PNKP Bifunctional polynucleotide phosphatase/kinase	4135
P21980_C 230	TGM2 Protein-glutamine gamma-glutamyltransferase 2	1436	P43034_C C252	PAFAH1B1 Platelet-activating factor acetylhydrolase IB subunit	4136
P31943_C 122	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	1437	Q9P215_C C39	POGK Pogo transposable element with K RAB domain	4137
P31947_C 38	SFN 14-3-3 protein sigma	1438	P09001_C C338	MRPL3 39S ribosomal protein L3, mitochondrial	4138
P18085_C 159	ARF4 ADP-ribosylation factor 4	1439	Q8NFC6_C C2164	BOD ILI Biorientation of chromosomes in cell division protein	4139
P60174_C 124	TPI1 Triosephosphate isomerase	1440	Q13126_C C136	MTAP S-methyl-5-thioadenosine phosphorylase	4140
P14618_C 152	PKM Pyruvate kinase isozymes M1/M2	1441	Q9Y6I3_C C205	EPN1 Epsin-1	4141
Q12765_C 324	SCRN1 Secemin-1	1442	Q9HA47_C C236	UCK1 Uridine-cytidine kinase 1	4142
Q16555_C 179	DPYSL2 Dihydropyrimidinase-related protein 2	1443	Q96KG9_C C88	SCYL1 N-terminal kinase-like protein	4143
P35579_C 1379	MYH9 Myosin-9	1444	P49419_C C70	ALDH7A1 Alpha-aminoadipic semialdehyde dehydrogenase	4144
P07814_C 92	EPRS Bifunctional glutamate/proline-tRNA ligase	1445	Q96RU3_C C511	FNBP1 Formin-binding protein 1	4145
Q92597_C 168	NDRG1 Protein NDRG1	1446	Q96RU2_C C733	USP28 Ubiquitin carboxyl-terminal hydrolase 28	4146
043707_C 351	ACTN4 Alpha-actinin-4	1447	Q16270_C C71	IGFBP7 Insulin-like growth factor-binding protein 7	4147
Q7RTV0_C C49	PHF5A PHD finger-like domain-containing protein SA	1448	P50395_C C302	GDI2 Rab GDP dissociation inhibitor beta	4148
P53396_C 845	ACLY ATP-citrate synthase	1449	P50395_C C414	GDI2 Rab GDP dissociation inhibitor beta	4149
P17844_C 234	DDX5 Probable ATP-dependent RNA helicase DDX5	1450	P40306_C C17	PSMB10 Proteasome subunit beta type-10	4150
Q9H0C8_C C325	ILKAP Integrin-linked kinase-associated serine/threonine	1451	Q16181_C C204	SEPT7 Septin-7	4151
P11413_C 446	G6PD Glucose-6-phosphate 1-dehydrogenase	1452	P60891_C C41	PRPS1 Ribose-phosphate pyrophosphokinase 1	4152
Q9BTT0_C C87	ANP32E Acidic leucine-rich nuclear phosphoprotein 32 family member #	1453	Q00403_C C223	GTF2B Transcription initiation factor IIFB	4153
Q14258_C 70	TRIM25 E3 ubiquitin/ISG15 ligase TRIM25	1454	095816_C C142	BAG2 BAG family molecular chaperone regulator 2	4154
Q8WU79_C C196	SMAP2 Stromal membrane-associated protein 2	1455	Q00610_C C926	CLTC Clathrin heavy chain 1	4155
Q92947_C 289	GCDH Glutaryl-CoA dehydrogenase, mitochondrial	1456	Q00610_C CI102	CLTC Clathrin heavy chain 1	4156

P45974_C195	USP5 Ubiquitin carboxyl-terminal hydrolase 5	1457	Q12996_C176	CSTF3 Cleavage stimulation factor subunit 3	4157
Q9BXJ9_C817	NAA15 N-alpha-acetyltransferase 15, NatA auxiliary subun	1458	Q9BXB5_C33	OSBPL10 Oxysterol-binding protein-related protein 10	4158
P62330_C155	ARF6 ADP-ribosylation factor 6	1459	P46013_C475	MKI67 Antigen KI-67	4159
Q13501_C27	SQSTM1 Sequestosome-1	1460	P46013_C1251	MKI67 Antigen KI-67	4160
Q5VWZ2_C12	LYPLALI Lysophospholipase-like protein 1	1461	O94979_C704	SEC31A Protein transport protein Sec31A	4161
Q04206_C105	RELA Transcription factor p65	1462	O75083_C170	WDR1 WD repeat-containing protein 1	4162
P36551_C198	CPOX Coproporphyrinogen-III oxidase, mitochondrial	1463	O43252_C53	PAPSS1 Bifunctional 3-phosphoadenosine 5-phosphosulfate	4163
P25398_C69	RPS12 40S ribosomal protein S12	1464	Q13131_C117	PRKAA1 5-AMP-activated protein kinase catalytic subunit	4164
Q00839_C648	HNRNPU Heterogeneous nuclear ribonucleoprotein U	1465	P62633_C158	CNBP Cellular nucleic acid-binding protein	4165
P24752_C142	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	1466	P52732_C695	KIF11 Kinesin-like protein KIF11	4166
P02545_C522	LMNA Prelamin-A/C	1467	Q8TD16_C437	BICD2 Protein bicaudal D homolog 2	4167
O60763_C678	USO1 General vesicular transport factor p115	1468	Q14008_C1768	CKAP5 Cytoskeleton-associated protein 5	4168
P04637_C182	TP53 Cellular tumor antigen p53	1469	P60604_C89	UBE2G2 Ubiquitin-conjugating enzyme E2 G2	4169
Q9UHX1_C129	PUF60 Poly(U)-binding-splicing factor PUF60	1470	Q9UHY1_C478	NRBP1 Nuclear receptor-binding protein	4170
Q9Y383_C348	LUC7L2 Putative RNA-binding protein Luc7-like 2	1471	Q9BPX3_C317	NCAPG Condensin complex subunit 3	4171
P78371_C289	CCT2 T-complex protein 1 subunit beta	1472	Q9NZJ9_C131	NUDT4 Diphosphoinositol polyphosphate phosphohydrolase 2	4172
Q15149_C4494	PLEC Plectin	1473	P21333_C1165	FLNA Filamin-A	4173
P13639_C369	EEF2 Elongation factor 2	1474	P13010_C296	XRCC5 X-ray repair cross-complementing protein 5	4174
P61163_C34	ACTR1A Alpha-centractin	1475	Q9NRX1_C64	PNO1 RNA-binding protein PNO1	4175
Q722W4_C645	ZC3HAV1 Zinc finger CCCH-type antiviral protein 1	1476	Q9NRX2_C129	MRPL17 39S ribosomal protein L17, mitochondrial	4176
P23526_C421	AHCY Adenosylhomocysteinase	1477	O75414_C163	NME6 Nucleoside diphosphate kinase 6	4177
Q9P2T1_C348	GMPR2 GMP reductase 2	1478	Q96CU9_C116	FOXRED1 FAD-dependent oxidoreductase domain-containing protein	4178
Q12849_C476	GRSF1 G-rich sequence factor 1	1479	Q6DN90_C485	IQSEC1 IQ motif and SEC7 domain-containing protein 1	4179
P07814_C744	EPRS Bifunctional glutamate/proline--tRNA ligase	1480	P01033_C168	TIMP1 Metalloproteinase inhibitor 1	4180
Q9ULA0_C327	DNPEP Aspartyl aminopeptidase	1481	Q92616_C1161	GCN1L1 Translational activator GCN1	4181

Q01081_C 67	U2AF1 Splicing factor U2AF 35 kDa subunit	1482	Q53GL7_ C50	PARP10 Poly	4182
P53041_C 11	PPP5C Serine/threonine- protein phosphatase 5	1483	Q9UH65 C260	SWAP70 Switch-associated protein 70	4183
P63244_C 138	GNB2L1 Guanine nucleotide- binding protein subunit beta-2-	1484	Q9UH65 C261	SWAP70 Switch-associated protein 70	4184
Q06323_C 106	PSME1 Proteasome activator complex subunit 1	1485	P46060_ C338	RANGAPI Ran GTPase-activating protein 1	4185
095071_C 730	UBR5 E3 ubiquitin-protein ligase UBR5	1486	P68402_ C35	PAFAH1B2 Platelet-activating factor acetylhydrolase IB subunit	4186
Q9H0D6_ C736	XRN2 5-3 exoribonuclease 2	1487	P61964_ C205	WDR5 WD repeat-containing protein 5	4187
P00558_C 50	PGK1 Phosphoglycerate kinase 1	1488	P49327_ C223	FASN Fatty acid synthase	4188
P52272_C 114	HNRNPM Heterogeneous nuclear ribonucleoprotein M	1489	Q99536_ C86	VAT1 Synaptic vesicle membrane protein VAT-1 homolog	4189
Q92598_C 34	HSPH1 Heat shock protein 105 kDa	1490	Q8N1G4 C249	LRRC47 Leucine-rich repeat- containing protein 47	4190
P51858_C 12	HDGF Hepatoma-derived growth factor	1491	014972_ C221	DSCR3 Down syndrome critical region protein 3	4191
Q9UBN7_ C426	HDAC6 Histone deacetylase 6	1492	060232_ C125	SSSCA1 Sjogren syndrome/scleroderma autoantigen 1	4192
P09234_C 25	SNRPC U1 small nuclear ribonucleoprotein C	1493	095619_ C210	YEATS4 YEATS donmin-containing protein 4	4193
Q9P1F3_ C39	ABRACL Costars family protein ABRACL	1494	P57772_ C93	FJEFSEC Selenocysteine-specific elongation factor	4194
P61158_C 34	ACTR3 Actin-related protein 3	1495	P13489_ C248	RNH1 Ribonuclease inhibitor	4195
P13639_C 812	EEF2 Elongation factor 2	1496	P13489_ C362	RNH1 Ribonuclease inhibitor	4196
B0V043_ C41	VARS Valyl-tRNA synthetase	1497	Q8ND83 C449	SLAIN1 SLAIN motif-containing protein 1	4197
Q9NQT5_ C215	EXOSC3 Exosome complex component RRP40	1498	Q9BUK6 C411	MSTO1 Protein misato homolog 1	4198
Q6PJG6_ C539	BRAT1 BRCA1-associated ATM activator 1	1499	Q12888_ C329	TP53BP1 Tumor suppressor p53- binding protein 1	4199
H3BN98_ C196	Uncharacterized protein	1500	Q15910_ C14	EZH2 Histone-lysine N- methyltransferase EZH2	4200
P35998_C 389	PSMC2 26S protease regulatory subunit 7	1501	Q99832_ C370	CCT7 T-complex protein 1 subunit eta	4201
P41250_C 616	GARS Glycine-tRNA ligase	1502	Q9BZH6 C363	WDRI 1 WD repeat-containing protein 11	4202
Q9Y5Y2_ C269	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	1503	007864_ C1935	POLE DNA polymerase epsilon catalytic subunit A	4203
P31948_C 26	STIP1 Stress-induced- phosphoprotein 1	1504	Q92974_ C383	ARHGEF2 Rho guanine nucleotide exchange factor 2	4204
099575_C 705	POP1 Ribonucleases P/MRP protein subunit POP 1	1505	Q9BTE3_ C636	MCMBP Mini-chromosome maintenance complex-binding protein	4205
000429_C 470	DNM1L Dynamin- 1-like protein	1506	P54578_ C203	USP14 Ubiquitin carboxyl-terminal hydrolase 14	4206
043264_C 568	ZW10 Centromere/kinetochore protein zw10 homolog	1507	P54578_ C415	USP14 Ubiquitin carboxyl-terminal hydrolase 14	4207
Q99961_C 277	SH3GL1 Endophilin-A2	1508	075995_ C152	SASH3 SAM and SH3 domain- containing protein 3	4208

Q99460_C 898	PSMD1 26S proteasome non-ATPase regulatory subunit 1	1509	095425_C 671	SVIL Supervillin	4209
P49411_C 290	TUFM Elongation factor Tu, mitochondrial	1510	Q9UH16_C 577	DDX20 Probable ATP-dependent RNA helicase DDX20	4210
P21980_C 370	TGM2 Protein-glutamine gamma-glutamyltransferase 2	1511	Q9H9Q2_C 240	COPS7B COP9 signalosome complex subunit 7b	4211
P21980_C 545	TGM2 Protein-glutamine gamma-glutamyltransferase 2	1512	P62191_C 58	PSMCI 26S protease regulatory subunit 4	4212
000273_C 154	DFFA DNA fragmentation factor subunit alpha	1513	P62195_C 363	PSMC5 26S protease regulatory subunit 8	4213
P09936_C 152	UCHL1 Ubiquitin carboxyl-terminal hydrolase isozyme LI	1514	PI1413_C 294	G6PD Glucose-6-phosphate 1-dehydrogenase	4214
Q66K74_C 440	MAP1S Microtubule-associated protein 1S	1515	P11142_C 267	HSPA8 Heat shock cognate 71 kDa protein	4215
Q9Y305_C 155	ACOT9 Acyl-coenzyme A thioesterase 9, mitochondrial	1516	Q9NQX3_C 419	GPHN Gephyrin	4216
P17655_C 105	CAPN2 Calpain-2 catalytic subunit	1517	P61081_C 47	UBE2M NEDD8-conjugating enzyme Ubc12	4217
P17655_C 301	CAPN2 Calpain-2 catalytic subunit	1518	Q9Y6W3_C 767	CAPN7 Calpain-7	4218
P35611_C 525	ADD1 Alpha-adducin	1519	Q01844_C 524	EWSR1 RNA-binding protein EWS	4219
P14625_C 645	HSP90B1 Endoplasmic	1520	Q9Y2Q3_C 27	GSTK1 Glutathione S-transferase kappa 1	4220
095571_C 34	ETHE1 Protein ETHE1, mitochondrial	1521	060825_C 28	PFKFB2 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase	4221
P62241_C 100	RPS8 40S ribosomal protein S8	1522	Q9GZV4_C 73	EIF5A2 Eukaryotic translation initiation factor 5A-2	4222
P22061_C 95	PCMT1 Protein-L-isoaspartate(D-aspartate) O-methyltransferase	1523	Q9NXV6_C 24	CDKN2AIP CDKN2A-interacting protein	4223
P19367_C 813	HK1 Hexokinase-1	1524	Q9U1D3_C 316	VPS51 Vacuolar protein sorting-associated protein 51 homolog	4224
P20073_C 363	ANXA7 Annexin A7	1525	Q99829_C 30	CPNE1 Copine-1	4225
095486_C 704	SEC24A Protein transport protein Sec24A	1526	Q5VT52_C 416	RPRD2 Regulation of nuclear pre-mRNA domain-containing protein 2	4226
P27816_C 535	MAP4 Microtubule-associated protein 4	1527	P22314_C 906	UBA1 Ubiquitin-like modifier-activating enzyme 1	4227
Q08J23_C 93	NSUN2 tRNA (cytosine(34)-C(5))-methyltransferase	1528	Q9UKV3_C 691	ACINI Apoptotic chromatin condensation inducer in the nucleus	4228
Q9NSD9_C 195	FARSB Phenylalanine-tRNA ligase beta subunit	1529	Q86U28_C 144	ISCA2 Iron-sulfur cluster assembly 2 homolog, mitochondrial	4229
Q9GZZ9_C 250	UBA5 Ubiquitin-like modifier-activating enzyme 5	1530	Q15814_C 184	TBCC Tubulin-specific chaperone C	4230
P41240_C 290	CSK Tyrosine-protein kinase CSK	1531	P42695_C 1484	NCAPD3 Condensin-2 complex subunit D3	4231
P00492_C 23	HPRT1 Hypoxanthine-guanine phosphoribosyl transferase	1532	Q14493_C 72	SLBP Histone RNA hairpin-binding protein	4232
Q99714_C 58	HSD17B10 3-hydroxyacyl-CoA dehydrogenase type-2	1533	Q14258_C 498	TRIM25 E3 ubiquitin/ISG15 ligase TRIM25	4233
P27707_C 59	DCK Deoxycytidine kinase	1534	Q9H3U1_C 384	UNC45A Protein unc-45 homolog A	4234
P19784_C 336	CSNK2A2 Casein kinase II subunit alpha	1535	043374_C 396	RASA4 Ras GTPase-activating protein 4	4235

P50914_C 42	RPL14 60S ribosomal protein L14	1536	P82921_C49	MRPS21 28S ribosomal protein S21, mitochondrial	4236
Q8WVJ2_C14	NUDCD2 NudC domain-containing protein 2	1537	P20810_C241	CAST Calpastatin	4237
Q02543_C22	RPL18A 60S ribosomal protein L18a	1538	P20810_C413	CAST Calpastatin	4238
Q6YN16_C218	HSDL2 Hydroxysteroid dehydrogenase-like protein 2	1539	Q9Y5S9_C149	RBM8A RNA-binding protein 8A	4239
Q9UHD8_C248	SEPT9 Septm-9	1540	P31997_C299	CEACAM8 Carcinoembryonic antigen-related cell adhesion molecule 8	4240
P22314_C1040	UBA1 Ubiquitin-like modifier-activating enzyme 1	1541	Q9ULV4_C39	COROIC Coronin-1C	4241
Q15020_C670	SART3 Squamous cell carcinoma antigen recognized by T-cells 3	1542	P11172_C174	UMPS Uridine 5-monophosphate synthase	4242
015144_C120	ARPC2 Actin-related protein 2/3 complex subunit 2	1543	Q6NXE6_C297	ARMC6 Armadillo repeat-containing protein 6	4243
Q9UNM6_C357	PSMD13 26S proteasome non-ATPase regulatory subunit 13	1544	Q92797_C578	SYMPK Symplekin	4244
P30040_C157	ERP29 Endoplasmic reticulum resident protein 29	1545	P45984_C116	MAPK9 Mitogen-activated protein kinase 9	4245
Q96Q11_C373	TRNT1 CCA tRNA nucleotidyltransferase 1, mitochondrial	1546	P50995_C294	ANXA11 Annexin A11	4246
Q02750_C277	MAP2K1 Dual specificity mitogen-activated protein kinase	1547	095376_C161	ARIH2 E3 ubiquitin-protein ligase ARIH2	4247
P27816_C635	MAP4 Microtubule-associated protein 4	1548	BOV043_C381	VARS Valyl-tRNA synthetase	4248
Q13185_C69	CBX3 Chromobox protein homolog 3	1549	BOV043_C444	VARS Valyl-tRNA synthetase	4249
P21291_C40	CSRPI Cysteine and glycine-rich protein 1	1550	P49848_C130	TAF6 Transcription initiation factor TFHD subunit 6	4250
P55072_C535	VCP Transitional endoplasmic reticulum ATPase	1551	Q86UV5_C850	USP48 Ubiquitin carboxyl-terminal hydrolase 48	4251
P55072_C572	VCP Transitional endoplasmic reticulum ATPase	1552	Q9Y2H0_C726	DLGAP4 Disks large-associated protein 4	4252
P39687_C87	ANP32A Acidic leucine-rich nuclear phosphoprotein 32 family	1553	Q92947_C176	GCDH Glutaryl-CoA dehydrogenase, mitochondrial	4253
Q9Y314_C8	NOSIP Nitric oxide synthase-interacting protein	1554	Q9UKW4_C800	VAV3 Guanine nucleotide exchange factor VAV3	4254
Q9UBT2_C173	UBA2 SUMO-activating enzyme subunit 2	1555	P35610_C92	SOAT1 Sterol O-acyltransferase 1	4255
P34897_C91	SHMT2 Serine hydroxymethyltransferase, mitochondrial	1556	Q14318_C274	FKBP8 Peptidyl-prolyl cis-trans isomerase FKBP8	4256
000299_C178	CLIC1 Chloride intracellular channel protein 1	1557	Q14315_C2154	FLNC Filamin-C	4257
Q9Y570_C238	PPME1 Protein phosphatase methylesterase 1	1558	P22234_C281	PAICS Multifunctional protein ADE2	4258
P61927_C19	RPL37 60S ribosomal protein L37	1559	P22234_C423	PAICS Multifunctional protein ADE2	4259
075153_C1196	KIAA0664 Clustered mitochondria protein homolog	1560	Q96920_C370	TBRG4 Protein TBRG4	4260

P23919_C 31	DTYMK Thymidylate kinase	1561	Q8WUM 4_C40	PDCD6IP Programmed cell death 6- interacting protein	4261
P40121_C 290	CAPG Macrophage-capping protein	1562	Q9H9A6 C264	LRRC40 Leucine-rich repeat- containing protein 40	4262
A0AVT1_ C433	UBA6 Ubiquitin-like modifier- activating enzyme 6	1563	P33764_ C30	S100A3 Protein S100-A3	4263
Q15365_C 201	PCBP1 Poly(rC)-binding protein 1	1564	P38936_ C117	CDKN1A Cyclin-dependent kinase inhibitor 1	4264
P29401_C 386	TKT Transketolase	1565	Q9UPU5 C1362	USP24 Ubiquitin carboxyl-terminal hydrolase 24	4265
P48147_C 25	PREP Prolyl endopeptidase	1566	Q8IWD4 C81	CCDC117 Coiled-coil domain- containing protein 117	4266
Q01813_C 411	PFKP 6-phosphofructokinase type C	1567	Q96GM8 C80	TOE1 Target of EGR1 protein 1	4267
P21333_C 2543	FLNA Filamin-A	1568	Q9UJY4_ C347	GGA2 ADP-ribosylation factor-binding protein GGA2	4268
P21333_C 2601	FLNA Filamin-A	1569	P12236_ C129	SLC25A6 ADP/ATP translocase 3	4269
O00154_C 288	ACOT7 Cytosolic acyl coenzyme A thioester hydrolase	1570	Q9NXH9 _C620	TRMT1 tRNA (guanine(26)-N(2))- dimethyltransferase	4270
P27635_C 195	RPL10 60S ribosomal protein L10	1571	Q7L0Y3_ C123	TRMT10C Mitochondrial ribonuclease P protein 1	4271
P26038_C 117	MSN Moesin	1572	Q08211_ C12	DHX9 ATP-dependent RNA helicase A	4272
Q96HE7_ C208	ERO1L ERO1-like protein alpha	1573	Q9Y4I1_ C535	MYO5A Unconventional myosin-Va	4273
P12814_C 480	ACTN1 Alpha-actinin-1	1574	P08240_ C253	SRPR Signal recognition particle receptor subunit alpha	4274
P07203_C 202	GPX1 Glutathione peroxidase 1	1575	Q5TFE4_ C399	NT5DC1 5-nucleotidase domain- containing protein 1	4275
Q99497_C 46	PARK7 Protein DJ-1	1576	Q8NFW8 C364	CMAS N-acetylneuraminase cytidyltransferase	4276
Q9HAV4_ C1131	XPO5 Exportin-5	1577	Q95817_ C373	BAG3 BAG family molecular chaperone regulator 3	4277
Q9UIX3_ C131	ANAPC7 Anaphase-promoting complex subunit 7	1578	Q92541_ C599	RTF1 RNA polymerase-associated protein RTF1 homolog	4278
O75821_C 139	EIF3G Eukaryotic translation initiation factor 3 subunit	1579	P52789_ C375	HK2 Hexokinase-2	4279
P00338_C 131	LDHA L-lactate dehydrogenase A chain	1580	P52789_ C813	HK2 Hexokinase-2	4280
Q15102_C 55	PAFAH1B3 Platelet-activating factor acetylhydrolase IB subu	1581	Q01469_ C87	FABP5 Fatty acid-binding protein, epidermal	4281
Q1KMD3_ C308	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U- like protein 2	1582	O43172_ C342	PRPF4 U4/U6 small nuclear ribonucleoprotein Prp4	4282
P54886_C 88	ALDH18A1 Delta-1-pyrroline- 5-carboxylate synthase	1583	O43175_ C48	PHGDH D-3-phosphoglycerate dehydrogenase	4283
Q5VSL9_ C798	FAM40A Protein FAM40A	1584	O43175_ C234	PHGDH D-3-phosphoglycerate dehydrogenase	4284
P30084_C 213	ECHS1 Enoyl-CoA hydratase, mitochondrial	1585	P22059_ C344	OSBP Oxysterol-binding protein 1	4285
P30086_C 168	PEBP1 Phosphatidylethanolamine- binding protein 1	1586	Q14699_ C551	RFTN1 Raftlin	4286

Q9Y3D0_C158	FAM96B Mitotic spindle-associated MMXD complex subunit MI	1587	Q14697_C822	GANAB Neutral alpha-glucosidase AB	4287
P49589_C204	CARS Cysteine--tRNA ligase, cytoplasmic	1588	Q15654_C310	TRIP6 Thyroid receptor-interacting protein 6	4288
Q15366_C217	PCBP2 Poly(rC)-binding protein 2	1589	Q15654_C328	TRIP6 Thyroid receptor-interacting protein 6	4289
O75369_C2556	FLNB Filamin-B	1590	Q15652_C684	JMJD1C Probable JmjC domain-containing histone demethylation protein 2C	4290
Q16181_C126	SEPT7 Septin-7	1591	Q9NU22_C1867	MDN1 Midasin	4291
Q99661_C245	KIF2C Kinesin-like protein KIF2C	1592	Q13439_C1862	GOLGA4 Golgin subfamily A member 4	4292
Q9UHD1_C86	CHORDC1 Cysteine and histidine-rich domain-containing protein	1593	Q9UPT8_C1302	ZC3H4 Zinc finger CCCH domain-containing protein 4	4293
P0CB43_C368	FAM203B Protein FAM203B	1594	Q9NXG2_C169	THUMP1 THUMP domain-containing protein 1	4294
P40925_C137	MDH1 Malate dehydrogenase, cytoplasmic	1595	Q27J81_C1029	INF2 Inverted formin-2	4295
Q12888_C1933	TP53BP1 Tumor suppressor p53-binding protein 1	1596	P01892_C188	HLA-A HLA class I histocompatibility antigen, A-2 alpha	4296
Q14247_C112	CTTN Src substrate cortactin	1597	P60903_C62	S100A10 Protein S100-A10	4297
Q13200_C251	PSMD2 26S proteasome non-ATPase regulatory subunit 2	1598	P51553_C236	IDH3G Isocitrate dehydrogenase	4298
P13639_C591	EEF2 Elongation factor 2	1599	P51003_C36	PAPOLA Poly(A) polymerase alpha	4299
P27816_C126	MAP4 Microtubule-associated protein 4	1600	P50213_C351	IDH3A Isocitrate dehydrogenase	4300
P48739_C187	PITPNB Phosphatidylinositol transfer protein beta isoform	1601	P62873_C204	GNB1 Guanine nucleotide-binding protein G(I)/G(S)/G(T)	4301
P14866_C472	HNRNPL Heterogeneous nuclear ribonucleoprotein L	1602	Q15003_C255	NCAPH Condensin complex subunit 2	4302
P07237_C343	P4HB Protein disulfide-isomerase	1603	O00764_C273	PDXK Pyridoxal kinase	4303
O43708_C205	GSTZ1 Maleylacetoacetate isomerase	1604	Q9BZL6_C217	PRKD2 Serine/threonine-protein kinase D2	4304
P19623_C25	SRM Spermidine synthase	1605	O75534_C506	CSDE1 Cold shock domain-containing protein E1	4305
P56537_C56	EIF6 Eukaryotic translation initiation factor 6	1606	Q9C0B1_C397	FTO Alpha-ketoglutarate-dependent dioxygenase FTO	4306
Q96SW2_C188	CRBN Protein cereblon	1607	O75223_C42	GGCT Gamma-glutamylcyclotransferase	4307
P41240_C31	CSK Tyrosine-protein kinase CSK	1608	Q13155_C168	AIMP2 Aminoacyl tRNA synthase complex-interacting multifunctional protein 2	4308
P36551_C127	CPOX Coproporphyrinogen-III oxidase, mitochondrial	1609	Q14204_C3389	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	4309
P52292_C133	KPNA2 Importin subunit alpha-2	1610	Q8WXI9_C409	GATAD2B Transcriptional repressor p66-beta	4310
Q04637_C1516	EIF4G1 Eukaryotic translation initiation factor 4 gamma 1	1611	P07814_C1301	EPRS Bifunctional glutamate/proline--tRNA ligase	4311

P60981_C 80	DSTN Dextrin	1612	P22102_C C62	GART Trifunctional purine biosynthetic protein adenosine	4312
Q7RTV0_C C40	PHF5A PHD finger-like domain-containing protein 5A	1613	075643_C C428	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicase	4313
P19838_C 61	NFKB1 Nuclear factor NF-kappa-B p105 subunit	1614	Q9ULL5_C C173	PRR12 Proline-rich protein 12	4314
P53396_C 633	ACLY ATP-citrate synthase	1615	Q14738_C C484	PPP2R5D Serine/threonine-protein phosphatase 2A 56 kDa regulatory	4315
P49207_C 83	RPL34 60S ribosomal protein L34	1616	P50851_C C1843	LRBA Lipopolysaccharide-responsive and beige-like anchor protein	4316
Q14974_C 689	KPNB1 Importin subunit beta-1	1617	Q9H668_C C8	OBFC1 CST complex subunit STN1	4317
Q96199_C 162	SUCLG2 Succinyl-CoA ligase	1618	Q15643_C C1329	TRIP11 Thyroid receptor-interacting protein 11	4318
P51610_C 1139	HCFC1 Host cell factor 1	1619	Q13422_C C394	IKZF1 DNA-binding protein Dcaros	4319
Q14657_C 23	LAGE3 L antigen family member 3	1620	P48739_C C94	PITPNB Phosphatidylinositol transfer protein beta isoform	4320
P13639_C 290	EEF2 Elongation factor 2	1621	Q9UJM3_C C378	ERRF1 ERBB receptor feedback inhibitor 1	4321
P22314_C 481	UBA1 Ubiquitin-like modifier-activating enzyme 1	1622	P62136_C C140	PPP1CA Serine/threonine-protein phosphatase PP1-alpha catalytic	4322
Q52UO_C 295	FAM98B Protein FAM98B	1623	P13674_C C528	P4HA1 Prolyl 4-hydroxylase subunit alpha-1	4323
Q7Z2W4_C C38	ZC3HAV1 Zinc finger CCCH-type antiviral protein 1	1624	Q9NVX2_C C280	NLE1 Notchless protein homolog 1	4324
P26447_C 81	S100A4 Protein S100-A4	1625	Q6IA86_C C68	ELP2 Elongator complex protein 2	4325
P30041_C 47	PRDX6 Peroxiredoxin-6	1626	P45954_C C308	ACADSB Short/branched chain specific acyl-CoA dehydrogenase	4326
P04040_C 377	CAT Catalase	1627	094921_C C100	CDK14 Cyclin-dependent kinase 14	4327
Q14847_C 20	LASP1 LEM and SH3 domain protein 1	1628	Q3KQU3_C C361	MAP7D1 MAP7 domain-containing protein 1	4328
P55209_C 88	NAPIL1 Nucleosome assembly protein 1-like 1	1629	Q8IVM0_C C85	CCDC50 Coiled-coil domain-containing protein 50	4329
Q9NRP4_C C80	ACN9 Protein ACN9 homolog, mitochondrial	1630	P52630_C C74	STAT2 Signal transducer and activator of transcription 2	4330
PI7987_C 385	TCP1 T-complex protein 1 subunit alpha	1631	P52630_C C529	STAT2 Signal transducer and activator of transcription 2	4331
P13797_C 104	PLS3 Plastin-3	1632	P42704_C C571	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	4332
Q7Z434_C C33	MAVS Mitochondrial antiviral-signaling protein	1633	P42704_C C1043	LRPPRC Leucine-rich PPR motif-containing protein, mitocho	4333
P49915_C 489	GMPS GMP synthase K	1634	Q99598_C C202	TSNAX Translin-associated protein X	4334
Q9H814_C C51	PHAX Phosphorylated adapter RNA export protein	1635	P34932_C C376	HSPA4 Heat shock 70 kDa protein 4	4335
Q15181_C 274	PPA1 Inorganic pyrophosphatase	1636	Q14980_C C65	NUMA1 Nuclear mitotic apparatus protein 1	4336
Q9UPN7_C C795	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	1637	Q14980_C C1367	NUMA1 Nuclear mitotic apparatus protein 1	4337
P50395_C 202	GDI2 Rab GDP dissociation inhibitor beta	1638	Q9BYV8_C C274	CEP41 Centrosomal protein of 41 kDa	4338

P27695_C 296	APEX1 DNA-(apurinic or apyrimidinic site) lyase	1639	P51970_C66	NDUFA8 NADH dehydrogenase	4339
P13010_C 493	XRCC5 X-ray repair cross-complementing protein 5	1640	Q01433_C230	AMPD2 AMP deaminase 2	4340
P27635_C 49	RPL10 60S ribosomal protein L10	1641	P55212_C68	CASP6 Caspase-6	4341
Q9BZE9_C109	ASPSR1 Tether containing UBX domain for GLUT4	1642	Q5SW79_C235	CEP170 Centrosomal protein of 170 kDa	4342
P43487_C 99	RANBP1 Ran-specific GTPase-activating protein	1643	Q9NQG5_C234	RPRD1B Regulation of nuclear pre-mRNA domain-containing protein	4343
P78527_C 1904	PRKDC DNA-dependent protein kinase catalytic subunit	1644	000743_C265	PPP6C Serine/threonine-protein phosphatase 6 catalytic subunit	4344
Q6JBY9_C155	RCSD1 CapZ-interacting protein	1645	PI0515_C586	DLAT Dihydrolipoyllysine-residue acetyltransferase component of pyruvate dehydrogenase complex, mitochondrial	4345
P14625_C 576	HSP90B1 Endoplasmic	1646	P28340_C360	POLD1 DNA polymerase delta catalytic subunit	4346
Q8N806_C260	UBR7 Putative E3 ubiquitin-protein ligase UBR7	1647	P28340_C1029	POLD1 DNA polymerase delta catalytic subunit	4347
Q9GZT9_C127	EGLN1 Egl nine homolog 1	1648	Q86VP6_C179	CAND1 Cullin-associated NEDD8-dissociated protein 1	4348
P06744_C 404	GPI Glucose-6-phosphate isomerase	1649	Q86VP6_C954	CAND1 Cullin-associated NEDD8-dissociated protein 1	4349
P00390_C 102	GSR Glutathione reductase, mitochondrial	1650	P54886_C486	ALDH18A1 Delta-l-pyrroline-5-carboxylate synthase	4350
P25398_C 106	RPS12 40S ribosomal protein S12	1651	P54886_C546	ALDH18A1 Delta-l-pyrroline-5-carboxylate synthase	4351
Q00839_C 497	HNRNPU Heterogeneous nuclear ribonucleoprotein U	1652	Q8N0X7_C288	SPG20 Spartin	4352
P49368_C 455	CCT3 T-complex protein 1 subunit gamma	1653	Q8TB52_C723	FBXO30 F-box only protein 30	4353
P33993_C 482	MCM7 DNA replication licensing factor MCM7	1654	Q14152_C404	EIF3A Eukaryotic translation initiation factor 3 subunit	4354
P57764_C 191	GSDMD Gasdermin-D	1655	P21281_C112	ATP6V1B2 V-type proton ATPase subunit B, brain isoform	4355
P40222_C 523	TXLNA Alpha-taxilin	1656	P21281_C207	ATP6V1B2 V-type proton ATPase subunit B, brain isoform	4356
Q9NTZ6_C887	RBM12 RNA-binding protein 12	1657	075116_C804	ROCK2 Rho-associated protein kinase 2	4357
Q9Y617_C80	PSATI Phosphoserine aminotransferase	1658	Q5UIP0_C2169	RIF1 Telomere-associated protein RIF1	4358
P27695_C 99	APEX1 DNA-(apurinic or apyrimidinic site) lyase	1659	Q9BW27_C515	NUP85 Nuclear pore complex protein Nup85	4359
Q7Z6Z7_C3239	HUWE1 E3 ubiquitin-protein ligase HUWE1	1660	P55199_C70	ELL RNA polymerase II elongation factor ELL	4360
Q16644_C 203	MAPKAPK3 MAP kinase-activated protein kinase 3	1661	Q8WXE1_C74	ATRIP ATR-interacting protein	4361
015355_C 13	PPM1G Protein phosphatase 1G	1662	014526_C571	FCHO1 FCH domain only protein 1	4362
Q15149_C 3821	PLEC Plectin	1663	Q9NSD9_C362	FARSB Phenylalanine--tRNA ligase beta subunit	4363
094776_C 209	MTA2 Metastasis-associated protein MTA2	1664	Q8WUW1_C43	BRK1 Protein BRICK1	4364

A6NHG4_C24	DDTL D-dopachrome decarboxylase-like protein	1665	Q12874_C145	SF3A3 Splicing factor 3A subunit 3	4365
P35611_C430	ADD1 Alpha-adducin	1666	Q9Y6A5_C20	TACC3 Transforming acidic coiled-coil-containing protein	4366
Q9NVA2_C41	SEPT11 Septin-11	1667	Q9Y6A5_C426	TACC3 Transforming acidic coiled-coil-containing protein	4367
P19404_C225	NDUFV2 NADH dehydrogenase	1668	Q92878_C133	RAD50 DNA repair protein RAD50	4368
P35579_C569	MYH9 Myosin-9	1669	Q9BXX1_C233	KLF16 Krueppel-like factor 16	4369
PI9367_C834	HK1 Hexokinase-1	1670	Q68CZ2_C842	TNS3 Tensin-3	4370
P30041_C91	PRDX6 Peroxiredoxin-6	1671	075616_C86	ERAL1 GTPase Era, mitochondrial	4371
P21281_C162	ATP6V1B2 V-type proton ATPase subunit B, brain isoform	1672	P18031_C32	PTPN1 Tyrosine-protein phosphatase non-receptor type 1	4372
P13796_C42	LCPI Plastin-2	1673	Q9UHB6_C316	LIM1 LIM domain and actin-binding protein 1	4373
000410_C687	IP05 Importin-5	1674	Q9UHB6_C414	LIM1 LIM domain and actin-binding protein 1	4374
P49207_C49	RPL34 60S ribosomal protein L34	1675	Q9NZ52_C396	GGA3 ADP-ribosylation factor-binding protein GGA3	4375
P35658_C186	NUP214 Nuclear pore complex protein Nup214	1676	Q9UBT2_C185	UBA2 SUMO-activating enzyme subunit 2	4376
P17858_C170	PFKL 6-phosphofructokinase, liver type	1677	Q15723_C470	ELF2 ETS-related transcription factor Elf-2	4377
P21333_C574	FLNA Filamin-A	1678	Q9H5V9_C11	CXorf56 UPF0428 protein CXorf56	4378
060701_C241	UGDH UDP-glucose 6-dehydrogenase	1679	014980_C199	XPO1 Exportin-1	4379
Q15691_C228	MAPRE1 Microtubule-associated protein RP/EB family member	1680	P15104_C53	GLUL Glutamine synthetase	4380
P31153_C104	MAT2A S-adenosylmethionine synthase isoform type-2	1681	P13796_C206	LCPI Plastin-2	4381
Q14247_C246	CTTN Src substrate cortactin	1682	095071_C2084	UBR5 E3 ubiquitin-protein ligase UBR5	4382
Q8IWX8_C69	CHERP Calcium homeostasis endoplasmic reticulum protein	1683	Q6XZF7_C909	DNMBP Dynamin-binding protein	4383
Q99543_C394	DNAJC2 DnaJ homolog subfamily C member 2	1684	Q9NXR7_C34	BRE BRCA1-A complex subunit BRE	4384
Q6JBY9_C181	RCSD1 CapZ-interacting protein	1685	Q9NQW6_C61	ANLN Actin-binding protein anillin	4385
P12814_C41	ACTN1 Alpha-actinin-1	1686	Q9NQW6_C234	ANLN Actin-binding protein anillin	4386
P17812_C491	CTPS1 CTP synthase 1	1687	Q6P587_C129	FAHDI AcylpyruvaseFAHDI, mitochondrial	4387
E7ETI0_C21	ARPC4-TTL3 Protein ARPC4-TTL3	1688	Q8NC96_C162	NECAPI Adaptin ear-binding coat-associated protein 1	4388
Q9ULC4_C14	MCTS1 Malignant T-cell-amplified sequence 1	1689	Q00653_C738	NFKB2 Nuclear factor NF-kappa-B p100 subunit	4389
P08134_C16	RHOC Rho-related GTP-binding protein RhoC	1690	Q86W56_C603	PARG Poly(ADP-ribose) glycohydrolase	4390

Q14980_C 80	NUMA1 Nuclear mitotic apparatus protein 1	1691	P39748_C 182	FEN1 Flap endonuclease 1	4391
Q9NYL9_C 231	TMOD3 Tropomodulin-3	1692	Q9Y3Z3_C 320	SAMHD1 SAM domain and HD domain-containing protein 1	4392
Q99439_C 61	CNN2 Calponin-2	1693	Q13045_C 1265	FLII Protein flightless-1 homolog	4393
P46776_C 144	RPL27A 60S ribosomal protein L27a	1694	Q14558_C 19	PRPSAP1 Phosphoribosyl pyrophosphate synthase-associated protein 1	4394
014980_C 164	XPO1 Exportin-1	1695	075592_C 3152	MYCBP2 Probable E3 ubiquitin-protein ligase MYCBP2	4395
Q9Y2L1_C 213	DIS3 Exosome complex exonuclease RRP44	1696	Q8IURO_C 40	TRAPPC5 TraiScking protein particle complex subunit 5	4396
060502_C 596	MGEA5 Bifunctional protein NCOAT	1697	016822_C 92	PCK2 Phosphoenolpyruvate carboxykmase	4397
P49748_C 237	ACADVL Very long-chain specific acyl-CoA dehydrogenase, mitochondrial	1698	Q53H96_C 129	PYCRL PyiToline-5-carboxylate reductase 3	4398
076003_C 146	GLRX3 Glutaredoxin-3	1699	Q96F24_C 126	NRBF2 Nuclear receptor-binding factor 2	4399
P27797_C 163	CALR Calreticulin	1700	H3BQ06_C 89	Uncharacterized protein	4400
P49368_C 279	CCT3 T-complex protein 1 subunit gamma	1701	Q06546_C 421	GABPA GA-binding protein alpha chain	4401
P32119_C 172	PRDX2 Peroxiredoxin-2	1702	P56192_C 309	MARS Methionine-tRNA ligase, cytoplasmic	4402
015541_C 15	RNF1 13A RING finger protein 113A	1703	Q9Y485_C 1419	DMXL1 DmX-like protein 1	4403
Q15417_C 59	CNN3 Calponin-3	1704	000839_C 408	HNRNPU Heterogeneous nuclear ribonucleoprotein U	4404
P60981_C 135	DSTN Destrin	1705	Q92499_C 631	DDX1 ATP-dependent RNA helicase DDX1	4405
P36776_C 682	LONP1 Lon protease homolog, mitochondrial	1706	043663_C 531	PRCI Protein regulator of cytokinesis 1	4406
P13693_C 28	TPT1 Translationally-controlled tumor protein	1707	014879_C 239	IFIT3 Interferon-induced protein with tetratricopeptide	4407
B5ME19_C 444	EIF3CL Eukaryotic translation initiation factor 3 subunit	1708	P36969_C 134	GPX4 Phospholipid hydroperoxide glutathione peroxidase,	4408
Q93009_C 223	USP7 Ubiquitin carboxyl-terminal hydrolase 7	1709	P12081_C 235	HARS Histidine-tRNA ligase, cytoplasmic	4409
Q9UPQ0_C 669	LIMCH1 LIM and calponin homology domains-containing prote	1710	P50914_C 54	RPL14 60S ribosomal protein L14	4410
Q96EY4_C 162	TMA16 Translation machinery-associated protein 16	1711	Q9H0D6_C 547	XRN2 5-3 exoribonuclease 2	4411
Q9BSH5_C 243	HDHD3 Haloacid dehalogenase-like hydrolase domain-contai	1712	Q14C86_C 129	GAPVDI GTPase-activating protein and VPS9 domain-containi	4412
Q99832_C 450	CCT7 T-complex protein I subunit eta	1713	Q9BXF6_C 106	RAB11FIP5 Rab11 family-interacting protein 5	4413
P68366_C 129	TUBA4A Tubulin alpha-4A chain	1714	A6NHR9_C 1856	SMCHD1 Structural maintenance of chromosomes flexible bin	4414
Q61S14_C 73	EIF5A1 Eukaryotic translation initiation factor 5A-	1715	Q9BW92_C 322	TARS2 Threonine-tRNA ligase, mitochondrial	4415

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P52907_C 157	CAPZA1 F-actin-capping protein subunit alpha-1	1716	P83916_C C156	CBX1 Chromobox protein homolog 1	4416
P78527_C 25	PRKDC DNA-dependent protein kinase catalytic subunit	1717	000410_C C229	IPOS Importin-5	4417
043592_C 650	XPOT Exportin-T	1718	Q5VUA4_C C1681	ZNF3 18 Zinc finger protein 318	4418
P49459_C 88	UBE2A Ubiquitin-conjugating enzyme E2 A	1719	Q96SY0_C C193	C15orf44 UPF0464 protein C15orf44	4419
Q9UEW8 C237	STK39 STE20/SPSI-related proline-alanine-rich protein ki	1720	Q9NS18_C C77	GLRX2 Glutaredoxin-2, mitochondrial	4420
Q92888_C 537	ARHGEF1 Rho guanine nucleotide exchange factor 1	1721	P46109_C C44	CRKL Crk-like protein	4421
P17812_C 362	CTPS1 CTP synthase 1	1722	Q14289_C C677	PTK2B Protein-tyrosine kinase 2-beta	4422
Q81Y67_C C255	RAVER1 Ribonucleoprotein PTB-binding 1	1723	Q14289_C C972	PTK2B Protein-tyrosine kinase 2-beta	4423
Q13547_C 408	HDAC1 Histone deacetylase 1	1724	075718_C C317	CRTAP Cartilage-associated protein	4424
P00505_C 106	GOT2 Aspartate aminotransferase, mitochondrial	1725	Q86Y37_C C94	CACUL1 CDK2-associated and ctilin domain-containing protein	4425
P35579_C 816	MYH9 Myosin-9	1726	PI6144_C C1553	ITGB4 Integrin beta-4	4426
000148_C 197	DDX39A ATP-dependent RNA helicase DDX39A	1727	Q9BY42_C C51	C20orf43 UPF0549 protein C20orf43	4427
Q14192_C 150	FHL2 Four and a half LIM domains protein 2	1728	Q8ND56_C C375	LSM14A Protein LSM14 homolog A	4428
Q14204_C 633	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	1729	P40121_C C165	CAPG Macrophage-capping protein	4429
P07814_C 1487	EPRS Bifunctional glutamate/proline-tRNA ligase	1730	P78347_C C745	GTF2I General transcription factor II-I	4430
P27816_C 1098	MAP4 Microtubule-associated protein 4	1731	P78347_C C903	GTF2I General transcription factor II-1	4431
P61586_C 107	RHOA Transforming protein RhoA	1732	PI6885_C C496	PLCG2 1-phosphatidylinositol4,5- bisphosphate phosphodiase	4432
Q08J23_C 673	NSUN2 tRNA (cytosine(34)- C(5))-methyltransferase	1733	Q9H814_C C87	PHAX Phosphorylated adapter RNA export protein	4433
P53041_C 77	PPP5C Serine/threonine- protein phosphatase 5	1734	P29401_C C41	TKT Transketolase	4434
043707_C 173	ACTN4 Alpha-actinin-4	1735	P35249_C C141	RFC4 Replication factor C subunit 4	4435
Q06210_C 55	GFPT1 Glucosamine- fructose-6-phosphate aminotransferase	1736	Q92835_C C956	INPP5D Phosphatidylinositol 3,4,5- trisphosphate 5-phosphatase	4436
P06400_C 853	RBI Retinoblastoma- associated protein	1737	Q9Y6E0_C C375	STK24 Serine/threonine-protein kinase 24	4437
Q9BUJ2_C C391	HNRNPUL1 Heterogeneous nuclear ribonucleoprotein U- like protein	1738	075380_C C87	NDUFS6 NADH dehydrogenase	4438
E7EVH7_C C286	KLC1 Kinesin light chain 1	1739	Q9Y4G6_C C1954	TLN2 Talin-2	4439
Q68CZ2_C	TNS3 Tensin-3	1740	Q9NYG5	ANAPCII Anaphase-promoting	4440

C1241			_C7	complex subunit 11	
Q9Y5Y2_C72	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	1741	Q9UPN3_C5131	MACF1 Microtubule-actin cross-linking factor I, isoforms	4441
PI1498_C850	PC Pyruvate carboxylase, mitochondrial	1742	P53634_C448	CTSC Dipeptidyl peptidase 1	4442
Q9BXS6_C256	NUSAP1 Nucleolar and spindle-associated protein 1	1743	Q96HA7_C830	TONSL Tonsoku-like protein	4443
P56192_C38	MARS Methionine-tRNA ligase, cytoplasmic	1744	A5YKK6_C677	CNOT1 CCR4-NOT transcription complex subunit 1	4444
P35914_C323	HMGCL Hydroxymethylglutaryl-CoA lyase, mitochondrial	1745	Q9BWU0_C125	SLC4A1AP Kanadaplin	4445
P00367_C172	GLUD1 Glutamate dehydrogenase 1, mitochondrial	1746	Q9BWU0_C730	SLC4A1AP Kanadaplin	4446
Q99873_C350	PRMT1 Protein arginine N-methyltransferase 1	1747	P40763_C718	STAT3 Signal transducer and activator of transcription 3	4447
P15170_C276	GSPT1 Eukaryotic peptide chain release factor GTP-binding	1748	Q96RU3_C555	FNBP1 Formin-binding protein 1	4448
Q13838_C165	DDX39B Spliceosome RNA helicase DDX39B	1749	Q96HS1_C168	PGAM5 Serine/threonine-protein phosphatase PGAM5, mitochondrial	4449
075369_C1617	FLNB Filamin-B	1750	Q6YN16_C136	HSDL2 Hydroxysteroid dehydrogenase-like protein 2	4450
Q96RU3_C609	FNBP1 Formin-binding protein 1	1751	P05067_C98	APP Amyloid beta A4 protein	4451
P16333_C266	NCK1 Cytoplasmic protein NCK1	1752	Q96RE7_C85	NACCI Nucleus accumbens-associated protein 1	4452
P35250_C88	RFC2 Replication factor C subunit 2	1753	P49959_C336	MRE11A Double-strand break repair protein MRE11A	4453
Q9BSD7_C184	NTPCR Cancer-related nucleoside-triphosphatase	1754	Q01813_C232	PFKP 6-phosphofructokinase type C	4454
P13489_C142	RNHI Ribonuclease inhibitor	1755	P49792_C348	RANBP2 E3 SUMO-protein ligase RanBP2	4455
P26639_C343	TARS Threonine-tRNA ligase, cytoplasmic	1756	P49792_C1296	RANBP2 E3 SUMO-protein ligase RanBP2	4456
P31153_C56	MAT2A S-adenosylmethionine synthase isoform type-2	1757	Q93008_C1566	USP9X Probable ubiquitin carboxyl-terminal hydrolase FAF	4457
P01591_C131	IGJ Immunoglobulin J chain	1758	Q9BY89_C817	KIAA1671 Uncharacterized protein KIAA1671	4458
P07858_C93	CTSB Cathepsin B	1759	Q5SRE5_C1445	NUP188 Nucleoporin NUP188 homolog	4459
P62191_C399	PSMC1 26S protease regulatory subunit 4	1760	Q92665_C356	MRPS31 28S ribosomal protein S31, mitochondrial	4460
P85037_C439	FOXK1 Forkhead box protein K1	1761	P18669_C55	PGAM1 Phosphoglycerate mutase 1	4461
Q96EY7_C642	PTCD3 Pentatricopeptide repeat-containing protein 3, mitochondrial	1762	Q9Y4P8_C70	WIPI2 WD repeat domain phosphoinositide-interacting protein	4462
P78417_C192	GSTO1 Glutathione S-transferase omega-1	1763	Q9Y4P1_C189	ATG4B Cysteine protease ATG4B	4463
075694_C704	NUP155 Nuclear pore complex protein Nup155	1764	Q9BZD4_C285	NUF2 Kinetochore protein Nuf2	4464

Q9NZD2_C36	GLTP Glycolipid transfer protein	1765	Q01581_C406	HMGCS1 Hydroxymethylglutaryl-CoA synthase, cytoplasmic	4465
Q9NR45_C287	NANS Sialic acid synthase	1766	P78344_C677	EIF4G2 Eukaryotic translation initiation factor 4 gamma 2	4466
P52788_C318	SMS Spermine synthase	1767	Q92609_C753	TBC1D5 TBC1 domain family member 5	4467
P52788_C337	SMS Spermine synthase	1768	Q9BSJ8_C890	ESYT1 Extended synaptotagmin-1	4468
P37837_C250	TALDOI Transaldolase	1769	P46013_C226	MKI67 Antigen KI-67	4469
Q9UBB4_C283	ATXN10 Ataxin-10	1770	P46013_C1373	MKI67 Antigen KI-67	4470
Q14204_C1888	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	1771	P46013_C1479	MKI67 Antigen KI-67	4471
P14866_C452	HNRNPL Heterogeneous nuclear ribonucleoprotein L	1772	P17858_C708	PFKL 6-phosphofructokinase, liver type	4472
P56537_C15	EDF6 Eukaryotic translation initiation factor 6	1773	Q96PK6_C31	RBM14 RNA-binding protein 14	4473
Q9Y5Y2_C54	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	1774	P53602_C133	MVD Diphosphomevalonate decarboxylase	4474
P28838_C445	LAP3 Cytosol aminopeptidase	1775	Q8WXH0_C1032	SYNE2 Nesprin-2	4475
P31350_C317	RRM2 Ribonucleoside-diphosphate reductase subunit M2	1776	Q14137_C108	BOP1 Ribosome biogenesis protein BOP1	4476
Q04637_C1384	EIF4G1 Eukaryotic translation initiation factor 4 gamma 1	1777	P23368_C481	ME2 NAD-dependent malic enzyme, mitochondrial	4477
P63167_C56	DYNLL1 Dynein light chain 1, cytoplasmic	1778	P51692_C688	STAT5B Signal transducer and activator of transcription 5	4478
Q86WR0_C83	CCDC25 Coiled-coil domain-containing protein 25	1779	Q8TD19_C890	NEK9 Serine/threonine-protein kinase Nek9	4479
P41227_C194	NAA10 N-alpha-acetyltransferase 10	1780	Q14008_C1113	CKAP5 Cytoskeleton-associated protein 5	4480
Q9BY42_C262	C20orf43 UPF0549 protein C20orf43	1781	Q14008_C1946	CKAP5 Cytoskeleton-associated protein 5	4481
Q9NVP2_C172	ASF1B Histone chaperone ASF1B	1782	Q9UJU6_C67	DBNL Drebrin-like protein	4482
Q8IZ07_C540	ANKRD13A Ankyrin repeat domain-containing protein 13A	1783	Q9UPQ0_C182	LIMCH1 LIM and calponin homology domains-containing protein	4483
Q8IUI8_C154	CRLF3 Cytokine receptor-like factor 3	1784	Q15424_C362	SAFB Scaffold attachment factor B1	4484
Q9H6S3_C543	EPS8L2 Epidermal growth factor receptor kinase substrate	1785	095757_C290	HSPA4L Heat shock 70 kDa protein 4L	4485
Q06124_C573	PTPN11 Tyrosine-protein phosphatase non-receptor type 11	1786	P21333_C623	FLNA Filamin-A	4486
P62829_C125	RPL23 60S ribosomal protein L23	1787	P51610_C326	HCFC1 Host cell factor 1	4487
P55769_C93	NHP2L1 NHP2-like protein 1	1788	Q9H6E5_C501	TUT1 Speckle targeted PIP5K1A-regulated poly(A) polymer	4488
Q15233_C208	NONO Non-POU domain-containing octamer-binding protein	1789	000154_CIOO	ACOT7 Cytosolic acyl coenzyme A thioester hydrolase	4489
Q13200_C459	PSMD2 26S proteasome non-ATPase regulatory subunit 2	1790	095347_C800	SMC2 Structural maintenance of chromosomes protein 2	4490

Q9ULZ2_C269	STAP1 Signal-transducing adaptor protein 1	1791	Q96SZ5_C239	ADO 2-aminoethanethiol dioxygenase	4491
P78527_C3403	PRKDC DNA-dependent protein kinase catalytic subunit	1792	P18615_C297	RDBP Negative elongation factor E	4492
Q9NZ63_C145	C9orf78 Uncharacterized protein C9orf78	1793	Q93034_C112	CUL5 Cullin-5	4493
P22234_C350	PAICS Multifunctional protein ADE2	1794	043913_C171	ORC5 Origin recognition complex subunit 5	4494
Q9NX46_C132	ADPRHL2 Poly(ADP-ribose) glycohydrolase ARH3	1795	PO1033_C189	TIMP1 Metalloproteinase inhibitor 1	4495
Q6PJT7_C261	ZC3H14 Zinc finger CCCH domain-containing protein 14	1796	Q92616_C1362	GCNLI Translational activator GCN1	4496
P52789_C909	HK2 Hexokinase-2	1797	Q92616_C1781	GCNLI Translational activator GCN1	4497
000148_C86	DDX39A ATP-dependent RNA helicase DDX39A	1798	Q99661_C154	KIF2C Kinesin-like protein KIF2C	4498
P48643_C302	CCT5 T-complex protein 1 subunit epsilon	1799	060701_C196	UGDH UDP-glucose 6-dehydrogenase	4499
Q9H6Z4_C203	RANBP3 Ran-binding protein 3	1800	Q9UH65_C279	SWAP70 Switch-associated protein 70	4500
P33991_C605	MCM4 DNA replication licensing factor MCM4	1801	Q96FS4_C446	SIP1 Signal-induced proliferation-associated protein 1	4501
Q13330_C229	MTA1 Metastasis-associated protein MTA1	1802	P49327_C1186	FASN Fatty acid synthase	4502
095630_C264	STAMBP STAM-binding protein	1803	P49327_C1759	FASN Fatty acid synthase	4503
P25786_C85	PSMA1 Proteasome subunit alpha type-1	1804	P49327_C2292	FASN Fatty acid synthase	4504
P42704_C1277	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	1805	Q05655_C280	PRKCD Protein kinase C delta type	4505
Q9NR50_C106	E1F2B3 Translation initiation factor eIF-2B subunit gamma	1806	Q05655_C344	PRKCD Protein kinase C delta type	4506
Q9H299_C71	SH3BGRL3 SH3 domain-binding glutamic acid-rich-like protein	1807	Q9BQE9_C189	BCL7B B-cell CLL/lymphoma 7 protein family member B	4507
Q32MZ4_C14	LRRFTP1 Leucine-rich repeat flightless-interacting protein	1808	Q8N1G0_C91	ZNF687 Zinc finger protein 687	4508
Q13619_C633	CUL4A Cvulin-4A	1809	PI3489_C45	RNH1 Ribonuclease inhibitor	4509
075832_C107	PSMD10 26S proteasome non-ATPase regulatory subunit 10	1810	P48444_C479	ARCN1 Coatomeer subunit delta	4510
075874_C379	IDH1 Isocitrate dehydrogenase	1811	Q96BN8_C129	FAM105B Protein FAM105B	4511
P04075_C178	ALDOA Fructose-bisphosphate aldolase A	1812	Q9UKU7_C159	ACAD8 Isobutyryl-CoA dehydrogenase, mitochondrial	4512
P34897_C412	SHMT2 Serine hydroxymethyltransferase, mitochondrial	1813	Q9H2L5_C249	RASSF4 Ras association domain-containing protein 4	4513
Q9Y490_C1939	TLN1 Talin-1	1814	Q12888_C1178	TP53BP1 Tumor suppressor p53-binding protein 1	4514
P26358_C896	DNMT1 DNA (cytosine-5)-methyltransferase 1	1815	P29034_C94	S100A2 Protein S100-A2	4515
P52701_C88	MSH6 DNA mismatch repair protein Msh6	1816	Q9UQ35_C785	SRRM2 Serine/arginine repetitive matrix protein 2	4516

Q96G03_C573	PGM2 Phosphoglucomutase-2	1817	000329_C474	PIK3CD Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic	4517
000410_C1078	IP05 Importin-5	1818	Q9Y2Y0_C149	ARL2BP ADP-ribosylation factor-like protein 2-bmding protein	4518
Q96FW1_C91	OTUB1 Ubiquitin thioesterase OTUB1	1819	015357_C1121	INPPL1 Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2	4519
P02545_C591	LMNA Prelamin-A/C	1820	Q99832_C345	CCT7 T-complex protein 1 subunit eta	4520
Q7Z5K2_C94	WAPAL Wings apart-like protein homolog	1821	Q9Y4D8_C1370	HECTD4 Probable E3 ubiquitin-protein ligase HECTD4	4521
075369_C991	FLNB Filamin-B	1822	Q6KC79_C419	NTPBL Nipped-B-like protein	4522
Q969T9_C80	WBP2 WW domain-binding protein 2	1823	P04179_C164	SOD2 Superoxide dismutase	4523
Q9H773_C162	DCTPP1 dCTP pyrophosphatase 1	1824	Q96RG2_C15	PASK PAS domain-containing serine/threonine-protein kinase	4524
Q15424_C225	SAFB Scaffold attachment factor B1	1825	Q14061_C24	COX17 Cytochrome c oxidase copper chaperone	4525
P07900_C529	HSP90AA1 Heat shock protein HSP 90-alpha	1826	Q96DC7_C14	TMC06 Transmembrane and coiled-coil domain-containing protein	4526
P23396_C134	RPS3 40S ribosomal protein S3	1827	P20248_C327	CCNA2 Cyclin-A2	4527
Q8N9N8_C89	EIF1AD Probable RNA-binding protein EIF1AD	1828	Q02878_C44	RPL6 60S ribosomal protein L6	4528
012888_C101	TP53BP1 Tumor suppressor p53-binding protein 1	1829	014773_C365	TPP1 Tripeptidyl-peptidase 1	4529
P61970_C114	NUTF2 Nuclear transport factor 2	1830	P61086_C92	UBE2K Ubiquitin-conjugating enzyme E2 K	4530
P18858_C895	LIG1 DNA ligase 1	1831	P31146_C332	CORO1A Coronin-1A	4531
P13639_C693	EEF2 Elongation factor 2	1832	09BR76_C153	CORO1B Coronin-1B	4532
Q7L5D6_C160	GET4 Golgi to ER traffic protein 4 homolog	1833	Q96QC0_C463	PPP1R10 Serine/threonine-protein phosphatase 1 regulatory	4533
P63104_C25	YWHAZ 14-3-3 protein zeta/delta	1834	Q5VT52_C1071	RPRD2 Regulation of nuclear pre-mRNA domain-containing p	4534
Q14676_C26	MDC1 Mediator of DNA damage checkpoint protein 1	1835	P78527_C373	PRKDC DNA-dependent protein kinase catalytic subunit	4535
Q15021_C596	NCAPD2 Condensin complex subunit 1	1836	Q96A35_C58	MRPL24 39S ribosomal protein L24, mitochondrial	4536
043815_C765	STRN Striatin	1837	Q14498_C303	RBM39 RNA-binding protein 39	4537
Q13310_C339	PABPC4 Polyadenylate-binding protein 4	1838	Q8N556_C157	AFAP1 Actin filament-associated protein 1	4538
P62241_C71	RPS8 40S ribosomal protein S8	1839	Q68CP9_C711	ARID2 AT-rich interactive domain-containing protein 2	4539
Q9Y263_C584	PLAA Phospholipase A-2-activating protein	1840	Q9H3U1_C663	UNC45 A Protein unc-45 homolog A	4540
095801_C238	TTC4 Tetratricopeptide repeat protein 4	1841	Q99567_C595	NUP88 Nuclear pore complex protein Nup88	4541
Q14192_C254	FHL2 Four and a half LIM domains protein 2	1842	Q14789_C1713	GOLGB1 Golgin subfamily B member 1	4542
Q92841_C584	DDX17 Probable ATP-dependent RNA helicase DDX17	1843	P20810_C661	CAST Calpastatin	4543

P07814_C 1148	EPRS Bifunctional glutamate/proline-tRNA ligase	1844	P07203 CI15	GPX1 Glutathione peroxidase 1	4544
P61586_C 159	RHOA Transforming protein RhoA	1845	060216 C35	RAD21 Double-strand-break repair protein rad21 homolog	4545
Q08J23_C 221	NSUN2 tRNA (cytosine(34)- C(5))-methyltransferase	1846	060216 C513	RAD21 Double-strand-break repair protein rad21 homolog	4546
Q9UER7 C699	DAXX Death domain- associated protein 6	1847	Q9ULV4 C190	COROIC Coronin-1C	4547
P05161_C 78	ISG15 Ubiquitin-like protein ISG15	1848	P30153 C174	PPP2R1A Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A	4548
P07741_C 140	APRT Adenine phosphoribosyltransferase	1849	P30153 C329	PPP2R1A Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A	4549
P08238_C 412	HSP90AB1 Heat shock protein HSP 90-beta	1850	Q9UEW8 C99	STK39 STE20/SPS1-related proline- alanine-rich protein kinase	4550
P53597_C 60	SUCLG1 Succinyl-CoA ligase	1851	Q13574 C265	DGKZ Diacylglycerol kinase zeta	4551
Q9UPY8 C182	MAPRE3 Microtubule- associated protein RP/EB family member	1852	000233 C216	PSMD9 26S proteasome non-ATPase regulatory subunit 9	4552
P61247_C 139	RPS3A 40S ribosomal protein S3a	1853	P05023 C705	ATPIA1 Sodium/potassium- transporting ATPase subunit alpha	4553
Q9Y2L1 C799	DIS3 Exosome complex exonuclease RRP44	1854	P45985 C266	MAP2K4 Dual specificity mitogen- activated protein kinase	4554
P23921_C 352	RRM1 Ribonucleoside- diphosphate reductase large subunit	1855	P45983 C245	MAPK8 Mitogen-activated protein kinase 8	4555
P07954_C 333	FH Fumarate hydratase, mitochondrial	1856	Q9P2R7 C320	SUCLA2 Succinyl-CoA ligase	4556
000429_C 361	DNM1L Dynamin-1-like protein	1857	P31040 C89	SDHA Succinate dehydrogenase	4557
P00491_C 31	PNP Purine nucleoside phosphorylase	1858	076071 C234	CIAO1 Probable cytosolic iron-sulfur protein assembly protein CIAO1	4558
P61927_C 37	RPL37 60S ribosomal protein L37	1859	095372 C56	LYPLA2 Acyl-protein thioesterase 2	4559
Q16543_C 336	CDC37 Hsp90 co-chaperone Cdc37	1860	Q04864 C524	REL Proto-oncogene c-Rel	4560
P49753_C 401	ACOT2 Acyl-coenzyme A thioesterase 2, mitochondrial	1861	Q96CD2 C173	PPCDC Phosphopantothencysteine decarboxylase	4561
Q9BSH4 C256	TACO1 Translational activator of cytochrome c oxidase 1	1862	A6NC98 C1222	CCDC88B Coiled-coil domain- containing protein 88B	4562
P43686_C 379	PSMC4 26S protease regulatory subunit 6B	1863	Q10570 C1020	CPSF1 Cleavage and polyadenylation specificity factor subunit 1	4563
075717_C 285	WDHD1 WD repeat and HMG-box DNA-binding protein 1	1864	P43378 C506	PTPN9 Tyrosine-protein phosphatase non-receptor type 9	4564
P36776_C 520	LONP1 Lon protease homolog, mitochondrial	1865	Q15021 C816	NCAPD2 Condensin complex subunit 1	4565
P36776_C 637	LONP1 Lon protease homolog, mitochondria]	1866	Q8TEW0 C6	PARD3 Partitioning defective 3 homolog	4566
Q16666_C 637	IFI16 Gamma-interferon- inducible protein 16	1867	094925 C500	GLS Glutaminase kidney isoform, mitochondrial	4567

Q92619_C 1020	HMHA1 Minor histocompatibility protein HA-1	1868	Q9Y3B8_C CI37	REX02 Oligoribonuclease, mitochondrial	4568
Q9P289_C C77	MST4 Serine/threonine-protein kinase MST4	1869	Q96LD4_C C347	TRIM47 Tripartite motif-containing protein 47	4569
H3BVE0_C C63	Uncharacterized protein	1870	Q9H081_C C104	MIS12 Protein MIS12 homolog	4570
P60891_C 91	PRPS1 Ribose-phosphate pyrophosphokinase 1	1871	P54687_C C293	BCAT1 Branched-chain-amino-acid aminotransferase, cytosol	4571
Q01813_C 343	PFKP 6-phosphofructokinase typeC	1872	Q8WUM 4 C524	PDCD6IP Programmed cell death 6-interacting protein	4572
P04632_C 144	CAPNS1 Calpain small subunit 1	1873	Q8WUM 4 C691	PDCD6IP Programmed cell death 6-interacting protein	4573
Q7Z6Z7_C C790	HUWE1 E3 ubiquitin-protein ligase HUWE1	1874	Q9H9A7_C C366	RMI1 RecQ-mediated genome instability protein 1	4574
014933_C 102	UBE2L6 Ubiquitin/ISG15-conjugating enzyme E2 L6	1875	Q13315_C C2021	ATM Serine-protein kinase ATM	4575
Q8WUA4_C C212	GTF3C2 General transcription factor 3C polypeptide 2	1876	P11766_C C174	ADH5 Alcohol dehydrogenase class-3	4576
Q9UJU6_C C127	DBNL Drebrin-like protein	1877	Q96EI5_C C34	TCEAL4 Transcription elongation factor A protein-like 4	4577
P21333_C 2199	FLNA Filamin-A	1878	Q9NR45_C C184	NANS Sialic acid synthase	4578
P45880_C 47	VDAC2 Voltage-dependent anion-selective channel protein	1879	Q13542_C C35	EIF4EBP2 Eukaryotic translation initiation factor 4E-binding	4579
P23396_C 119	RPS3 40S ribosomal protein S3	1880	Q13547_C C151	HDAC1 Histone deacetylase 1	4580
P13489_C 30	RNH1 Ribonuclease inhibitor	1881	Q8NF50_C C939	DOCK8 Deducator of cytokinesis protein 8	4581
P17676_C 248	CEBPB CCAAT/enhancer-binding protein beta	1882	P09110_C C218	ACAA1 3-ketoacyl-CoA thiolase, peroxisomal	4582
Q92974_C 478	ARHGEF2 Rho guanine nucleotide exchange factor 2	1883	060841_C C749	EDF5B Eukaryotic translation initiation factor 5B	4583
075995_C 351	SASH3 SAM and SH3 domain-containing protein 3	1884	Q15306_C C223	IRF4 Interferon regulatory factor 4	4584
P61978_C 184	HNRNPK Heterogeneous nuclear ribonucleoprotein K	1885	Q96S59_C C513	RANBP9 Ran-binding protein 9	4585
Q15149_C 3295	PLEC Plectin	1886	060443_C C180	DFNA5 Non-syndromic hearing impairment protein 5	4586
PI1142_C 574	HSPA8 Heat shock cognate 71 kDa protein	1887	P08240_C C621	SRPR Signal recognition particle receptor subunit alpha	4587
P21964_C 223	COMT Catechol O-methyltransferase	1888	Q9NRR5_C C29	UBQLN4 Ubiquilin-4	4588
Q96TA1_C C466	FAM129B Niban-like protein 1	1889	Q92769_C C274	HDAC2 Histone deacetylase 2	4589
Q9NVG8_C C145	TBC1D13 TBC1 domain family member 13	1890	043823_C C85	AKAP8 A-kinase anchor protein 8	4590
Q96EV2_C C726	RBM33 RNA-binding protein 33	1891	Q9Y3C7_C C93	MED3 1 Mediator of RNA polymerase II transcription subunit	4591
P00505_C 295	GOT2 Aspartate aminotransferase, mitochondrial	1892	Q7Z7A3_C C210	CTU1 Cytoplasmic tRNA 2-thiolation protein 1	4592
Q92945_C 436	KHSRP Far upstream element-binding protein 2	1893	Q14696_C C180	MESDC2 LDLR chaperone MESD	4593

P46734_C 227	MAP2K3 Dual specificity mitogen-activated protein kinase	1894	P19367_ C628	HK1 Hexokinase-1	4594
P68104_C 370	EEF1A1 Elongation factor 1- alpha 1	1895	Q13557_ C373	CAMK2D Calcium/calmodulin- dependent protein kinase type I	4595
Q14204_C 4216	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	1896	Q9HB71_ C154	CACYBP Calyculin-binding protein	4596
P55060_C 939	CSEIL Exportin-2	1897	000148_ C299	DDX39A ATP-dependent RNA helicase DDX39A	4597
Q8WYJ6_ C293	SEPT1 Septin-1	1898	Q9BW19 C509	KIFC1 Kinesin-like protein KEFC1	4598
Q04760_C 61	GLO1 Lactoylglutathione lyase	1899	P48643_ C440	CCT5 T-complex protein 1 subunit epsilon	4599
P54105_C 73	CLNS1A Methylosome subunit pICln	1900	Q03164_ C2841	MLL Histone-lysine N- methyltransferase MLL	4600
Q99439_C 274	CNN2 Calponin-2	1901	Q9H0L4_ C441	CSTF2T Cleavage stimulation factor subunit 2 tau variant	4601
Q15054_C 137	POLD3 DNA polymerase delta subunit 3	1902	P51553_ C148	IDH3G Isocitrate dehydrogenase	4602
Q14232_C 169	EIF2B1 Translation initiation factor eIF-2B subunit alpha	1903	Q9Y678_ C813	COPG1 Coatomer subunit gamma- 1	4603
Q8TB45_ C284	DEPTOR DEP domain- containing mTOR-interacting protein	1904	Q9UBB4 _C405	ATXN10 Ataxin-10	4604
P18031_C 92	PTPNI Tyrosine-protein phosphatase non-receptor type 1	1905	Q9C0C2_ C1114	TNKS1BP1 182 kDa tankyrase-1- binding protein	4605
060343_C 74	TBC1D4 TBC1 domain family member 4	1906	Q9C0C2_ C1175	TNKS1BP1 182 kDa tankyrase-1- binding protein	4606
Q9NQW6 C353	ANLN Actin-binding protein anillin	1907	P09651_ C43	HNRNPA1 Heterogeneous nuclear ribonucleoprotein A1	4607
Q86U90_ C99	YRDC YrdC domain- containing protein, mitochondrial	1908	Q96R06_ C307	SPAG5 Sperm-associated antigen 5	4608
Q9Y3D2_ C45	MSRB2 Methionine-R- sulfoxide reductase B2, mitochondrial	1909	Q8NFB8 _C380	REPS2 RalBP1 -associated Eps domain- containing protein 2	4609
Q9P258_ C144	RCC2 Protein RCC2	1910	Q14204_ C3325	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	4610
P56192_C 441	MARS Methionine-tRNA ligase, cytoplasmic	1911	Q14204_ C4121	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	4611
P31751_C 311	AKT2 RAC-beta serine/threonine-protein kinase	1912	075643_ C502	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicas	4612
000410_C 915	IP05 Importin-5	1913	075643_ C516	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicas	4613
Q53ET0_ C515	CRTC2 CREB-regulated transcription coactivator 2	1914	Q13085_ C1297	ACACA Acetyl-CoA carboxylase 1	4614
P29401_C 417	TKT Transketolase	1915	P04049_ C27	RAF1 RAF proto-oncogene serine/threonine-protein kinase	4615
Q9UPN9_ C461	TRIM33 E3 ubiquitin-protein ligase TRIM33	1916	Q53T59_ C287	HS1BP3 HCLS1-binding protein 3	4616
P16152_C 227	CBR1 Carbonyl reductase	1917	P60468_ C39	SEC61B Protein transport protein Sec61 subunit beta	4617
P49419_C 478	ALDH7A1 Alpha-aminoadipic semialdehyde dehydrogenase	1918	Q15019_ C114	SEPT2 Septin-2	4618

Q9BX40_C310	LSM14B Protein LSM14 homolog B	1919	Q15643_C1299	TRIP11 Thyroid receptor-interacting protein 11	4619
Q93009_C315	USP7 Ubiquitin carboxyl-terminal hydrolase 7	1920	Q13541_C62	EIF4EBP1 Eukaryotic translation initiation factor 4E-binding	4620
Q9POL0_C60	VAPA Vesicle-associated membrane protein-associated protein A	1921	Q9HD42_C44	CHMP1A Charged multivesicular body protein 1a	4621
Q9Y617_C291	PSATI Phosphoserine aminotransferase	1922	015371_C327	EIF3D Eukaryotic translation initiation factor 3 subunit	4622
Q5U5X0_C97	LYRM7 LYR motif-containing protein 7	1923	Q06187_C337	BTK Tyrosine-protein kinase BTK	4623
075390_C101	CS Citrate synthase, mitochondrial	1924	P55060_C344	CSE1L Exportin-2	4624
P53602_C386	MVD Diphosphomevalonate decarboxylase	1925	Q8IUD2_C110	ERC1 ELKS/Rab6-interacting/CAST family member 1	4625
P60953_C157	CDC42 Cell division control protein 42 homolog	1926	Q9UBE0_C342	SAE1 SUMO-activating enzyme subunit 1	4626
P09936_C47	UCHL1 Ubiquitin carboxyl-terminal hydrolase isozyme L1	1927	Q13459_C2028	MY09B Unconventional myosin-IXb	4627
P21333_C1018	FLNA Filamin-A	1928	P41236_C86	PPP1R2 Protein phosphatase inhibitor 2	4628
000267_C740	SUPT5H Transcription elongation factor SPT5	1929	Q6IA86_C746	ELP2 Elongator complex protein 2	4629
P42166_C518	TMPO Lamina-associated polypeptide 2, isoform alpha	1930	075815_C449	BCAR3 Breast cancer anti-estrogen resistance protein 3	4630
P41091_C105	EIF2S3 Eukaryotic translation initiation factor 2 subunit	1931	Q08J23_C599	NSUN2 tRNA (cytosine(34)-C(5))-methyltransferase	4631
Q92973_C297	TNPO1 Transportin-1	1932	015231_C466	ZNF185 Zinc finger protein 185	4632
Q15149_C3336	PLEC Plectin	1933	Q8TF05_C566	PPP4R1 Serine/threonine-protein phosphatase 4 regulatory	4633
P22314_C278	UBA1 Ubiquitin-like modifier-activating enzyme 1	1934	Q86VQ1_C151	GLCCI1 Glucocorticoid-induced transcript 1 protein	4634
P38117_C42	ETFB Electron transfer flavoprotein subunit beta	1935	Q66K14_C839	TBC1D9B TBC1 domain family member 9B	4635
P62316_C46	SNRPD2 Small nuclear ribonucleoprotein Sm D2	1936	075676_C257	RPS6KA4 Ribosomal protein S6 kinase alpha-4	4636
P48735_C154	IDH2 Isocitrate dehydrogenase	1937	Q01082_C2227	SPTBN1 Spectrin beta chain, non-erythrocytic 1	4637
000151_C45	PDLIM1 PDZ and LIM domain protein 1	1938	P61812_C89	TGFB2 Transforming growth factor beta-2	4638
Q8IUD2_C258	ERC1 ELKS/Rab6-interacting/CAST family member 1	1939	P42704_C927	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	4639
P55210_C186	CASP7 Caspase-7	1940	Q02218_C604	OGDH 2-oxoglutarate dehydrogenase, mitochondrial	4640
Q9BY77_C338	POLDIP3 Polymerase delta-interacting protein 3	1941	Q99594_C368	TEAD3 Transcriptional enhancer factor TEF-5	4641
Q13501_C131	SQSTM1 Sequestosome-1	1942	P42858_C1961	HTT Huntingtin	4642
Q96ST2_C749	IWS1 Protein IWS1 homolog	1943	P42858_C2971	HTT Huntingtin	4643
P41250_C180	GARS Glycine-tRNA ligase	1944	P82675_C211	MRPS5 28S ribosomal protein S5, mitochondrial	4644

Q96EB6_C67	SIRT1 NAD-dependent protein deacetylase sirtuin-1	1945	P21291_C25	CSRP1 Cysteine and glycine-rich protein 1	4645
P23921_C492	RRM1 Ribonucleoside-diphosphate reductase large subunit	1946	043447_C131	PPIH Peptidyl-prolyl cis-trans isomerase H	4646
Q53H96_C235	PYCR1 Pyroline-5-carboxylate reductase 3	1947	Q9UBR2_C132	CTSZ Cathepsin Z	4647
B9A064_C213	IGLL5 Immunoglobulin lambda-like polypeptide 5	1948	P31939_C101	ATIC Bifunctional purine biosynthesis protein PURH	4648
P49588_C947	AARS Alanine-tRNA ligase, cytoplasmic	1949	Q9P2E9_C1128	RRBP1 Ribosome-binding protein 1	4649
P25398_C56	RPS12 40S ribosomal protein S12	1950	Q9NWU1_C209	OXSM 3-oxoacyl-ACP synthase, mitochondria]	4650
P28066_C165	PSMA5 Proteasome subunit alpha type-5	1951	095059_C78	RPP14 Ribonuclease P protein subunit p14	4651
P46937_C343	YAP1 Yorkie homolog	1952	P51570_C322	GALK1 Galactokinase	4652
Q16836_C211	HADH Hydroxyacyl-coenzyme A dehydrogenase, mitochondrial	1953	P28340_C1076	POLD1 DNA polymerase delta catalytic subunit	4653
P30626_C57	SRI Sorcin	1954	Q7Z5L9_C555	IRF2BP2 Interferon regulatory factor 2-binding protein 2	4654
P49023_C108	PXN Paxillin	1955	P54886_C161	ALDH18A1 Delta-1-pyrroline-5-carboxylate synthase	4655
P35270_C159	SPR Sepiapterin reductase	1956	PI7987_C236	TCPI T-complex protein 1 subunit alpha	4656
P02545_C588	LMNA Prclamin-A/C	1957	043143_C774	DHX15 Putative pre-mRNA-splicing factor ATP-dependent RN	4657
P08621_C39	SNRNP70 U1 small nuclear ribonucleoprotein 70 kDa	1958	P67775_C251	PPP2CA Serine/threonine-protein phosphatase 2A catalytic	4658
Q14566_C91	MCM6 DNA replication licensing factor MCM6	1959	Q92667_C102	AKAP1 A-kinase anchor protein 1, mitochondrial	4659
Q14103_C226	HNRNPD Heterogeneous nuclear ribonucleoprotein D0	1960	Q99615_C116	DNAJC7 DnaJ homolog subfamily C member 7	4660
P26641_C194	EEF1G Elongation factor 1-gamma	1961	P04062_C165	GBA Glucosylceramidase	4661
Q9UK41_C128	VPS28 Vacuolar protein sorting-associated protein 28 homolog	1962	Q96P11_C308	NSUN5 Putative methyltransferase NSUN5	4662
Q9BQ52_C44I	ELAC2 Zinc phosphodiesterase ELAC protein 2	1963	Q86X02_C160	CDR2L Cerebellar degeneration-related protein 2-like	4663
P04632_C232	CAPNS1 Calpain small subunit 1	1964	P16035_C159	TIMP2 Metalloproteinase inhibitor 2	4664
P09936_C90	UCHL1 Ubiquitin carboxyl-terminal hydrolase isozyme L1	1965	Q52LW3_C793	ARHGAP29 Rho GTPase-activating protein 29	4665
P21333_C1912	FLNA Filamin-A	1966	H3BQZ7_C538	Uncharacterized protein	4666
P30566_C340	ADSL Adenylosuccinate lyase	1967	Q9BQ90_C213	KLHDC3 Kelch domain-containing protein 3	4667
095983_C215	MBD3 Methyl-CpG-binding domain protein 3	1968	P13797_C167	PLS3 Plastin-3	4668
P40925_C251	MDH1 Malate dehydrogenase, cytoplasmic	1969	Q06210_C620	GFPT1 Glucosamine--fructose-6-phosphate aminotransferase	4669

P78417_C 90	GSTO1 Glutathione S-transferase omega-1	1970	Q7L576_C98	CYFIP1 Cytoplasmic FMR1-interacting protein 1	4670
P17655_C 82	CAPN2 Calpain-2 catalytic subunit	1971	Q7L576_C1241	CYFIP1 Cytoplasmic FMR1-interacting protein 1	4671
075688_C 172	PPM1B Protein phosphatase 1B	1972	Q03001_C5056	DST Dystonin	4672
Q09666_C 2806	AHNAK Neuroblast differentiation-associated protein AHNAK	1973	Q03001_C5394	DST Dystonin	4673
P62140_C 126	PPP1CB Serine/threonine-protein phosphatase PP1-beta catalytic	1974	Q9UFW8_C92	CGGBP1 CGG triplet repeat-binding protein 1	4674
P54687_C 8	BCAT1 Branched-chain-amino-acid aminotransferase, cytosol	1975	P49721_C163	PSMB2 Proteasome subunit beta type-2	4675
060934_C 487	NBN Nibrin	1976	Q96151_C329	WBSR16 Williams-Beuren syndrome chromosomal region 16 protein	4676
Q9NZT2_C 443	OPGR Opioid growth factor receptor	1977	060884_C280	DNAJA2 DnaJ homolog subfamily A member 2	4677
P52789_C 834	HK2 Hexokinase-2	1978	060884_C308	DNAJA2 DnaJ homolog subfamily A member 2	4678
P35579_C 671	MYH9 Myosin-9	1979	Q9BV19_C189	C1orf50 Uncharacterized protein Clorf50	4679
Q9HAV7_C 108	GRPEL1 GrpE protein homolog 1, mitochondrial	1980	P29353_C248	SHC1 SHC-transforming protein 1	4680
043175_C 18	PHGDH D-3-phosphoglycerate dehydrogenase	1981	Q7Z4Q2_C57	HEATR3 HEAT repeat-containing protein 3	4681
043175_C 295	PHGDH D-3-phosphoglycerate dehydrogenase	1982	075376_C2403	NCOR1 Nuclear receptor corepressor 1	4682
P12004_C 162	PCNA Proliferating cell nuclear antigen	1983	Q9Y6A5_C293	TACC3 Transforming acidic coiled-coil-containing protein	4683
075531_C 85	BANF1 Barrier-to-autointegration factor	1984	P31323_C149	PRKAR2B cAMP-dependent protein kinase type II-beta regulatory subunit beta	4684
P46940_C 494	IQGAP1 RasGTPase-activating-like protein IQGAP1	1985	Q15120_C41	PDK3	4685
PI1586_C 195	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	1986	P05455_C18	SSB Lupus La protein	4686
Q7Z5L9_C 65	IRF2BP2 Interferon regulatory factor 2-binding protein 2	1987	Q08257_C166	CRYZ Quinone oxidoreductase	4687
Q9Y5K6_C 595	CD2AP CD2-associated protein	1988	P54278_C216	PMS2 Mismatch repair endonuclease PMS2	4688
Q9Y5L0_C 511	TNPO3 Transportin-3	1989	P05534_C363	HLA-A HLA class I histocompatibility antigen, A-24 alpha	4689
Q9NZN4_C 138	EHD2 EH domain-containing protein 2	1990	Q96P16_C100	RPRD1 A Regulation of nuclear pre-mRNA domain-containing protein	4690
Q13813_C 2233	SPTAN1 Spectrin alpha chain, non-erythrocytic 1	1991	Q9NWK9_C211	ZNHIT6 Box C/D snoRNA protein 1	4691
P62910_C 91	RPL32 60S ribosomal protein L32	1992	Q9BZF9_C408	UACA Uveal autoantigen with coiled-coil domains and ankyrin repeats	4692
076003_C 229	GLRX3 Glutaredoxin-3	1993	P57081_C412	WDR4 tRNA (guanine-N(7)-methyltransferase subunit WDR4	4693

P08559_C 181	PDHA1 Pyruvate dehydrogenase E1 component subunit alpha,	1994	Q9H4L7_C861	SMARCAD1 SWI/SNF-related matrix-associated actin-dependent	4694
P42126_C 173	ECU Enoyl-CoA delta isomerase 1, mitochondrial	1995	Q14149_C671	MORC3 MORC family CW-type zinc finger protein 3	4695
P84103_C 6	SRSF3 Serine/arginine-rich splicing factor 3	1996	Q8WUA7_C151	TBC1D22A TBC1 domain family member 22A	4696
Q14566_C 540	MCM6 DNA replication licensing factor MCM6	1997	Q2T9J0_C284	TYSND1 Peroxisomal leader peptide-processing protease	4697
P21980_C 290	TGM2 Protein-glutamine gamma-glutamyltransferase 2	1998	Q96C86_C37	DCPS mJGpppX diphosphatase	4698
075391_C 191	SPAG7 Sperm-associated antigen 7	1999	P30084_C143	ECHS1 Enoyl-CoA hydratase, mitochondrial	4699
P31943_C 22	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	2000	Q29RF7_C1093	PDS5A Sister chromatid cohesion protein PDS5 homolog A	4700
P31943_C 290	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	2001	015111_C30	CHUK Inhibitor of nuclear factor kappa-B kinase subunit	4701
095347_C 132	SMC2 Structural maintenance of chromosomes protein 2	2002	Q9H7B4_C238	SMYD3 SET and MYND domain-containing protein 3	4702
095983_C 172	MBD3 Methyl-CpG-binding domain protein 3	2003	Q8TDX7_C53	NEK7 Serine/threonine-protein kinase Nek7	4703
P49321_C 788	NASP Nuclear autoantigenic sperm protein	2004	Q8TDX7_C298	NEK7 Serine/threonine-protein kinase Nek7	4704
P13489_C 96	RNH1 Ribonuclease inhibitor	2005	Q86W56_C155	PARG Poly(ADP-ribose) glycohydrolase	4705
Q86V48_C C969	LUZP1 Leucine zipper protein 1	2006	P43246_C199	MSH2 DNA mismatch repair protein Msh2	4706
Q14240_C 135	EIF4A2 Eukaryotic initiation factor 4A-II	2007	P28702_C340	RXRβ Retinoic acid receptor RXR-beta	4707
P22307_C 71	SCP2 Non-specific lipid-transfer protein	2008	Q13283_C73	G3BP1 Ras GTPase-activating protein-binding protein 1	4708
Q9Y3B4_C C83	SF3B14 Pre-mRNA branch site protein p14	2009	075608_C173	LYPLA1 Acyl-protein thioesterase 1	4709
Q8WUM4_C C512	PDCD6IP Programmed cell death 6-interacting protein	2010	P23497_C248	SP100 Nuclear autoantigen Sp-100	4710
Q8IXH7_C C293	TH1L Negative elongation factor C/D	2011	Q8WX92_C115	COBRA1 Negative elongation factor B	4711
Q15003_C 296	NCAPH Condensin complex subunit 2	2012	075044_C820	SRGAP2 SLIT-ROBO Rho GTPase-activating protein 2	4712
Q9C0B1_C C171	FTO Alpha-ketoglutarate-dependent dioxygenase FTO	2013	Q13464_C1206	ROCK1 Rho-associated protein kinase 1	4713
Q8WXI9_C C308	GATAD2B Transcriptional repressor p66-beta	2014	096013_C58	PAK4 Serine/threonine-protein kinase PAK 4	4714
P07814_C 856	EPRS Bifunctional glutamate/proline-tRNA ligase	2015	P15056_C748	BRAF Serine/threonine-protein kinase B-raf	4715
P22102_C 134	GART Trifunctional purine biosynthetic protein adenosin	2016	Q16762_C248	TST Thiosulfate sulfurtransferase	4716
Q13425_C 374	SNTB2 Beta-2-syntrophin	2017	P05198_C218	EIF2S1 Eukaryotic translation initiation factor 2 subunit	4717
Q04760_C 139	GLO1 Lactoylglutathione lyase	2018	P15374_C209	UCHL3 Ubiquitin carboxyl-terminal hydrolase isozyme L3	4718
P25789_C 163	PSMA4 Proteasome subunit alpha type-4	2019	Q9NZN4_C356	EHD2 EH domain-containing protein 2	4719

P07355_C 262	ANXA2 Annexin A2	2020	Q9NZN8 C175	CNOT2 CCR4-NOT transcription complex subunit 2	4720
P53597_C 172	SUCLG1 Succinyl-CoA ligase	2021	P52294_ C529	KPNA1 Importin subunit alpha- 1	4721
P26368_C 429	U2AF2 Splicing factor U2AF 65 kDa subunit	2022	076003_ C46	GLRX3 Glutaredoxin-3	4722
Q05086_C 83	UBE3A Ubiquitin-protein ligase E3A	2023	P35914_ C307	HMGCL Hydroxymethylglutaryl-CoA lyase, mitochondrial	4723
000170_C 208	AIP AH receptor-interacting protein	2024	Q00796_ C179	SORD Sorbitol dehydrogenase	4724
P31323_C 116	PRKAR2B cAMP-dependent protein kinase type II-beta regulat	2025	P27797_ C105	CALR Calreticulin	4725
Q8WW33 C51	GTSF1 Gametocyte-specific factor 1	2026	Q969E4_ C44	TCEAL3 Transcription elongation factor A protein-like 3	4726
Q9Y5Y2_ C196	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	2027	Q7KZF4_ C152	SNDI Staphylococcal nuclease domain- containing protein	4727
095456_C 169	PSMG1 Proteasome assembly chaperone 1	2028	Q9P1U0_ C78	ZNRDI DNA-directed RNA polymerase I subunit RPA12	4728
P13796_C 618	LCPI1 Plastin-2	2029	Q8WZ82 C152	OVCA2 Ovarian cancer-associated gene 2 protein	4729
P23921_C 779	RRM1 Ribonucleoside- diphosphate reductase large subunit	2030	Q9NPD3 _C97	EXOSC4 Exosome complex component RRP41	4730
P31689_C 149	DNAJ1 DnaJ homolog subfamily A member 1	2031	P52701_ C1294	MSH6 DNA mismatch repair protein Msh6	4731
Q9Y490_ C1045	TLN1 Talin-1	2032	P52701_ C1337	MSH6 DNA mismatch repair protein Msh6	4732
Q9UGI8_ C196	TES Testin	2033	Q15637_ C279	SF1 Splicing factor 1	4733
P54136_C 369	RARS Arginine-tRNA ligase, cytoplasmic	2034	P49366_ C177	DHPS Deoxyhypusine synthase	4734
P47756_C 62	CAPZB F-actin-capping protein subunit beta	2035	Q96PQ7_ C677	KLHL5 Kelch-like protein 5	4735
P47897_C 657	QARS Glutamine--tRNA ligase	2036	095785_ C1429	WIZ Protein Wiz	4736
P56192_C 12	MARS Methionine--tRNA ligase, cytoplasmic	2037	P49756_ C795	RBM25 RNA-binding protein 25	4737
Q9Y570_ C312	PPME1 Protein phosphatase methyltransferase 1	2038	P49591_ C398	SARS Serine-tRNA ligase, cytoplasmic	4738
Q7L4I2_C 382	RSRC2 Arginine/serine-rich coiled-coil protein 2	2039	P31751_ C77	AKT2 RAC-beta serine/threonine- protein kinase	4739
Q13496_C 53	MTM1 Myomalarin	2040	Q9Y2X3 C205	NOP58 Nucleolar protein 58	4740
015460_C 510	P4HA2 Prolyl 4-hydroxylase subunit alpha-2	2041	Q8IZ21_ C568	PHACTR4 Phosphatase and actin regulator 4	4741
P00558_C 99	PGK1 Phosphoglycerate kinase 1	2042	000410_ C266	IP05 Importin-5	4742
P05412_C 99	JUN Transcription factor AP-1	2043	095861_ C249	BPNT1 3(2),5-bisphosphate nucleotidase 1	4743
Q9H3R5_ C35	CENPH Centromere protein H	2044	Q9NTK5 C75	OLA1 Obg-like ATPase 1	4744
Q02543_C 16	RPL18A 60S ribosomal protein L18a	2045	P60228_ C141	EIF3E Eukaryotic translation initiation factor 3 subunit	4745

Q06587_C 69	RING1 E3 ubiquitin-protein ligase RING1	2046	Q05048_ C44	CSTF1 Cleavage stimulation factor subunit 1	4746
Q15365_C 163	PCBP1 Poly(rC)-binding protein 1	2047	P41229_ C1551	KDM5C Lysine-specific demethylase 5C	4747
075369_C 660	FLNB Filamin-B	2048	Q9NZ09_ C161	UBAP1 Ubiquitin-associated protein 1	4748
075369_C 2537	FLNB Filamin-B	2049	Q9H4A4 C151	RNPEP Aminopeptidase B	4749
Q5RKV6_ C117	EXOSC6 Exosome complex component MTR3	2050	Q99704_ C308	DOK1 Docking protein 1	4750
015067_C 606	PFAS Phosphoribosylformylglycine midase synthase	2051	Q16531_ C128	DDB1 DNA damage-binding protein 1	4751
Q9HB19_ C191	PLEKHA2 Pleckstrin homology domain-containing family A member 2	2052	043294_ C91	TGFB1I1 Transforming growth factor beta-1-induced transcript 1	4752
Q8WVV9_ C84	HNRPLL Heterogeneous nuclear ribonucleoprotein L- like	2053	P28482_ C65	MAPK1 Mitogen-activated protein kinase 1	4753
095400_C 234	CD2BP2 CD2 antigen cytoplasmic tail-binding protein 2	2054	P36578_ C250	RPL4 60S ribosomal protein L4	4754
094804_C 947	STK10 Serine/threonine- protein kinase 10	2055	Q9Y5N6 C88	ORC6 Origin recognition complex subunit 6	4755
Q5TBB1_ C56	RNASEH2B Ribonuclease H2 subunit B	2056	P62487_ C106	POLR2G DNA-directed RNA polymerase II subunit RPB7	4756
Q96GW9_ C425	MARS2 Methionine-tRNA ligase, mitochondrial	2057	000139_ C406	KIF2A Kinesin-like protein KIF2A	4757
P82912_C 112	MRPS11 28S ribosomal protein S11, mitochondrial	2058	P21266_ C119	GSTM3 Glutathione S-transferase Mu 3	4758
Q16643_C 613	DBN1 Drebrin	2059	000622_ C78	CYR61 Protein CYR61	4759
Q9UPQ0_ C577	LIMCH1 LIM and calponin homology domains-containing prote	2060	000622_ C117	CYR61 Protein CYR61	4760
P21333_C 1453	FLNA Filamin-A	2061	000622_ C353	CYR61 Protein CYR61	4761
Q9UGV2_ C166	NDRG3 Protein NDRG3	2062	Q86WA6 C234	BPHL Valacyclovir hydrolase	4762
P40926_C 89	MDH2 Malate dehydrogenase, mitochondrial	2063	Q9BUF5 C354	TUBB6 Tubulin beta-6 chain	4763
P40926_C 93	MDH2 Malate dehydrogenase, mitochondrial	2064	Q07960_ C91	ARHGAP1 Rho GTPase-activating protein 1	4764
Q14839_C 1594	CHD4 Chromodomain- helicase-DNA-binding protein 4	2065	P78346_ C257	RPP30 Ribonuclease P protein subunit p30	4765
095273_C 300	CCNDBP1 Cyclin-D1 -binding protein 1	2066	P16885_ C849	PLCG2 1-phosphatidylinositol 4,5- bisphosphate phosphodiesterase	4766
A6NE09_ C163	RPSAP58 Protein RPSAP58	2067	Q969U7_ C168	PSMG2 Proteasome assembly chaperone 2	4767
P62942_C 23	FKBP1A Peptidyl-prolyl cis- trans isomerase FKBP1A	2068	Q9BZG1 C38	RAB34 Ras-related protein Rab-34	4768
Q04446_C 221	GBE1 1,4-alpha-glucan- branching enzyme	2069	Q96KQ7 C596	EHMT2 Histone-lysine N- methyltransferase EHMT2	4769

P16219_C 289	ACADS Short-chain specific acyl-CoA dehydrogenase, mitochondrial	2070	Q8IWB7 _C401	WDFY1 WD repeat and FYVE domain-containing protein 1	4770
Q9Y3C6_C 133	PP1L1 Peptidyl-prolyl cis-trans isomerase-like 1	2071	Q14566_C 721	MCM6 DNA replication licensing factor MCM6	4771
P61970_C 80	NUTF2 Nuclear transport factor 2	2072	P17844_C 170	DDX5 Probable ATP-dependent RNA helicase DDX5	4772
014776_C 535	TCERG1 Transcription elongation regulator 1	2073	094903_C 261	PROSC Proline synthase co-transcribed bacterial homolog	4773
Q9BRP1_C 278	PDCD2L Programmed cell death protein 2-like	2074	Q9UPN3_C 5346	MACF1 Microtubule-actin cross-linking factor 1, isoforms	4774
P13639_C 567	EEF2 Elongation factor 2	2075	P53634_C 355	CTSC Dipeptidyl peptidase 1	4775
Q8WUX2_C 113	CHAC2 Cation transport regulator-like protein 2	2076	Q5VZL5_C 948	ZMYM4 Zinc finger MYM-type protein 4	4776
Q9H8W4_C 219	PLEKHF2 Pleckstrin homology domain-containing family F member 2	2077	A5YKK6_C 2359	CNOT1 CCR4-NOT transcription complex subunit 1	4777
Q15021_C 286	NCAPD2 Condensin complex subunit 1	2078	Q9BWU0_C 336	SLC4A1AP Kanadaplin	4778
095394_C 93	PGM3 Phosphoacetylglucosamine mutase	2079	075369_C 1868	FLNB Filarnin-B	4779
Q9NP61_C 312	ARFGAP3 ADP-ribosylation factor GTPase-activating protein	2080	075369_C 1876	FLNB Filamin-B	4780
Q86TG7_C 119	PEG 10 Retrotransposon-derived protein PEG 10	2081	P21980_C 620	TGM2 Protein-glutamine gamma-glutamyltransferase 2	4781
Q7L0Y3_C 78	TRMTI0C Mitochondrial ribonuclease P protein 1	2082	Q14966_C 1279	ZNF638 Zinc finger protein 638	4782
P35579_C 694	MYH9 Myosin-9	2083	P50395_C 335	GDI2 Rab GDP dissociation inhibitor beta	4783
Q7Z7A4_C 570	PXK PX domain-containing protein kinase-like protein	2084	QL3643_C 150	FHL3 Four and a half LIM domains protein 3	4784
P05091_C 386	ALDH2 Aldehyde dehydrogenase, mitochondrial	2085	Q16181_C 161	SEPT7 Septin-7	4785
015231_C 615	ZNF185 Zinc finger protein 185	2086	Q9UPR0_C 90	PLCL2 Inactive phospholipase C-like protein 2	4786
Q9P2J5_C 573	LARS Leucine-tRNA ligase, cytoplasmic	2087	Q9UPR0_C 1095	PLCL2 Inactive phospholipase C-like protein 2	4787
P41250_C 525	GARS Glycine-tRNA ligase	2088	014787_C 132	TNP02 Transportin-2	4788
Q9NR33_C 84	POLE4 DNA polymerase epsilon subunit 4	2089	015067_C 1338	PFAS Phosphoribosylfornylglycinamide synthase	4789
Q9NQW6_C 210	ANLN Actm-bmding protein anillin	2090	Q9NW64_C 58	RBM22 Pre-mRNA-splicing factor RBM22	4790
Q9NQW6_C 1117	ANLN Actin-binding protein anillin	2091	000273_C 21	DFFA DNA fragmentation factor subunit alpha	4791
Q9HCC0_C 267	MCCC2 Methylcrotonoyl-CoA carboxylase beta chain, mitoch	2092	Q86V21_C 493	AACS Acetoacetyl-CoA synthetase	4792
P55884_C 420	EIF3B Eukaryotic translation initiation factor 3 subunit	2093	Q96GX5_C 251	MASTL Serine/threonine-protein kinase greatwall	4793
P20290_C 22	BTF3 Transcription factor BTF3	2094	Q96GX5_C 614	MASTL Serine/threonine-protein kinase greatwall	4794

P49368_C 398	CCT3 T-complex protein 1 subunit gamma	2095	O60493_C140	SNX3 Sorting nexin-3	4795
O75600_C 106	GCAT 2-amino-3-ketobutyrate coenzyme A ligase, mitochondrial	2096	P29279_C120	CTGF Connective tissue growth factor	4796
Q6PKG0_C 864	LARP1 La-related protein 1	2097	P49790_C585	NUP153 Nuclear pore complex protein Nup153	4797
Q5H9R7_C 467	PPP6R3 Serine/threonine-protein phosphatase 6 regulatory	2098	P49790_C753	NUP153 Nuclear pore complex protein Nup153	4798
Q9H4A4_C 311	RNPEP Aminopeptidase B	2099	P51114_C99	FXR1 Fragile X mental retardation syndrome-related protein	4799
Q9BUF5_C 12	TUBB6 Tubulin beta-6 chain	2100	Q15170_C88	TCEAL1 Transcription elongation factor A protein-like 1	4800
P52272_C 676	HNRNPM Heterogeneous nuclear ribonucleoprotein M	2101	Q81Y18_C229	SMC5 Structural maintenance of chromosomes protein 5	4801
Q8TB03_C 300	CXorf38 Uncharacterized protein CXorf38	2102	P62979_C126	RPS27A Ubiquitin-40S ribosomal protein S27a	4802
Q9H7D7_C 656	WDR26 WD repeat-containing protein 26	2103	Q9BSJ8_C635	ESYT1 Extended synaptotagmin-1	4803
P50395_C 317	GDI2 Rab GDP dissociation inhibitor beta	2104	P35658_C399	NUP214 Nuclear pore complex protein Nup214	4804
P25205_C 263	MCM3 DNA replication licensing factor MCM3	2105	P27694_C200	RPA1 Replication protein A 70 kDa DNA-binding subunit	4805
Q8TD19_C 878	NEK9 Serine/threonine-protein kinase Nek9	2106	P27694_C503	RPA1 Replication protein A 70 kDa DNA-binding subunit	4806
P31947_C 96	SPN 14-3-3 protein sigma	2107	P46013_C1843	MKI67 Antigen KI-67	4807
P49321_C 568	NASP Nuclear autoantigenic sperm protein	2108	P17858_C212	PFKL 6-phosphofructokinase, liver type	4808
Q7L2J0_C 54	MEPCE 7SK snRNA methylphosphate capping enzyme	2109	Q14353_C220	GAMT Guanidinoacetate N-methyltransferase	4809
Q96BN8_C 347	FAM105B Protein FAM105B	2110	Q7Z5J4_C239	RAI1 Retinoic acid-induced protein 1	4810
Q12888_C 1159	TP53BP1 Tumor suppressor p53-binding protein 1	2111	O75083_C438	WDR1 WD repeat-containing protein 1	4811
P29034_C 22	S100A2 Protein S100-A2	2112	Q8WXH0_C553	SYNE2 Nesprin-2	4812
P61978_C 205	HNRNPK Heterogeneous nuclear ribonucleoprotein K	2113	Q14137_C469	BOP1 Ribosome biogenesis protein BOP1	4813
P78527_C 3837	PRKDC DNA-dependent protein kinase catalytic subunit	2114	Q8N4X5_C781	AFAP1L2 Actin filament-associated protein 1-like 2	4814
Q7LG56_C 279	RRM2B Ribonucleoside-diphosphate reductase subunit M2 B	2115	P52732_C773	KIF11 Kinesin-like protein KIF11	4815
P12814_C 180	ACTN1 Alpha-actinin-1	2116	Q7Z6Z7_C1879	HUWE1 E3 ubiquitin-protein ligase HUWE1	4816
Q9ULV4_C 343	CORO1C Coronin-1C	2117	Q7Z6Z7_C4099	HUWE1 E3 ubiquitin-protein ligase HUWE1	4817
P22234_C 185	PAICS Multifunctional protein ADE2	2118	P11216_C496	PYGB Glycogen phosphorylase, brain form	4818
P22234_C 288	PAICS Multifunctional protein ADE2	2119	Q16514_C143	TAF12 Transcription initiation factor TFIID subunit 12	4819

P30837_C 386	ALDH1B1 Aldehyde dehydrogenase X, mitochondrial	2120	Q9H3P2_C471	WHSC2 Negative elongation factor A	4820
P25098_C 120	ADRBK1 Beta-adrenergic receptor kinase 1	2121	Q9UFC0_C88	LRWD1 Leucine-rich repeat and WD repeat-containing protein	4821
P35998_C 180	PSMC2 26S protease regulatory subunit 7	2122	Q9UFC0_C249	LRWD1 Leucine-rich repeat and WD repeat-containing prote	4822
P08243_C 255	ASNS Asparagine synthetase	2123	Q96RR4_C223	CAMKK2 Calcium/calmodulin-dependent protein kinase kinase	4823
095819_C 202	MAP4K4 Mitogen-activated protein kinase kinase kinase kin	2124	Q9UJU6_C97	DBNL Drebrin-like protein	4824
Q13557_C 273	CAMK2D Calcium/calmodulin-dependent protein kinase type I	2125	Q9NYZ3_C45	GTSE1 G2 and S phase-expressed protein 1	4825
P50213_C 127	IDH3A Isocitrate dehydrogenase	2126	Q9ULI3_C1360	HEG1 Protein HEG homolog 1	4826
095336_C 237	PGLS 6-phosphogluconolactonase	2127	P38606_C277	ATP6V1A V-type proton ATPase catalytic subunit A	4827
Q13155_C 143	ATMP2 Aminoacyl tRNA synthase complex-interacting multifunctional protein 2	2128	Q9UPQ0_C333	LIMCH1 LIM and calponin homology domains-containing protein	4828
Q14204_C 3940	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	2129	Q7L2H7_C125	EIF3M Eukaryotic translation initiation factor 3 subunit	4829
P30154_C 306	PPP2R1B Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A beta isoform	2130	Q9BPX3_C177	NCAPG Condensin complex subunit 3	4830
P61758_C 113	VBP1 Prefoldin subunit 3	2131	095757_C540	HSPA4L Heat shock 70 kDa protein 4L	4831
P48739_C 13	PITPNB Phosphatidylinositol transfer protein beta isoform	2132	095757_C589	HSPA4L Heat shock 70 kDa protein 4L	4832
P08134_C 159	RHOC Rho-related GTP-binding protein RhoC	2133	Q9BWH6_C195	RPAP1 RNA polymerase II-associated protein 1	4833
P15121_C 81	AKR1B1 Aldose reductase	2134	Q8NHV4_C314	NEDD1 Protein NEDD 1	4834
P86790_C 358	CCZ1B Vacuolar fusion protein CCZ1 homolog B	2135	Q9UJV9_C568	DDX41 Probable ATP-dependent RNA helicase DDX41	4835
P42704_C 863	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	2136	P13010_C157	XRCC5 X-ray repair cross-complementing protein 5	4836
P33316_C 166	DUT Deoxyuridine 5-triphosphate nucleotidohydrolase,	2137	095340_C202	PAPSS2 Bifunctional 3-phosphoadenosine 5-phosphosulfate	4837
Q92597_C 289	NDRG1 Protein NDRG1	2138	Q5JZ73_C9	LINC00207 Protein LINC00207	4838
P35236_C 62	PTPN7 Tyrosine-protein phosphatase non-receptor type 7	2139	Q6DN90_C214	IQSEC1 IQ motif and SEC7 domain-containing protein 1	4839
P17987_C 296	TCPI T-complex protein 1 subunit alpha	2140	Q9BZE9_C127	ASPSCR1 Tether containing UBX domain for GLUT4	4840
Q6PI48_C 590	DARS2 Aspartate-tRNA ligase, mitochondrial	2141	095294_C386	RASAL1 RasGAP-activating-like protein 1	4841
P63244_C 249	GNB2L1 Guanine nucleotide-binding protein subunit beta-2-	2142	095294_C534	RASAL1 RasGAP-activating-like protein 1	4842

	like 1				
Q12874_C 437	SF3A3 Splicing factor 3A subunit 3	2143	P06737_C 496	PYGL Glycogen phosphorylase, liver form	4843
Q9Y6W5_C 27	WASF2 Wiskott-Aldrich syndrome protein family member 2	2144	Q92616_C 1482	GCN1L1 Translational activator GCN1	4844
P04075_C 290	ALDOA Fructose-bisphosphate aldolase A	2145	Q9Y619_C 165	TEX264 Testis-expressed sequence 264 protein	4845
Q8WW33_C 76	GTSE1 Gametocyte-specific factor 1	2146	Q99996_C 1966	AKAP9 A-kinase anchor protein 9	4846
P57081_C 137	WDR4 tRNA (guanine-N(7)-methyltransferase subunit WDR	2147	Q6UB99_C 2640	ANKRD1 1 Ankyrin repeat domain-containing protein 11	4847
060343_C 1277	TBC1D4 TBC1 domain family member 4	2148	Q9NRV9_C 168	HEBP1 Heme-binding protein 1	4848
P30084_C 111	ECHS1 Enoyl-CoA hydratase, mitochondrial	2149	Q6ZUT6_C 437	C15orf52 Uncharacterized protein C15orf52	4849
P12268_C 173	IMPDH2 Inosine-5-monophosphate dehydrogenase 2	2150	PI5407_C 172	FOSL1 Fos-related antigen 1	4850
043290_C 674	SART1 U4/U6.U5 tri-snRNP-associated protein 1	2151	Q9BYG3_C 237	MKI67IP MKI67 FHA domain-interacting nucleolar phosphoprotein	4851
Q9P258_C 280	RCC2 Protein RCC2	2152	P49327_C 496	FASN Fatty acid synthase	4852
P15153_C 6	RAC2 Ras-related C3 botulinum toxin substrate 2	2153	Q99436_C 74	PSMB7 Proteasome subunit beta type-7	4853
060361_C 94	NME2P1 Putative nucleoside diphosphate kinase	2154	Q96BR1_C 308	SGK3 Serine/threonine-protein kinase Sgk3	4854
075600_C 219	GCAT 2-amino-3-ketobutyrate coenzyme A ligase, mitochondrial	2155	Q9GZS1_C 200	POLR1E DNA-directed RNA polymerase I subunit RPA49	4855
060568_C 494	PLOD3 Procollagen-lysine,2-oxoglutarate 5-dioxygenase 3	2156	P41091_C 269	EIF2S3 Eukaryotic translation initiation factor 2 subunit	4856
Q9H0R6_C 512	QRSL1 Glutamyl-tRNA(Gln) amidotransferase subunit A, mitochondrial	2157	Q12769_C 659	NUP160 Nuclear pore complex protein Nup160	4857
Q7RTV0_C 11	PHF5A PHD finger-like domain-containing protein 5A	2158	P13489_C 313	RNH1 Ribonuclease inhibitor	4858
Q96199_C 255	SUCLG2 Succinyl-CoA ligase	2159	Q9H5N1_C 482	RABEP2 Rab GTPase-binding effector protein 2	4859
AOAVTI_C 770	UBA6 Ubiquitin-like modifier-activating enzyme 6	2160	Q9Y2Z0_C 49	SUGT1 Suppressor of G2 allele of SKP1 homolog	4860
P08047_C 755	SP1 Transcription factor Sp1	2161	P48444_C 441	ARCN1 Coatamer subunit delta	4861
P26641_C 166	EEF1G Elongation factor 1-gamma	2162	Q12888_C 1375	TP53BP1 Tumor suppressor p53-binding protein 1	4862
Q16270_C 131	IGFBP7 Insulin-like growth factor-binding protein 7	2163	P14921_C 112	ETS1 Protein C-ets-1	4863
Q9BQ52_C 51	ELAC2 Zinc phosphodiesterase ELAC protein 2	2164	Q5JTZ9_C 443	AARS2 Alanine-tRNA ligase, mitochondrial	4864
Q6YN16_C 11	HSDL2 Hydroxysteroid dehydrogenase-like protein 2	2165	Q92990_C 406	GLMN Glomulin	4865
Q9BQP7_C	C20orf72 Uncharacterized	2166	Q9POJ1_C	PDP1	4866

C79	protein C20orf72		C132		
Q7Z6Z7_C2865	HUWE1 E3 ubiquitin-protein ligase HUWE1	2167	Q8NBJS_C369	GLT25D1 Procollagen galactosyltransferase 1	4867
Q7Z6Z7_C3259	HUWE1 E3 ubiquitin-protein ligase HUWE1	2168	P01591_C94	IGJ Immunoglobulin J chain	4868
Q7Z6Z7_C3658	HUWE1 E3 ubiquitin-protein ligase HUWE1	2169	Q96QR8_C238	PURB Transcriptional activator protein Pur-beta	4869
Q14914_C239	PTGR1 Prostaglandin reductase 1	2170	Q99832_C326	CCT7 T-complex protein 1 subunit eta	4870
000268_C1022	TAF4 Transcription initiation factor TFHD subunit 4	2171	095218_C71	ZRANB2 Zinc finger Ran-binding domain-containing protein	4871
095340_C155	PAPSS2 Bifunctional 3-phosphoadenosine 5-phosphosulfate	2172	043237_C191	DYNC1LI2 Cytoplasmic dynein 1 light intermediate chain 2	4872
095295_C66	SNAPIN SNARE-associated protein Snapin	2173	Q92576_C276	PHF3 PHD finger protein 3	4873
P43490_C287	NAMPT Nicotinamide phosphoribosyltransferase	2174	Q9HAU0_C473	PLEKHA5 Pleckstrin homology domain-containing family A member	4874
P49327_C135	FASN Fatty acid synthase	2175	095425_C76	SVIL Supervillin	4875
Q9Y383_C59	LUC7L2 Putative RNA-binding protein Luc7-like 2	2176	Q8TD30_C158	GPT2 Alanine aminotransferase 2	4876
Q9NS86_C49	LANCL2 LanC-like protein 2	2177	Q8TD30_C347	GPT2 Alanine aminotransferase 2	4877
Q15149_C317	PLEC Plectin	2178	Q14790_C409	CASP8 Caspase-8	4878
060825_C430	PFKFB2 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase 2	2179	P09211_C170	GSTP1 Glutathione S-transferase P	4879
Q5JS54_C55	PSMG4 Proteasome assembly chaperone 4	2180	Q03519_C641	TAP2 Antigen peptide transporter 2	4880
P52566_C76	ARHGDI2 Rho GDP-dissociation inhibitor 2	2181	Q9ULW0_C462	TPX2 Targeting protein for Xklp2	4881
P07203_C156	GPX1 Glutathione peroxidase 1	2182	Q16222_C251	UAP1 UDP-N-acetylhexosamine pyrophosphorylase	4882
Q9UL25_C29	RAB21 Ras-related protein Rab-21	2183	P61158_C408	ACTR3 Actin-related protein 3	4883
P49841_C14	GSK3B Glycogen synthase kinase-3 beta	2184	Q6WKZ4_C318	RAB11FIP1 Rab11 family-interacting protein 1	4884
P17655_C39	CAPN2 Calpain-2 catalytic subunit	2185	Q9HCE7_C725	SMURF1 E3 ubiquitin-protein ligase SMURF1	4885
Q14315_C2679	FLNC Filamin-C	2186	Q13564_C153	NAE1 NEDD8-activating enzyme E1 regulatory subunit	4886
P32969_C74	RPL9P9 60S ribosomal protein L9	2187	Q13564_C384	NAE1 NEDD8-activating enzyme E1 regulatory subunit	4887
Q96JH7_C1178	VCPIP1 Deubiquitinating protein VCIP135	2188	P31146_C24	CORO1A Coronin-1A	4888
Q9NP61_C241	ARFGAP3 ADP-ribosylation factor GTPase-activating protein	2189	Q96JM7_C169	L3MBTL3 Lethal(3)maUgnant brain tumor-like protein 3	4889
Q9Y265_C141	RUVBL1 RuvB-like 1	2190	P07199_C135	CENPB Major centromere autoantigen B	4890
P52789_C158	HK2 Hexokinase-2	2191	000442_C28	RTCA RNA 3-terminal phosphate cyclase	4891

P35579_C 172	MYH9 Myosin-9	2192	P13639_C 388	EEF2 Elongation factor 2	4892
P12955_C 482	PEPD Xaa-Pro dipeptidase	2193	Q9P0K7_C 468	RAI14 Ankycorbin	4893
Q86UX7_C 235	FERMT3 Fermitin family homolog 3	2194	P35606_C 276	COPB2 Coatomer subunit beta	4894
Q15003_C 239	NCAPH Condensin complex subunit 2	2195	P46199_C 290	MTIF2 Translation initiation factor IF- 2, mitochondrial	4895
P07814_C 1377	EPRS Bifunctional glutamate/proline--tRNA ligase	2196	P78527_C 232	PRKDC DNA-dependent protein kinase catalytic subunit	4896
P11586_C 143	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	2197	P78527_C 1455	PRKDC DNA-dependent protein kinase catalytic subunit	4897
P62312_C 36	LSM6 U6 snRNA-associated Sm-like protein LSM6	2198	P78527_C 4045	PRKDC DNA-dependent protein kinase catalytic subunit	4898
P55209_C 132	NAP1L1 Nucleosome assembly protein 1-like 1	2199	P11908_C 60	PRPS2 Ribose-phosphate pyrophosphokinase 2	4899
O75815_C 699	BCAR3 Breast cancer anti- estrogen resistance protein 3	2200	Q9H410_C 65	DSN1 Kinetochore-associated protein DSN1 homolog	4900
P24534_C 191	EEF1B2 Elongation factor 1- beta	2201	Q14498_C 478	RBM39 RNA-binding protein 39	4901
P15121_C 200	AKR1B1 Aldose reductase	2202	O75694_C 1344	NUP155 Nuclear pore complex protein Nup155	4902
Q9GZU8_C 187	FAM192A Protein FAM192A	2203	Q8WU76_C 79	SCFD2 Sec1 family domain-containing protein 2	4903
P25789_C 34	PSMA4 Proteasome subunit alpha type-4	2204	Q8IU81_C 207	IRF2BP1 Interferon regulatory factor 2- binding protein 1	4904
P25789_C 74	PSMA4 Proteasome subunit alpha type-4	2205	P49189_C 443	ALDH9A1 4- trimethylaminobutyraldehyde dehydrogenase	4905
P07355_C 133	ANXA2 Annexin A2	2206	Q14789_C 1257	GOLGB1 Golgin subfamily B member 1	4906
Q15393_C 410	SF3B3 Splicing factor 3B subunit 3	2207	Q8N5K1_C 92	CISD2 CDGSH iron-sulfur domain- containing protein 2	4907
P63244_C 240	GNB2L1 Guanine nucleotide- binding protein subunit beta-2- like 1	2208	O43592_C 693	XPOT Exportin-T	4908
P61247_C 111	RPS3A 40S ribosomal protein S3a	2209	O43374_C 302	RASA4 Ras GTPase-activating protein 4	4909
P53582_C 40	METAP1 Methionine aminopeptidase 1	2210	O43374_C 657	RASA4 Ras GTPase-activating protein 4	4910
P23921_C 790	RRM1 Ribonucleoside- diphosphate reductase large subunit R	2211	Q9NUQ3_C 480	TXLNG Gamma-taxilin	4911
Q9BT78_C 378	COPS4 COP9 signalosome complex subunit 4	2212	P63104_C 189	YWHAZ 14-3-3 protein zeta/delta	4912
Q7KZ85_C 336	SUPT6H Transcription elongation factor SPT6	2213	O60216_C 392	RAD21 Double-strand-break repair protein rad21 homolog	4913
P23381_C 274	WARS Tryptophan-tRNA ligase, cytoplasmic	2214	Q8N3U4_C 869	STAG2 Cohesin subunit SA-2	4914
P36551_C 239	CPOX Coproporphyrinogen- III oxidase, mitochondrial	2215	Q9ULV4_C 283	CORO1C Coronin-1C	4915
Q7KZF4_C 31	SND1 Staphylococcal nuclease domain-containing protein	2216	P61160_C 221	ACTR2 Actin-related protein 2	4916

Q14139_C 1002	UBE4A Ubiquitin conjugation factor E4 A	2217	Q12904_C C161	AIMP1 Aminoacyl tRNA synthase complex-interacting multifunctional protein 1	4917
Q8NCF5_C C232	NFATC2IP NFATC2-interacting protein	2218	Q9H9P8_C C187	L2HGDH L-2-hydroxyglutarate dehydrogenase, mitochondrial	4918
075934_C 106	BCAS2 Pre-mRNA-splicing factor SPF27	2219	Q7Z2W4_C C272	ZC3HAV1 Zinc finger CCCH-type antiviral protein 1	4919
Q96IF1_C 158	AJUBA LIM domain-containing protein ajuba	2220	P30153_C C148	PPP2R1A Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform	4920
Q9NZL4_C C22	HSPBP1 Hsp70-binding protein 1	2221	Q92797_C C969	SYMPK Symplekin	4921
Q9NZL9_C C58	MAT2B Methionine adenosyltransferase 2 subunit beta	2222	Q9Y3B7_C C50	MRPL11 39S ribosomal protein L11, mitochondrial	4922
Q5TDH0_C C361	DDK Protein DDI1 homolog 2	2223	Q9BV44_C C391	THUMP3 THUMP domain-containing protein 3	4923
Q13126_C 131	MTAP S-methyl-5-thioadenosine phosphorylase	2224	014578_C C402	CIT Citron Rho-interacting kinase	4924
075369_C 706	FLNB Filamin-B	2225	Q9NVU0_C C70	POLR3E DNA-directed RNA polymerase III subunit RPC5	4925
P21980_C 269	TGM2 Protein-glutamine gamma-glutamyltransferase 2	2226	Q92947_C C115	GCDH Glutaryl-CoA dehydrogenase, mitochondrial	4926
Q16270_C 113	IGFBP7 Insulin-like growth factor-binding protein 7	2227	Q6PJ69_C C320	TRIM65 Tripartite motif-containing protein 65	4927
H7BZ11_C C88	Uncharacterized protein	2228	Q15027_C C501	ACAPI Arf-GAP with coiled-coil, ANK repeat and PH domain	4928
Q96FZ2_C C131	C3orf37 UPF0361 protein C3orf37	2229	Q15020_C C341	SART3 Squamous cell carcinoma antigen recognized by T-cells 3	4929
Q6YN16_C C71	HSDL2 Hydroxysteroid dehydrogenase-like protein 2	2230	Q9Y6J9_C C41	TAF6L TAF6-like RNA polymerase II p300/CBP-associated factor 6 like	4930
Q9UBL3_C C581	ASH2L Set1/Ash2 histone methyltransferase complex subunit	2231	P17812_C C216	CTPS1 CTP synthase 1	4931
Q15370_C 60	TCEB2 Transcription elongation factor B polypeptide 2	2232	Q96GG9_C C29	DCUN1D1 DCN1-like protein 1	4932
043252_C 360	PAPSS1 Bifunctional 3-phosphoadenosine 5-phosphosulfate	2233	Q14315_C C1448	FLNC Filamin-C	4933
P62633_C 171	CNBP Cellular nucleic acid-binding protein	2234	Q9NSP4_C C40	CENPM Centromere protein M	4934
P63151_C 398	PPP2R2A Serine/threonine-protein phosphatase 2A 55 kDa regulatory subunit B alpha isoform	2235	Q9Y3B2_C C40	EXOSC1 Exosome complex component CSL4	4935
Q16881_C 209	TXNRD1 Thioredoxin reductase 1, cytoplasmic	2236	Q9H4K7_C C206	GTPBP5 GTP-binding protein 5	4936
095294_C 761	RASAL1 RasGAP-activating-like protein 1	2237	P62140_C C201	PPP1CB Serine/threonine-protein phosphatase PPI-beta catalytic subunit	4937
Q9UQ35_C C872	SRRM2 Serine/arginine repetitive matrix protein 2	2238	Q9H063_C C133	MAFI Repressor of RNA polymerase III transcription MAFI	4938
P78371_C 535	CCT2 T-complex protein 1 subunit beta	2239	P23434_C C138	GCSH Glycine cleavage system H protein, mitochondrial	4939

P54577_C 250	YARS Tyrosine--tRNA ligase, cytoplasmic	2240	Q5JPH6_ C386	EARS2 Probable glutamate--tRNA ligase, mitochondrial	4940
Q8TD30_ C477	GPT2 Alanine aminotransferase 2	2241	O14976_ C1142	GAK Cyclin-G-associated kinase	4941
Q15149_C 3299	PLEC Plectin	2242	O14974_ C553	PPP1R12A Protein phosphatase 1 regulatory subunit 12A	4942
O14744_C 278	PRMT5 Protein arginine N- methyltransferase 5	2243	Q9H9A6 C438	LRRC40 Leucine-rich repeat- containing protein 40	4943
Q7L1Q6_ C96	BZW1 Basic leucine zipper and W2 domain-containing prot	2244	Q13315_ C2607	ATM Serine-protein kinase ATM	4944
P04181_C 150	OAT Ornithine aminotransferase, mitochondrial	2245	P51116_ C270	FXR2 Fragile X mental retardation syndrome-related protein	4945
P04181_C 330	OAT Ornithine aminotransferase, mitochondrial	2246	Q8N3X1 _C877	FNBP4 Formin-binding protein 4	4946
Q9NVT9_ C69	ARMC1 Armadillo repeat- containing protein 1	2247	P36404_ C153	ARL2 ADP-ribosylation factor-like protein 2	4947
O60888_C 96	CUTA Protein CutA	2248	Q9HD64 C43	XAGE1E G antigen family D member 2	4948
Q6P2E9_ C976	EDC4 Enhancer of mRNA- decapping protein 4	2249	Q8NF50_ C1230	DOCK8 Dedicator of cytokinesis protein 8	4949
P20810_C 408	CAST Calpastatin	2250	Q8WWM 7 C628	ATXN2L Ataxin-2-like protein	4950
Q5T6F2_ C208	UBAP2 Ubiquitin-associated protein 2	2251	P55795_ C290	HNRNPH2 Heterogeneous nuclear ribonucleoprotein H2	4951
Q9BQ61_ C165	C19orf43 Uncharacterized protein C19orf43	2252	Q9BYW2 C1471	SETD2 Histone-lysine N- methyltransferase SETD2	4952
P54687_C 12	BCAT1 Branched-chain- amino-acid aminotransferase, cytosolic	2253	O15143_ C202	ARPC1B Actin-related protein 2/3 complex subunit 1B	4953
P54687_C 335	BCAT1 Branched-chain- amino-acid aminotransferase, cytosolic	2254	O15294_ C323	OGT UDP-N-acetylglucosamine-- peptide N-acetylglucosamine (GlcNAc) transferase	4954
Q96I15_C 22	SCLY Selenocysteine lyase	2255	Q92945_ C176	KHSRP Far upstream element-binding protein 2	4955
P45974_C 335	USP5 Ubiquitin carboxyl- terminal hydrolase 5	2256	O43847_ C60	NRD1 Nardilysin	4956
O14497_C 336	ARID1A AT-rich interactive domain-containing protein 1A	2257	Q9H9A5 C504	CNOT10 CCR4-NOT transcription complex subunit 10	4957
O43776_C 438	NARS Asparagine--tRNA ligase, cytoplasmic	2258	Q9H9A5 C633	CNOT10 CCR4-NOT transcription complex subunit 10	4958
P12955_C 467	PEPD Xaa-Pro dipeptidase	2259	P10155_ C71	TROVE2 60 kDa SS-A/Ro ribonucleoprotein	4959
Q9Y678_ C97	COPG1 Coatomer subunit gamma-1	2260	P52789_ C386	HK2 Hexokinase-2	4960
Q9Y678_ C169	COPG1 Coatomer subunit gamma-1	2261	Q01469_ C43	FABP5 Fatty acid-binding protein, epidermal	4961
P55786_C 339	NPEPPS Puromycin-sensitive aminopeptidase	2262	P46734_ C305	MAP2K3 Dual specificity mitogen- activated protein kinase	4962
Q9Y520_ C223	PRRC2C Protein PRRC2C	2263	P35579_ C511	MYH9 Myosin-9	4963
P52306_C 29	RAP1GDS1 Rap1 GTPase- GDP dissociation stimulator 1	2264	P35579_ C789	MYH9 Myosin-9	4964

Q6GMV2 CI94	SMYD5 SET and MYND domain-containing protein 5	2265	Q9Y3C1 C36	NOP16 Nucleolar protein 16	4965
Q16763_C 95	UBE2S Ubiquitin-conjugating enzyme E2 S	2266	P62888 C52	RPL30 60S ribosomal protein L30	4966
Q7L014_C C590	DDX46 Probable ATP-dependent RNA helicase DDX46	2267	Q8TAQ2 C495	SMARCC2 SWI/SNF complex subunit SMARCC2	4967
Q8NFX7_C C144	STXBP6 Syntaxin-binding protein 6	2268	Q94854 C242	KIAA0754 Uncharacterized protein KIAA0754	4968
P56537_C 11	EIF6 Eukaryotic translation initiation factor 6	2269	P23526 C113	AHCY Adenosylhomocysteinase	4969
Q9NRL3_C C17	STRN4 Striatin-4	2270	Q6QNY1 C41	BLOC1S2 Biogenesis of lysosome-related organelles complex	4970
P41252_C 185	IARS Isoleucine-tRNA ligase, cytoplasmic	2271	Q7Z7A4 C196	PXK PX domain-containing protein kinase-like protein	4971
060343_C 45	TBC1D4 TBC1 domain family member 4	2272	Q14699 C128	RFTN1 Raftlin	4972
P30086_C 133	PEBPI Phosphatidylethanolamine-binding protein 1	2273	Q14694 C254	USP10 Ubiquitin carboxyl-terminal hydrolase 10	4973
Q9NQW7 C308	XPNPEP1 Xaa-Pro aminopeptidase 1	2274	Q13435 C661	SF3B2 Splicing factor 3B subunit 2	4974
000299_C 89	CLIC1 Chloride intracellular channel protein 1	2275	P22692 C38	IGFBP4 Insulin-like growth factor-binding protein 4	4975
Q9Y4B6_C C784	VPRBP Protein VPRBP	2276	P22692 C215	IGFBP4 Insulin-like growth factor-binding protein 4	4976
Q66PJ3_C 349	ARL6IP4 ADP-ribosylation factor-like protein 6-interacting	2277	P60900 C161	PSMA6 Proteasome subunit alpha type-6	4977
P00367_C 327	GLUD1 Glutamate dehydrogenase 1, mitochondrial	2278	Q9NWX4 C17	C4orf27 UPF0609 protein C4orf27	4978
Q14C86_C C568	GAPVD1 GTPase-activating protein and VPS9 domain-containing protein 1	2279	P12004 C62	PCNA Proliferating cell nuclear antigen	4979
P09382_C 89	LGALS1 Galectin-1	2280	000148 C238	DDX39A ATP-dependent RNA helicase DDX39A	4980
000244_C 41	ATOX1 Copper transport protein ATOX1	2281	Q9BW19 C144	KTFC1 Kinesin-like protein KIFC1	4981
PI6885_C 624	PLCG2 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase	2282	Q9BW19 C557	KIFC1 Kinesin-like protein KIFC1	4982
Q92835_C 138	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1	2283	Q15477 C247	SKTV2L Helicase SKI2W	4983
J3QR44_C C430	CDK11B Cyclin-dependent kinase 11B	2284	Q9NQ89 C9	C12orf4 Uncharacterized protein C12orf4	4984
Q9P289_C C352	MST4 Serine/threonine-protein kinase MST4	2285	Q9Y2R9 C152	MRPS7 28S ribosomal protein S7, mitochondrial	4985
Q92688_C 27	ANP32B Acidic leucine-rich nuclear phosphoprotein 32 family member B	2286	Q12933 C287	TRAF2 TNF receptor-associated factor 2	4986
Q96GX9_C C97	APIP Probable methylthioribulose-1-phosphate dehydratase	2287	Q12931 C501	TRAP1 Heat shock protein 75 kDa, mitochondrial	4987

Q15004_C 54	KIAA0101 PCNA-associated factor	2288	Q9NQS1 C251	AVEN Cell death regulator Aven	4988
075083_C 325	WDR1 WD repeat-containing protein 1	2289	Q9UBB4 C134	ATXN10 Ataxin-10	4989
043252_C 207	PAPSS1 Bifunctional 3-phosphoadenosine 5-phosphosulfate	2290	Q9UBB4 _C382	ATXN10 Ataxin-10	4990
P62633_C 161	CNBP Cellular nucleic acid-binding protein	2291	Q9C0C9_ C910	UBE20 Ubiquitin-conjugating enzyme E2 0	4991
Q7Z6Z7_ CI832	HUWE1 E3 ubiquitin-protein ligase HUWE1	2292	Q9BTW9 C234	TBCD Tubulin-specific chaperone D	4992
Q8NCW5 C91	APOA1BP NAD(P)H-hydrate epimerase	2293	Q9Y520_ C2340	PRRC2C Protein PRRC2C	4993
P31949_C 13	S100A11 Protein S100-A11	2294	075533_ C933	SF3B1 Splicing factor 3B subunit 1	4994
P07900_C 572	HSP90AA1 Heat shock protein HSP 90-alpha	2295	075533_ C1059	SF3B1 Splicing factor 3B subunit 1	4995
Q86UA6_ C122	RPAIN RPA-interacting protein	2296	Q96BD8_ C29	SKA1 Spindle and kinetochore-associated protein 1	4996
Q8N6MO_ C172	OTUD6B OTU domain-containing protein 6B	2297	Q14192_ C28	FHL2 Four and a half LIM domains protein 2	4997
Q13153_C 411	PAK1 Serine/threonine-protein kinase PAK 1	2298	Q14192_ C129	FHL2 Four and a half LIM domains protein 2	4998
060232_C 53	SSSCA1 Sjogren syndrome/scleroderma autoantigen 1	2299	Q92844_ C328	TANK TRAF family member-associated NF-kappa-B activator	4999
Q9NQY0_ C72	BIN3 Bridging integrator 3	2300	Q9Y4H4 C116	GPSM3 G-protein-signaling modulator 3	5000
060942_C 419	RNGTT mRNA-capping enzyme	2301	P30154_ C389	PPP2R1B Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A beta	5001
P13804_C 155	ETFFA Electron transfer flavoprotein subunit alpha, mitochondrial	2302	Q9UN37 _C403	VPS4A Vacuolar protein sorting-associated protein 4A	5002
Q96QR8_ C17	PURB Transcriptional activator protein Pur-beta	2303	Q96RL1_ C121	UIMC1 BRCA1-A complex subunit RAP80	5003
060711_C 199	LPXN Leupaxin	2304	Q8WZA9 C443	IRGQ Immunity-related GTPase family Q protein	5004
000013_C 242	MPP1 55 kDa erythrocyte membrane protein	2305	Q8IZT6_ C51	ASPM Abnormal spindle-like microcephaly-associated protein	5005
P52597_C 290	HNRNPF Heterogeneous nuclear ribonucleoprotein F	2306	P11586_ C408	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	5006
P09211_C 102	GSTP1 Glutathione S-transferaseP	2307	P11586_ C691	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	5007
Q15149_C 950	PLEC Plectin	2308	P11586_ C785	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	5008
P62195_C 209	PSMC5 26S protease regulatory subunit 8	2309	P21912_ C243	SDHB Succinate dehydrogenase	5009
Q9Y2Q3_ C176	GSTK1 Glutathione S-transferase kappa 1	2310	Q99471_ C49	PFDN5 Prefoldin subunit 5	5010
015164_C 629	TRIM24 Transcription intermediary factor 1-alpha	2311	P48735_ C336	IDH2 Isocitrate dehydrogenase	5011
P22314_C 234	UBA1 Ubiquitin-like modifier-activating enzyme 1	2312	Q9UJM3 C430	ERRF1 ERBB receptor feedback inhibitor 1	5012

Q96HE7_C94	ERO1L ERO1-like protein alpha	2313	Q6IA69_C627	NADSYN1 Glutamine-dependent NAD(+) synthetase	5013
P07203_C78	GPX1 Glutathione peroxidase 1	2314	P61221_C201	ABCE1 ATP-binding cassette sub-family E member 1	5014
P21964_C238	COMT Catechol O-methyltransferase	2315	Q7L1V2_C326	MON1B Vacuolar fusion protein MON1 homolog B	5015
O76071_C72	CIAO1 Probable cytosolic iron-sulfur protein assembly protein CIAO1	2316	Q7L1V2_C349	MON1B Vacuolar fusion protein MON1 homolog B	5016
P04083_C324	ANXA1 Annexin A1	2317	P62136_C202	PPP1CA Serine/threonine-protein phosphatase PP1-alpha catalytic subunit	5017
Q14315_C1109	FLNC Filamin-C	2318	Q8IWS0_C87	PHF6 PHD finger protein 6	5018
Q13526_C57	PIN1 Peptidyl-prolyl cis-trans isomerase NIMA-interacting 1	2319	O95239_C1159	KIF4A Chromosome-associated kinesin KIF4A	5019
Q9Y3B2_C170	EXOSC1 Exosome complex component CSL4	2320	P05091_C66	ALDH2 Aldehyde dehydrogenase, mitochondrial	5020
P54687_C140	BCAT1 Branched-chain-amino-acid aminotransferase, cytosolic	2321	O75817_C66	POP7 Ribonuclease P protein subunit p20	5021
Q92945_C379	KHSRP Far upstream element-binding protein 2	2322	O15231_C650	ZNF185 Zinc finger protein 185	5022
Q13148_C198	TARDBP TAR DNA-binding protein 43	2323	Q92922_C520	SMARCC1 SWI/SNF complex subunit SMARCC1	5023
Q9Y3C4_C167	TPRKB TP53RK-binding protein	2324	Q9NSY1_C32	BMP2K BMP-2-inducible protein kinase	5024
O43175_C281	PHGDH D-3-phosphoglycerate dehydrogenase	2325	O60671_C148	RAD1 Cell cycle checkpoint protein RAD1	5025
Q16698_C285	DECR1 2,4-dienoyl-CoA reductase, mitochondrial	2326	O75676_C425	RPS6KA4 Ribosomal protein S6 kinase alpha-4	5026
P49773_C38	HINT1 Histidine triad nucleotide-binding protein 1	2327	Q01082_C964	SPTBN1 Spectrin beta chain, non-erythrocytic 1	5027
P12004_C27	PCNA Proliferating cell nuclear antigen	2328	P61812_C380	TGFB2 Transforming growth factor beta-2	5028
P51553_C81	IDH3G Isocitrate dehydrogenase	2329	P42704_C361	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	5029
Q14192_C214	FHL2 Four and a half LIM domains protein 2	2330	P42858_C777	HTT Huntingtin	5030
P07814_C381	EPRS Bifunctional glutamate/proline--tRNA ligase	2331	P42858_C1808	HTT Huntingtin	5031
Q8WWY3_C247	PRPF31 U4/U6 small nuclear ribonucleoprotein Prp31	2332	P34932_C146	HSPA4 Heat shock 70 kDa protein 4	5032
Q13085_C813	ACACA Acetyl-CoA carboxylase 1	2333	P34932_C167	HSPA4 Heat shock 70 kDa protein 4	5033
O43765_C38	SGTA Small glutamine-rich tetratricopeptide repeat-cont	2334	O43447_C174	PPIH Peptidyl-prolyl cis-trans isomerase H	5034
Q13185_C160	CBX3 Chromobox protein homolog 3	2335	P31937_C75	HIBADH 3-hydroxyisobutyrate dehydrogenase, mitochondrial	5035
Q9UBR2_C164	CTSZ Cathepsin Z	2336	P31937_C199	HIBADH 3-hydroxyisobutyrate dehydrogenase, mitochondrial	5036
P54886_C612	ALDH18A1 Delta-1-pyrroline-5-carboxylate synthase	2337	Q8LXK0_C740	PHC2 Polyhomeotic-like protein 2	5037

Q9H9E3_C494	COG4 Conserved oligomeric Golgi complex subunit 4	2338	Q9NUI1_C120	DECR2 Peroxisomal 2,4-dienoyl-CoA reductase	5038
P19623_C209	SRM Spermidine synthase	2339	Q9NR50_C334	EIF2B3 Translation initiation factor eIF-2B subunit gamma	5039
P61247_C201	RPS3A 40S ribosomal protein S3a	2340	Q9NV56_C59	MRGBP MRG-binding protein	5040
P15311_C284	EZR Ezrin	2341	Q9BYV9_C340	BACH2 Transcription regulator protein BACH2	5041
P53004_C204	BLVRA Biliverdin reductase A	2342	P08237_C351	PFKM 6-phosphofructokinase, muscle type	5042
Q969E8_C114	TSR2 Pre-rRNA-processing protein TSR2 homolog	2343	Q15118_C240	PDK1	5043
P41252_C350	IARS Isoleucine--tRNA ligase, cytoplasmic	2344	Q5M775_C805	SPECC1 Cytospin-B	5044
O60343_C316	TBC1D4 TBC1 domain family member 4	2345	Q9H845_C507	ACAD9 Acyl-CoA dehydrogenase family member 9, mitochondrial	5045
Q96JB2_C349	COG3 Conserved oligomeric Golgi complex subunit 3	2346	Q8TF72_C1983	SHROOM3 Protein Shroom3	5046
Q9Y490_C1978	TLN1 Talin-1	2347	Q7Z5L9_C521	IRF2BP2 Interferon regulatory factor 2-binding protein 2	5047
P23381_C62	WARS Tryptophan--tRNA ligase, cytoplasmic	2348	Q86VP6_C237	CAND1 Cullin-associated NEDD8-dissociated protein 1	5048
P27708_C280	CAD CAD protein	2349	O43148_C95	RNMT mRNA cap guanine-N7 methyltransferase	5049
Q9Y3Z3_C80	SAMHD1 SAM domain and HD domain-containing protein 1	2350	P27144_C104	AK4 Adenylate kinase isoenzyme 4, mitochondrial	5050
Q53H96_C49	PYCR1 Pyroline-5-carboxylate reductase 3	2351	P67775_C269	PPP2CA Serine/threonine-protein phosphatase 2A catalytic	5051
Q9HCC0_C431	MCCC2 Methylcrotonoyl-CoA carboxylase beta chain, mitochondrial	2352	Q92667_C438	AKAP1 A-kinase anchor protein 1, mitochondrial	5052
P47897_C358	QARS Glutamine--tRNA ligase	2353	Q9NYL2_C285	MLTK Mitogen-activated protein kinase kinase kinase MLT	5053
P55084_C435	HADHB Trifunctional enzyme subunit beta, mitochondrial	2354	Q9Y5X2_C455	SNX8 Sorting nexin-8	5054
P30405_C157	PPIF Peptidyl-prolyl cis-trans isomerase F, mitochondrial	2355	Q14152_C185	EIF3A Eukaryotic translation initiation factor 3 subunit	5055
P08567_C160	PLEK Pleckstrin	2356	Q15669_C108	RHOH Rho-related GTP-binding protein RhoH	5056
A6NHR9_C84	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	2357	P19623_C89	SRM Spermidine synthase	5057
Q9Y2X3_C439	NOP58 Nucleolar protein 58	2358	P63244_C153	GNB2L1 Guanine nucleotide-binding protein subunit beta-2-like 1	5058
O00410_C420	IPO5 Importin-5	2359	Q9NZB2_C892	FAM120A Constitutive coactivator of PPAR-gamma-like protein	5059
P09382_C61	LGALS1 Galectin-1	2360	Q15398_C696	DLGAP5 Disks large-associated protein 5	5060
O75150_C950	RNF40 E3 ubiquitin-protein ligase BRE1B	2361	O60566_C51	BUB1B Mitotic checkpoint serine/threonine-protein kinase	5061
P11021_C420	HSPA5 78 kDa glucose-regulated protein	2362	Q9UDY4_C175	DNAJB4 DnaJ homolog subfamily B member 4	5062

P29401_C 133	TKT Transketolase	2363	Q03001_ C6799	DST Dystonin	5063
Q92598_C 658	HSPH1 Heat shock protein 105 kDa	2364	P11182_ C279	DBT Lipoamide acyltransferase component of branched-chain transacylase E2	5064
043795_C 129	MYOIB Unconventional myosin-Ib	2365	P56537_ C110	EIF6 Eukaryotic translation initiation factor 6	5065
075369_C 1326	FLNB Filamin-B	2366	015037_ C157	KHNYN Protein KHNYN	5066
Q70E73_ C94	RAPH1 Ras-associated and pleckstrin homology domains-con	2367	Q15052_ C57	ARHGEF6 Rho guanine nucleotide exchange factor 6	5067
Q0PNE2_ C218	ELP6 Elongator complex protein 6	2368	Q15052_ C553	ARHGEF6 Rho guanine nucleotide exchange factor 6	5068
Q12996_C 628	CSTF3 Cleavage stimulation factor subunit 3	2369	000592_ C381	PODXL Podocalyxin	5069
P09543_C 49	CNP 2,3-cyclic-nucleotide 3-phosphodiesterase	2370	E7EVH7 C408	KLC1 Kinesin light chain 1	5070
Q8WW9_ C405	HNRPLL Heterogeneous nuclear ribonucleoprotein L-like	2371	E7EVH7_ C628	KLC1 Kinesin light chain 1	5071
Q8N4X5_ C467	AFAP1L2 Actin filament-associated protein 1-like 2	2372	Q9H2U2 C161	PPA2 Inorganic pyrophosphatase 2, mitochondrial	5072
Q8IUI8_C 313	CRLF3 Cytokine receptor-like factor 3	2373	P24390_ C29	KDELRL1 ER lumen protein retaining receptor 1	5073
Q9BPX3_ C843	NCAPG Condensin complex subunit 3	2374	Q9H0W9 C149	C1lorf54 Ester hydrolase C1lorf54	5074
P30566_C 27	ADSL Adenylosuccinate lyase	2375	Q9H0W9 C154	C1lorf54 Ester hydrolase C1lorf54	5075
000469_C 494	PLOD2 Procollagen-lysine,2-oxoglutarate 5-dioxygenase 2	2376	Q9UK59 C339	DBR1 Lariat debranching enzyme	5076
Q92616_C 55	GCN1L1 Translational activator GCN1	2377	Q6P2Q9_ C435	PRPF8 Pre-mRNA-processing-splicing factor 8	5077
P49327_C 212	FASN Fatty acid synthase	2378	075586_ C137	MED6 Mediator of RNA polymerase II transcription subunit	5078
P42166_C 330	TMPO I-amina-associated polypeptide 2, isoform alpha	2379	Q99933_ C213	BAG1 BAG family molecular chaperone regulator 1	5079
P55769_C 73	NHP2L1 NHP2-like protein 1	2380	Q9H4L5_ C515	OSBPL3 Oxysterol-binding protein-related protein 3	5080
Q9UQ35_ C2116	SRRM2 Serine/arginine repetitive matrix protein 2	2381	Q14149_ C694	MORC3 MORC family CW-type zinc finger protein 3	5081
P01591_C 91	IGJ Immunoglobulin J chain	2382	Q92546_ C314	RGP1 Retrograde Golgi transport protein RGP1 homolog	5082
P61970_C 38	NUTF2 Nuclear transport factor 2	2383	P46821_ C1228	MAP1B Microtubule-associated protein 1B	5083
094953_C 547	KDM4B Lysine-specific demethylase 4B	2384	060343_ C753	TBC1D4 TBC1 domain family member 4	5084
Q15149_C 730	PLEC Plectin	2385	Q9UBT2 C432	UBA2 SUMO-activating enzyme subunit 2	5085
Q9ULW0 C301	TPX2 Targeting protein for Xklp2	2386	Q86SQ0_ C935	PHLDB2 Pleckstrin homology-like domain family B member 2	5086
Q9UNF1_ C516	MAGED2 Melanoma-associated antigen D2	2387	Q96A65_ C957	EXOC4 Exocyst complex component 4	5087
P51808_C 8	DYNLT3 Dynein light chain Tctex-type 3	2388	014980_ C498	XPO1 Exportin-1	5088

Q09666_C 5502	AHNAK Neuroblast differentiation-associated protein AHNA	2389	Q9ULP9_C29	TBC1D24 TBC1 domain family member 24	5089
P27348_C 25	YWHAQ 14-3-3 protein theta	2390	P28290_C448	SSFA2 Sperm-specific antigen 2	5090
Q8WUM0_C811	NUP133 Nuclear pore complex protein Nup133	2391	P31948_C62	STIP1 Stress-induced-phosphoprotein 1	5091
P52789_C 628	HK2 Hexokinase-2	2392	095071_C739	UBR5 E3 ubiquitin-protein ligase UBR5	5092
060716_C 618	CTNND1 Catenin delta-1	2393	Q96L91_C694	EP400 E1A-binding protein p400	5093
P26599_C 251	PTBP1 Polypyrimidine tract-binding protein 1	2394	Q9Y2L1_C357	DIS3 Exosome complex exonuclease RRP44	5094
P23528_C 147	CFL1 Cofilin-1	2395	Q96L94_C184	SNX22 Sorting nexin-22	5095
Q14694_C 94	USP10 Ubiquitin carboxyl-terminal hydrolase 10	2396	Q15437_C40	SEC23B Protein transport protein Sec23B	5096
P36507_C 384	MAP2K2 Dual specificity mitogen-activated protein kinase	2397	Q9H0F6_C140	SHARPEN Sharpin	5097
Q9UJX3_C259	ANAPC7 Anaphase-promoting complex subunit 7	2398	Q6NZY4_C633	ZCCHC8 Zinc finger CCHC domain-containing protein 8	5098
Q9BV20_C168	MRI1 Methylthioribose-1-phosphate isomerase	2399	Q6NVY1_C271	HIBCH 3-hydroxyisobutyryl-CoA hydrolase, mitochondrial	5099
Q9Y696_C189	CLIC4 Chloride intracellular channel protein 4	2400	P38432_C425	COIL Coilin	5100
Q6ZMK1_C342	CYHR1 Cysteine and histidine-rich protein 1	2401	Q29RF7_C508	PDS5A Sister chromatid cohesion protein PDS5 homolog A	5101
P45954_C 139	ACADSB Short/branched chain specific acyl-CoA dehydrogenase	2402	Q29RF7_C925	PDS5A Sister chromatid cohesion protein PDS5 homolog A	5102
P15121_C 187	AKR1B1 Aldose reductase	2403	Q8N5C7_C40	DTWD1 DTW domain-containing protein 1	5103
Q9NR50_C64	EEF2B3 Translation initiation factor eIF-2B subunit gamma	2404	060437_C660	PPL Pcriplakin	5104
Q14980_C 1907	NUMA1 Nuclear mitotic apparatus protein 1	2405	Q15042_C678	RAB3GAP1 Rab3 GTPase-activating protein catalytic subunit	5105
043707_C 793	ACTN4 Alpha-actinin-4	2406	015111_C406	CHUK Inhibitor of nuclear factor kappa-B kinase subunit	5106
043707_C 879	ACTN4 Alpha-actinin-4	2407	P499I5_C554	GMPS GMP synthase	5107
Q9NPA3_C62	MIDI1 IP1 Midi-interacting protein 1	2408	Q9Y490_C709	TLN1 Talin-1	5108
Q5UIP0_C2450	RIF1 Telomere-associated protein RIF1	2409	Q9Y490_C1661	TLN1 Talin-1	5109
P41134_C 17	ID1 DNA-binding protein inhibitor ID-1	2410	Q9UGI8_C238	TES Testin	5110
Q13509_C 129	TUBB3 Tubulin beta-3 chain	2411	Q9Y3D3_C26	MRPS16 28S ribosomal protein S16, mitochondrial	5111
Q16718_C 17	NDUFA5 NADH dehydrogenase	2412	Q8WUY1_C104	THEM6 UPF0670 protein THEM6	5112
Q9H6K1_C18	C6orf106 Uncharacterized protein C6orf106	2413	Q969Y2_C489	GTPBP3 tRNA modification GTPase GTPBP3, mitochondrial	5113
Q13057_C 144	COASY Bifunctional coenzyme A synthase	2414	Q13042_C194	CDCl6 Cell division cycle protein 16 homolog	5114

P28838_C 313	LAP3 Cytosol aminopeptidase	2415	Q8IWP9_ C108	CCDC28A Coiled-coil domain- containing protein 28A	5115
Q96EP0_ C504	RNF31 E3 ubiquitin-protein ligase RNF31	2416	Q13469_ C386	NFATC2 Nuclear factor of activated T- cells, cytoplasmic 2	5116
P08107_C 17	HSPA1B Heat shock 70 kDa protein 1A/1B	2417	Q13263_ C232	TRIM28 Transcription intermediary factor 1-beta	5117
P27708_C 1455	CAD CAD protein	2418	Q16822_ C210	PCK2 Phosphoenolpyruvate carboxykinase	5118
P23497_C 309	SP100 Nuclear autoantigen Sp- 100	2419	Q96BY7_ C891	ATG2B Autophagy-related protein 2 homolog B	5119
PI1498_C 739	PC Pyruvate carboxylase, mitochondrial	2420	Q9H8M7 C27	FAM188A Protein FAM188A	5120
Q02790_C 396	FKBP4 Peptidyl-prolyl cis- trans isomerase FKBP4	2421	Q8N7H5 C36	PAF1 RNA polymerase II-associated factor 1 homolog	5121
P48507_C 35	GCLM Glutamate-cysteine ligase regulatory subunit	2422	000116_ C226	AGPS Alkyldihydroxyacetonephosphate synthase, peroxisom	5122
P55735_C 245	SEC13 Protein SEC13 homolog	2423	014641_ C354	DVL2 Segment polarity protein dishevelled homolog DVL-2	5123
P00367_C 376	GLUD1 Glutamate dehydrogenase 1, mitochondrial	2424	P49588_ C723	AARS Alanine-tRNA hgase, cytoplasmic	5124
P52701_C 1075	MSH6 DNA mismatch repair protein Msh6	2425	Q9H0G5 C171	NSRP1 Nuclear speckle splicing regulatory protein 1	5125
Q14166_C 612	TTL12 Tubulin-tyrosine ligase-like protein 12	2426	Q9NZN5 C784	ARIIGEF12 Rho guanine nucleotide exchange factor 12	5126
Q6PKG0_ C502	LARP1 La-related protein 1	2427	Q5JVF3_ C362	PCID2 PCI domain-containing protein 2	5127
Q9NVS9_ C156	PNPO Pyridoxine-5-phosphate oxidase	2428	P56192_ C566	MARS Methionine-tRNA ligase, cytoplasmic	5128
Q99873_C 93	PRMT1 Protein arginine N- methyltransferase 1	2429	P07954_ C434	FH Fumarate hydratase, mitochondrial	5129
Q9H4A6_ C84	GOLPH3 Golgi phosphoprotein 3	2430	P09429_ C106	HMGB1 High mobility group protein B1	5130
P78347_C 34	GTF2I General transcription factor II-I	2431	Q9BVP2 C158	GNL3 Guanine nucleotide-binding protein-like 3	5131
Q96FZ2_ C39	C3orf37 UPF0361 protein C3orf37	2432	Q138I3_ C315	SPTAN1 Spectrin alpha chain, non- erythrocytic 1	5132
060547_C 336	GMDS GDP-mannose 4,6 dehydratase	2433	Q66PJ3_ C159	ARL6IP4 ADP-ribosylation factor-like protein 6-interacting	5133
P62979_C 149	RPS27A Ubiquitin-40S ribosomal protein S27a	2434	P55957_ C15	BID BH3-interacting domain death agonist	5134
P52732_C 911	KIF11 Kinesin-like protein KIF11	2435	Q9H4A3 C547	WNKI Serine/threonine-protein kinase WNKI	5135
P40938_C 32	RFC3 Replication factor C subunit 3	2436	P27797_ C137	CALR Calreticulin	5136
P31943_C 34	HNRNPHI Heterogeneous nuclear ribonucleoprotein H	2437	P15498_ C83	VAV1 Proto-oncogene vav	5137
Q8NIF7_ C422	NUP93 Nuclear pore complex protein Nup93	2438	Q9Y572_ C365	RIPK3 Receptor-interacting serine/threonine-protein kina	5138
Q16643_C 96	DBN1 Drebrin	2439	Q8DZ90_ C290	SKA3 Spindle and kinetochore- associated protein 3	5139
P45880_C 76	VDAC2 Voltage-dependent anion-selective channel protein	2440	096019_ C32	ACTL6A Actin-like protein 6A	5140

Q9BYG5_C13	PARD6B Partitioning defective 6 homolog beta	2441	P46939_C447	UTRNUtrophin	5141
P42765_C128	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	2442	P46939_C1759	UTRNUtrophin	5142
Q96HC4_C213	PDLIM5 PDZ and LIM domain protein 5	2443	P52701_C1275	MSH6 DNA mismatch repair protein Msh6	5143
015042_C320	U2SURP U2 snRNP-associated SURP motif-containing protein	2444	Q14160_C1612	SCRIB Protein scribble homolog	5144
Q96IY1_C224	NSL1 Kinetochore-associated protein NSL1 homolog	2445	014879_C39	IFIT3 Interferon-induced protein with tetratricopeptide	5145
P12270_C1068	TPR Nucleoprotein TPR	2446	Q16543_C64	CDC37 Hsp90 co-chaperone Cdc37	5146
P01591_C156	IGJ Immunoglobulin J chain	2447	075962_C868	TRIO Triple functional domain protein	5147
P53992_C1083	SEC24C Protein transport protein Sec24C	2448	Q9H3S7_C1466	PTPN23 Tyrosine-protein phosphatase non-receptor type 23	5148
Q92973_C142	TNPO1 Transportin-1	2449	P26196_C102	DDX6 Probable ATP-dependent RNA helicase DDX6	5149
P32321_C60	DCTD Deoxycytidylate deaminase	2450	P33992_C207	MCM5 DNA replication licensing factor MCM5	5150
P62195_C112	PSMC5 26S protease regulatory subunit 8	2451	014893_C34	GEMIN2 Gem-associated protein 2	5151
P31146_C40	CORO 1A Coronin- 1A	2452	Q86SE5_C51	RALYL RNA-binding Raly-like protein	5152
P12814_C774	ACTN1 Alpha-actinin-1	2453	Q9BUN5_C13	CCDC28B Coiled-coil domain-containing protein 28B	5153
Q04726_C528	TLE3 Transducin-like enhancer protein 3	2454	Q9NR12_C388	PDLIM7 PDZ and LIM domain protein 7	5154
Q52LJ0_C216	FAM98B Protein FAM98B	2455	Q9NR19_C75	ACSS2 Acetyl-coenzyme A synthetase, cytoplasmic	5155
P04083_C270	ANXA1 AnnexinA1	2456	Q9Y2X0_C790	MED16 Mediator of RNA polymerase II transcription subunit	5156
094925_C203	GLS Glutaminase kidney isoform, mitochondrial	2457	Q9Y2X0_C801	MED 16 Mediator of RNA polymerase II transcription subunit	5157
Q9GZP4_C187	PITHD1 PITH domain-containing protein 1	2458	Q00325_C237	SLC25A3 Phosphate carrier protein, mitochondrial	5158
P33764_C14	S100A3 Protein S100-A3	2459	095861_C243	BPNT1 3(2),5-bisphosphate nucleotidase 1	5159
Q9UKK9_C76	NUDT5 ADP-sugar pyrophosphatase	2460	Q5VUA4_C475	ZNF3 18 Zinc finger protein 3 18	5160
P38117_C71	ETFB Electron transfer flavoprotein subunit beta	2461	Q8TDZ2_C837	MICAL1 Protene-methionine sulfoxide oxidase MICAL1	5161
095817_C151	BAG3 BAG family molecular chaperone regulator 3	2462	Q7RTV0_C61	PHF5A PHD finger-like domain-containing protein 5A	5162
Q27J81_C898	INF2 Inverted formin-2	2463	Q9Y4R8_C644	TEL02 Telomere length regulation protein TEL2 homolog	5163
Q9C0C2_C1443	TNKSIBPI 182 kDa tankyrase- 1-binding protein	2464	Q2PPJ7_C838	RALGAPA2 Ral GTPase-activating protein subunit alpha-2	5164
Q9C0C9_C314	UBE20 Ubiquitin-conjugating enzyme E2 O	2465	P09382_C131	LGALS1 Galectin-1	5165
P84090_C69	ERH Enhancer of rudimentary homolog	2466	095081_C30	AGFG2 Arf-GAP domain and FG repeat-containing protein 2	5166
Q8TDN6_C52	BRX1 Ribosome biogenesis protein BRX1 homolog	2467	Q8WV74_C224	NUDT8 Nucleoside oUphosphate-linked moiety X motif 8, mitochondrial	5167

P42704_C 484	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	2468	Q86Y37_C166	CACUL1 CDK2-associated and cullin domain-containing prote	5168
Q9NR56_C53	MBNL1 Muscblind-like protein 1	2469	043414_C258	ERI3 ERI1 exoribonuclease 3	5169
P14678_C43	SNRPB Small nuclear ribonucleoprotein-associated protein	2470	Q6PON0_C890	MIS18BP1 Mis18-binding protein 1	5170
Q86VP6_C1134	CAND1 Cullin-associated NEDD8-dissociated protein 1	2471	Q5SW96_C286	LDLRAP1 Low density lipoprotein receptor adapter protein 1	5171
P14324_C333	FDPS Farnesyl pyrophosphate synthase	2472	Q96FW1_C212	OTUB1 Ubiquitin thioesterase OTUB1	5172
P07237_C312	P4HB Protein disulfide-isomerase	2473	Q7Z7H8_C180	MRPL10 39S ribosomal protein L10, mitochondrial	5173
Q9BXJ9_C238	NAA15 N-alpha-acetyltransferase 15, NatA auxiliary subunit	2474	P21266_C208	GSTM3 Glutathione S-transferase Mu 3	5174
Q99614_C28	TTC1 Tetratricopeptide repeat protein 1	2475	Q8N5F7_C47	NKAP NF-kappa-B-activating protein	5175
Q9UDY2_C914	TJP2 Tight junction protein ZO-2	2476	Q00534_C83	CDK6 Cyclin-dependent kinase 6	5176
Q06210_C254	GFPT1 Glucosamine-fructose-6-phosphate aminotransferase	2477	Q00537_C233	CDK17 Cyclin-dependent kinase 17	5177
P55199_C14	ELL RNA polymerase II elongation factor ELL	2478	Q13838_C300	DDX39B Spliceosome RNA helicase DDX39B	5178
Q9H2U2_C180	PPA2 Inorganic pyrophosphatase 2, mitochondrial	2479	Q9HB09_C266	BCL2L12 Bcl-2-like protein 12	5179
Q6UB35_C779	MTHFD1L Monofunctional C1-tetrahydrofolate synthase, mitochondrial	2480	P13693_C172	TPT1 Translationally-controlled tumor protein	5180
P34897_C80	SHMT2 Serine hydroxymethyltransferase, mitochondrial	2481	Q9H6Q4_C300	NARFL Cytosolic Fe-S cluster assembly factor NARFL	5181
P13798_C30	APEH Acylamino-acid-releasing enzyme	2482	P05388_C226	RPLP0 60S acidic ribosomal protein P0	5182
095671_C333	ASMTL N-acetylserotonin O-methyltransferase-like protein	2483	P16885_C937	PLCG2 1-phosphatidylinositol4,5-bisphosphate phosphodiesterase	5183
095671_C441	ASMTL N-acetylserotonin O-methyltransferase-like protein	2484	P16885_C1082	PLCG2 1-phosphatidylinositol4,5-bisphosphate phosphodiesterase	5184
Q9NQW6_C309	ANLN Acun-binding protein anillin	2485	Q13905_C474	RAPGEF1 Rap guanine nucleotide exchange factor 1	5185
Q04206_C109	RELA Transcription factor p65	2486	075439_C485	PMPCB Mitochondrial-processing peptidase subunit beta	5186
P31350_C202	RRM2 Ribonucleoside-diphosphate reductase subunit M2	2487	P43034_C168	PAFAH1B1 Platelet-activating factor acetylhydrolase IB subunit	5187
P08107_C306	HSPA1B Heat shock 70 kDa protein 1A/1B	2488	A6NDG6_C35	PGP Phosphoglycolate phosphatase	5188
075914_C424	PAK3 Serine/threonine-protein kinase PAK 3	2489	A6NDG6_C217	PGP Phosphoglycolate phosphatase	5189
P27708_C379	CAD CAD protein	2490	060610_C314	DIAPH1 Protein diaphanous homolog 1	5190

P62910_C 96	RPL32 60S ribosomal protein L32	2491	Q92598_ C167	HSPH1 Heat shock protein 105 kDa	5191
Q9Y570_ C347	PPME1 Protein phosphatase methyltransferase 1	2492	Q13011_ C92	ECHI DeIta(3,5)-Delta(2,4)-dienoyl- CoA isomerase, mitochondrial	5192
Q92499_C 110	DDX1 ATP-dependent RNA helicase DDX1	2493	Q8NEM2 C591	SHCBP1 SHC SH2 domain-binding protein 1	5193
P30405_C 203	PP1F Peptidyl-prolyl cis-trans isomerase F, mitochondrial	2494	Q9NRH3 C13	TUBG2 Tubulin gamma-2 chain	5194
Q92621_C 1662	NUP205 Nuclear pore complex protein Nup205	2495	Q8NFC6 C1849	BOD IL1 Bionentation of chromosomes in cell division protein 1-like 1	5195
Q14376_C 196	GALE UDP-glucose 4- epimerase	2496	Q7L8L6_ C670	FASTKD5 FAST kinase domain- containing protein 5	5196
075717_C 1008	WDHD1 WD repeat and HMG-box DNA-binding protein 1	2497	Q13123_ C263	IK Protein Red	5197
Q03933_C 369	HSF2 Heat shock factor protein 2	2498	Q9UPN3 C666	MACF1 Microtubule-actin cross- linking factor 1, isoforms	5198
Q00535_C 290	CDK5 Cyclin-dependent kinase 5	2499	Q9UPN3 C7245	MACF1 Microtubule-actin cross- linking factor 1, isoforms	5199
B5ME19_ C753	EIF3CL Eukaryotic translation initiation factor 3 subunit	2500	Q9UPN7 C689	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	5200
Q9NVP2_ C189	ASF1B Histone chaperone ASF1B	2501	Q9UGP4 C374	LIMD1 LIM domain-containing protein 1	5201
Q13018_C 1354	PLA2R1 Secretory phospholipase A2 receptor	2502	Q9UGP4 C401	LIMD1 LIM domain-containing protein 1	5202
Q15181_C 242	PPA1 Inorganic pyrophosphatase	2503	075369_ C183	FLNB Filarnin-B	5203
Q7Z5K2_ CI170	WAPAL Wings apart-like protein homolog	2504	075369_ C604	FLNB Filamin-B	5204
Q13642_C 71	FHL1 Four and a half LIM domains protein 1	2505	P40763_ C687	STAT3 Signal transducer and activator of transcription 3	5205
P48556_C 274	PSMD8 26S proteasome non- ATPase regulatory subunit 8	2506	Q13347_ C160	EIF3I Eukaryotic translation initiation factor 3 subunit	5206
Q9UBL3_ C362	ASH2L Set1/Ash2 histone methyltransferase complex subunit	2507	Q96KG9 _C210	SCYL1 N-terminal kinase-like protein	5207
Q8TBB5_ C373	KLHDC4 Kelch domain- containing protein 4	2508	Q96KG9 C241	SCYL1 N-terminal kinase-like protein	5208
P07339_C 329	CTSD Cathepsin D	2509	P21980_ C27	TGM2 Proteom-glutamine gamma- glutamyltransferase 2	5209
Q7Z6Z7_ C1401	HUWE1 E3 ubiquitin-protein ligase HUWE1	2510	P21980_ C524	TGM2 Proteom-glutamine gamma- glutamyltransferase 2	5210
Q16514_C 100	TAF12 Transcription initiation factor TFHD subunit 12	2511	Q9ULJ6_ C81	ZMIZ1 Zinc finger MIZ domain- containing protein 1	5211
P63151_C 239	PPP2R2A Serme/trireonine- protein phosphatase 2A 55 kDa regulatory subunit B alpha isofonn	2512	P30519_ C265	HMOX2 Heme oxygenase 2	5212
Q7L2H7_ C175	EIF3M Eukaryotic translation initiation factor 3 subunit	2513	Q96RE7_ C178	NACC1 Nucleus accumbens-associated protein 1	5213
Q8NHV4_ C66	NEDD1 Protein NEDD1	2514	Q96RE7_ C301	NACC1 Nucleus accumbens-associated protein 1	5214
P13010_C 339	XRCC5 X-ray repair cross- complementing protein 5	2515	Q96GX9 C32	APIP Probable methylthioribulose-1- phosphate dehydratase	5215

P51858_C 108	HDGF Hepatoma-derived growth factor	2516	P49792_ C1335	RANBP2 E3 SUMO-protein ligase RanBP2	5216
P26038_C 284	MSN Moesin	2517	P49792_ C2696	RANBP2 E3 SUMO-protein ligase RanBP2	5217
P68402_C 206	PAFAH1B2 Platelet-activating factor acetylhydrolase IB subunit	2518	P56545_ C60	CTBP2 C-terminal-binding protein 2	5218
P15407_C 97	FOSL1 Fos-related antigen 1	2519	Q5SRE5_ C1433	NUP188 Nucleoporin NUP1 88 homolog	5219
Q12768_C 21	KIAA0196 WASH complex subunit strumpeUin	2520	Q9P0L0_ C128	VAPA Vesicle-associated membrane protein-associated protein A, 33kDa	5220
P29144_C 28	TPP2 Tripeptidyl-peptidase 2	2521	Q9Y618_ C2447	NCOR2 Nuclear receptor corepressor 2	5221
P78371_C 412	CCT2 T-complex protein 1 subunit beta	2522	Q9Y617_ C175	PSAT1 Phosphoserine aminotransferase	5222
060711_C 340	LPXN Leupaxin	2523	Q9Y617_ C245	PSAT1 Phosphoserine aminotransferase	5223
Q9H9Q2_ C110	COPS7B COP9 signalosome complex subunit 7b	2524	Q9U1A9_ C244	XP07 Exportin-7	5224
P40261_C 165	NNMT Nicotinamide N-methyltransferase	2525	Q9H8U3 C118	ZFAND3 AN 1-type zinc finger protein 3	5225
Q9BWJ5_ C76	SF3B5 Splicing factor 3B subunit 5	2526	000506_ C73	STK25 Serine/threonine-protein kinase 25	5226
P50479_C 44	PDLIM4 PDZ and LIM domain protein 4	2527	Q4G0N4 C311	NADKD1 NAD kinase domain-containing protein 1	5227
Q5JRX3_ C556	PITRMI Presequence protease, mitochondrial	2528	Q4V328_ C744	GRIPAP1 GRIP 1-associated protein 1	5228
Q9ULE6_ C845	PALDI Paladin	2529	Q9BXP5 C479	SRRT Serrate RNA effector molecule homolog	5229
Q9NXV6_ C178	CDKN2AIP CDKN2A-interacting protein	2530	Q01581_ C268	HMGCS1 Hydroxymethylglutaryl-CoA synthase, cytoplasmic	5230
P13639_C 67	EEF2 Elongation factor 2	2531	P46013_ C643	MKI67 Antigen KI-67	5231
P04183_C 79	TK1 Thymidine kinase, cytosolic	2532	P17858_ C351	PFKL 6-phosphofructokuiase, liver type	5232
Q9H8V3_ C221	ECT2 Protein ECT2	2533	Q9H7Z7_ C110	PTGES2 Prostaglandin E synthase 2	5233
Q9NPJ6_ C162	MED4 Mediator of RNA polymerase II transcription subunit	2534	075083_ C194	WDR1 WD repeat-containing protein 1	5234
Q5VTR2_ C924	RNF20 E3 ubiquitin-protein ligaseBREIA	2535	043252_ C127	PAPSS1 Bifunctional 3-phosphoadenosine 5-phosphosulfate synthase 1	5235
000231_C 202	PSMD1 1 26S proteasome non-ATPase regulatory subunit 11	2536	Q09028_ C278	RBBP4 Histone-binding protein RBBP4	5236
P50995_C 384	ANXA11 Annexin All	2537	Q8WXH0 C1235	SYNE2 Nesprin-2	5237
P62851_C 59	RPS25 40S ribosomal protein S25	2538	Q9UPM8 C1119	AP4E1 AP-4 complex subunit epsilon-1	5238
Q12906_C 203	ILF3 Interleukin enhancer-binding factor 3	2539	P23368_ C428	ME2 NAD-dependent malic enzyme, mitochondrial	5239
Q13315_C 2770	ATM Serine-protein kinase ATM	2540	095402_ C598	MED26 Mediator of RNA polymerase II transcription subunit	5240
P22681_C 508	CBL E3 ubiquitin-protein ligase CBL	2541	Q8TD19_ C808	NEK9 Serine/threonine-protein kinase Nek9	5241

P35998_C 270	PSMC2 26S protease regulatory subunit 7	2542	P11216_ C109	PYGB Glycogen phosphorylase, brain form	5242
075570_C 137	MTRF1 Peptide chain release factor 1, mitochondrial	2543	P40938_ C11	RFC3 Replication factor C subunit 3	5243
P35579_C 1437	MYH9 Myosin-9	2544	P40939_ C110	HADHA Trifunctional enzyme subunit alpha, mitochondrial	5244
P48643_C 493	CCT5 T-complex protein 1 subunit epsilon	2545	P40939_ C550	HADHA Trifunctional enzyme subunit alpha, mitochondrial	5245
P52209_C 422	PGD 6-phosphogluconate dehydrogenase, decarboxylating	2546	Q8NCW5 _C127	APOA1BP NAD(P)H-hydrate epimerase	5246
Q13155_C 306	AIMP2 Aminoacyl tRNA synthase complex-interacting multifunctional protein 2	2547	Q13356_ C15	PPIL2 Peptidyl-prolyl cis-trans isomerase-like 2	5247
Q14197_C 82	ICT1 Peptidyl-tRNA hydrolase ICT1, mitochondrial	2548	Q5F1R6_ C3	DNAJC21 DnaJ homolog subfamily C member 21	5248
C9J4G0_ C66	C17orf49 HCG32827, isoform CRA_d	2549	P40337_ C77	VHL Von Hippel-Lindau disease tumor suppressor	5249
P00338_C 185	LDHA L-lactate dehydrogenase A chain	2550	Q8N6R0_ C226	METTL13 Methyltransferase-like protein 13	5250
Q9UBQ0_ C41	VPS29 Vacuolar protein sorting-associated protein 29	2551	P39023_ C336	RPL3 60S ribosomal protein L3	5251
Q15645_C 14	TRIP13 Pachytene checkpoint protein 2 homolog	2552	P51610_ C135	HCFC1 Host cell factor 1	5252
Q9H1K1_ C69	ISCU Iron-sulfur cluster assembly enzyme ISCU, mitochondrial	2553	Q12800_ C453	TFCP2 Alpha-globin transcription factor CP2	5253
P30101_C 244	PDIA3 Protein disulfide- isomerase A3	2554	Q9Y281_ C39	CFL2 Cofilin-2	5254
P09884_C 1458	POLA1 DNA polymerase alpha catalytic subunit	2555	Q5T4S7_ C1274	UBR4 E3 ubiquitin-protein ligase UBR4	5255
Q9NT62_ C182	ATG3 Ubiquitin-like- conjugating enzyme ATG3	2556	Q5T4S7_ C2222	UBR4 E3 ubiquitin-protein ligase UBR4	5256
Q7L591_ C323	DOK3 Docking protein 3	2557	Q5T4S7_ C4049	UBR4 E3 ubiquitin-protein ligase TJBR4	5257
Q6IA86_ C487	ELP2 Elongator complex protein 2	2558	000154_ C117	ACOT7 Cytosolic acyl coenzyme A thioester hydrolase	5258
P54819_C 40	AK2 Adenylate kinase 2, mitochondrial	2559	Q53EZ4_ C159	CEP55 Centrosomal protein of 55 kDa	5259
P23610_C 110	F8A3 Factor VIII intron 22 protein	2560	Q5VV42 C138	CDKAL1 Threonylcarbamoyladenosine tRNA methyltransferase	5260
P13861_C 101	PRKAR2A cAMP-dependent protein kinase type II-alpha regulatory subunit	2561	Q9P2A4_ C145	ABI3 ABI gene family member 3	5261
Q96ER3_ C366	SAAL1 Protein SAAL1	2562	Q9BRR8 C839	GPATCH1 G patch domain-containing protein 1	5262
Q92597_C 272	NDRG1 Protein NDRG 1	2563	Q9Y310_ C122	C22orf28 tRNA-splicing ligase RtcB homolog	5263
Q6P9B6_ C13	KIAA1609 TLD domain- containing protein KIAA1609	2564	P28331_ C92	NDUFS1 NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial	5264
075663_C 14	TIPRL TIP4Mike protein	2565	P62826_ C122	RAN GTP-binding nuclear protein Ran	5265
Q05086_C 49	UBE3A Ubiquitin-protein ligase E3A	2566	Q9BZE1_ C153	MRPL37 39S ribosomal protein L37, mitochondrial	5266

Q14152_C 78	EIF3A Eukaryotic translation initiation factor 3 subunit	2567	P01033_ C197	TIMP1 Metalloproteinase inhibitor 1	5267
P63244_C 207	GNB2L1 Guanine nucleotide-binding protein subunit beta-2-like 1	2568	Q99661_ C610	KIF2C Kinesin-like protein KIF2C	5268
Q13509_C 201	TUBB3 Tubulin beta-3 chain	2569	Q99666_ C1601	RGPD6 RANBP2-like and GRIP domain-containing protein 5/6	5269
Q9Y6A5_ C502	TACC3 Transforming acidic coiled-coil-containing protein	2570	P24468_ C343	NR2F2 COUP transcription factor 2	5270
Q86W42_ C314	THOC6 THO complex subunit 6 homolog	2571	060701_ C288	UGDH UDP-ghucose 6-dehydrogenase	5271
Q92878_C 157	RAD50 DNA repair protein RAD50	2572	043488_ C214	AKR7A2 Aflatoxin B1 aldehyde reductase member 2	5272
075879_C 228	PET112 Glutamyl-tRNA(Gln) amidotransferase subunit B, mitochondrial	2573	P53618_ C102	COPB1 Coatomer subunit beta	5273
Q9UHB9_ C562	SRP68 Signal recognition particle 68 kDa protein	2574	Q8WV24 C148	PHLDA1 Pleckstrin homology-like domain family A member 1	5274
P41250_C 155	GARS Glycine-tRNA ligase	2575	Q8WV24 C266	PHLDA1 Pleckstrin homology-like domain family A member 1	5275
P46821_C 1814	MAP1B Microtubule-associated protein 1B	2576	Q8TEX9 C483	IP04 Importin-4	5276
014980_C 723	XPO1 Exportin-1	2577	095433_ C301	AHSA1 Activator of 90 kDa heat shock protein ATPase homolog	5277
PI3796_C 164	LCPI1 Plastin-2	2578	P49327_ C1992	FASN Fatty acid synthase	5278
PI3796_C 336	LCPI1 Plastin-2	2579	Q99447_ C30	PCYT2 Ethanolamine-phosphate cytidyltransferase	5279
Q9Y2L1_ C533	DIS3 Exosome complex exonuclease RRP44	2580	P49321_ C254	NASP Nuclear autoantigenic sperm protein	5280
Q9NQW6 C96	ANLN Actin-binding protein anillin	2581	P14618_ C165	PKM Pyruvate kinase isozymes M1/M2	5281
P43246_C 176	MSH2 DNA mismatch repair protein Msh2	2582	Q05655_ C393	PRKCD Protein kinase C delta type	5282
Q9Y4L1_ C352	HYOU1 Hypoxia up-regulated protein 1	2583	Q14012_ C179	CAMK1 Calcium/calmodulin-dependent protein kinase type 1	5283
P15153_C 105	RAC2 Ras-related C3 botulinum toxin substrate 2	2584	Q15746_ C1077	MYLK Myosin light chain kinase, smooth muscle	5284
Q9H0G5_ C232	NSRP1 Nuclear speckle splicing regulatory protein 1	2585	043353_ C414	RIPK2 Receptor-interacting serine/threonine-protein kinase 2	5285
P48507_C 194	GCLM Glutamate-cysteine ligase regulatory subunit	2586	P41091_ C434	EIF2S3 Eukaryotic translation initiation factor 2 subunit	5286
Q9BRX5_ C188	GIN53 DNA replication complex GINS protein PSF3	2587	Q9BQ39_ C603	DDX50 ATP-dependent RNA helicase DDX50	5287
Q9NR09_ C543	BIRC6 Baculoviral IAP repeat-containing protein 6	2588	PI3489_ C38	RNHI Ribonuclease inhibitor	5288
Q13813_C 1314	SPTAN1 Spectrin alpha chain, non-erythrocytic 1	2589	Q8TBC4 C70	UBA3 NEDD8-activating enzyme E1 catalytic subunit	5289
Q10713_C 466	PMPCA Mitochondrial-processing peptidase subunit alpha	2590	P25325_ C65	MPST 3-mercaptopyruvate sulfurtransferase	5290
Q9H7N4_ C1098	SCAF1 Splicing factor, arginine/serine-rich 19	2591	015287_ C392	FANCG Fanconi anemia group G protein	5291
Q9NXA8_ C303	SIRT5 NAD-dependent protein deacylase sirtuin-5,	2592	P13804_ C109	ETFFA Electron transfer flavoprotein subunit alpha, mitochondrial	5292

	mitochondrial				
P83916_C 60	CBX1 Chromobox protein homolog 1	2593	P31153_C149	MAT2A S-adenosylmethionine synthase isoform type-2	5293
000410_C 110	IP05 Importin-5	2594	Q86V48_C594	LUZP1 Leucine zipper protein 1	5294
P57764_C 457	GSDMD Gasdennin-D	2595	Q9UKU7_C351	ACAD8 Isobutyryl-CoA dehydrogenase, mitochondrial	5295
P15170_C 327	GSPT1 Eukaryotic peptide chain release factor GTP-binding	2596	Q12888_C772	TP53BP1 Tumor suppressor p53-binding protein 1	5296
Q9BWD1 C360	ACAT2 Acetyl-CoA acetyltransferase, cytosolic	2597	Q12888_C1796	TP53BP1 Tumor suppressor p53-binding protein 1	5297
P04818_C 180	TYMS Thymidylate synthase	2598	P14923_C511	JUP Junction plakoglobin	5298
Q9BQ69_C 276	MACROD1 O-acetyl-ADP-ribose deacetylase MACROD1	2599	Q8NBJ5_C203	GLT25D1 Procollagen galactosyltransferase 1	5299
Q01970_C 834	PLCB3 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase	2600	Q7LDG7_C398	RASGRP2 RAS guanyl-releasing protein 2	5300
Q9Y6E0_C 394	STK24 Serine/threonine-protein kinase 24	2601	Q56VL3_C27	OCIAD2 OCIA domain-containing protein 2	5301
P53634_C 136	CTSC Dipeptidyl peptidase 1	2602	P01591_C123	IGJ Immunoglobulin J chain	5302
Q9UGP4_C 431	LIMD1 LIM domain-containing protein 1	2603	Q9H1B7_C298	IRF2BPL Interferon regulatory factor 2-binding protein-1-like	5303
075369_C 455	FLNB Filamin-B	2604	000522_C134	KRIT1 Krev interaction trapped protein 1	5304
P21980_C 554	TGM2 Protein-glutamine gamma-glutamyltransferase 2	2605	Q9BZZ5_C234	API5 Apoptosis inhibitor 5	5305
P30281_C 47	CCND3 G1/S-specific cyclin-D3	2606	Q9H8G2_C226	CAAPI Caspase activity and apoptosis inhibitor 1	5306
P49790_C 1129	NUP153 Nuclear pore complex protein Nup 153	2607	060711_C379	LPXN Leupaxin	5307
Q93008_C 673	USP9X Probable ubiquitin carboxyl-terminal hydrolase FAF	2608	Q6KC79_C279	NIPBL Nipped-B-like protein	5308
Q9Y613_C 31	FHOD1 FH1/FH2 domain-containing protein 1	2609	Q92974_C335	ARHGEF2 Rho guanine nucleotide exchange factor 2	5309
Q9BXB5_C 203	OSBPL10 Oxysterol-binding protein-related protein 10	2610	P43007_C109	SLC1A4 Neutral amino acid transporter A	5310
P62633_C 97	CNBP Cellular nucleic acid-binding protein	2611	Q92973_C164	TNPO1 Transportin-1	5311
Q14005_C 1016	IL16 Pro-interleukin-16	2612	Q92973_C862	TNPO1 Transportin-1	5312
Q9UPQ0_C 863	LIMCH1 LIM and calponin homology domains-containing protein	2613	P54578_C359	USP14 Ubiquitin carboxyl-terminal hydrolase 14	5313
Q9HD26_C 408	GOPC Golgi-associated PDZ and coiled-coil motif-containing	2614	Q92576_C561	PHF3 PHD finger protein 3	5314
P07900_C 481	HSP90AA1 Heat shock protein HSP 90-alpha	2615	Q13200_C285	PSMD2 26S proteasome non-ATPase regulatory subunit 2	5315
P21333_C 717	FLNA Filamin-A	2616	P49336_C349	CDK8 Cyclin-dependent kinase 8	5316
P21333_C	FLNA Filamin-A	2617	Q8IVH4	MMAA Methylmalonic aciduria type A	5317

2582			C184	protein, mitochondrial	
P13010_C 235	XRCC5 X-ray repair cross-complementing protein 5	2618	Q9GZR7 C832	DDX24 ATP-dependent RNA helicase DDX24	5318
O95347_C 46	SMC2 Structural maintenance of chromosomes protein 2	2619	Q15149_ C888	PLEC Plectin	5319
P68402_C 188	PAFAH1B2 Platelet-activating factor acetylhydrolase IB subunit	2620	Q15149_ C1405	PLEC Plectin	5320
P61962_C 256	DCAF7 DDB1- and CUL4-associated factor 7	2621	Q15149_ C3493	PLEC Plectin	5321
P49327_C 1118	FASN Fatty acid synthase	2622	Q15149_ C3667	PLEC Plectin	5322
P49321_C 84	NASP Nuclear autoantigenic sperm protein	2623	P25787_ C213	PSMA2 Proteasome subunit alpha type-2	5323
Q14019_C 52	COTL1 Coactosin-like protein	2624	Q9ULW0 C198	TPX2 Targeting protein for Xklp2	5324
Q9NYK5_ C335	MRPL39 39S ribosomal protein L39, mitochondrial	2625	Q9UN19_ C54	DAPP1 Dual adapter for phosphotyrosine and 3-phosphotyrosine and 3-phosphoinositide	5325
P55160_C 338	NCKAP1L Nck-associated protein 1-like	2626	P40261_ C115	NNMT Nicotinamide N-methyltransferase	5326
P10599_C 69	TXN Thioredoxin	2627	Q9BWJ5 C41	SF3B5 Splicing factor 3B subunit 5	5327
P14921_C 31	ETS1 Protein C-ets-1	2628	Q9BR76_ C345	CORO1B Coronin-1B	5328
Q8NBJ5_ C412	GLT25D1 Procollagen galactosyltransferase 1	2629	Q9HB40_ C191	SCPEP1 Retinoid-inducible serine carboxypeptidase	5329
Q13200_C 448	PSMD2 26S proteasome non-ATPase regulatory subunit 2	2630	Q9BPZ3_ C60	PAIP2 Polyadenylate-binding protein-interacting protein	5330
Q9ULW0 C364	TPX2 Targeting protein for Xklp2	2631	Q96F07_ C1265	CYFIP2 Cytoplasmic FMR1-interacting protein 2	5331
P09914_C 138	IFIT1 Interferon-induced protein with tetratricopeptide	2632	Q8TCG1 C583	KIAA1524 Protein CIP2A	5332
O14744_C 449	PRMT5 Protein arginine N-methyltransferase 5	2633	O00442_ C100	RTCA RNA 3-terminal phosphate cyclase	5333
Q6NXT1_ C230	ANKRD54 Ankyrin repeat domain-containing protein 54	2634	P06132_ C308	UROD Uroporphyrinogen decarboxylase	5334
Q5VT52_ C649	RPRD2 Regulation of nuclear pre-mRNA domain-containing p	2635	Q9NTJ3_ C260	SMC4 Structural maintenance of chromosomes protein 4	5335
P22314_C 200	UBA1 Ubiquitin-like modifier-activating enzyme 1	2636	Q86JU0 C68	BCL9L B-cell CLL/lymphoma 9-like protein	5336
P22314_C 431	UBA1 Ubiquitin-like modifier-activating enzyme 1	2637	Q15031_ C167	LARS2 Probable leucine--tRNA ligase, mitochondrial	5337
Q8IU81_ C280	IRF2BP1 Interferon regulatory factor 2-binding protein 1	2638	O15164_ C394	TRIM24 Transcription intermediary factor 1-alpha	5338
Q5T160_ C576	RARS2 Probable arginine--tRNA ligase, mitochondrial	2639	Q5VT52_ C222	RPRD2 Regulation of nuclear pre-mRNA domain-containing protein 2	5339
Q86UV5_ C986	USP48 Ubiquitin carboxyl-terminal hydrolase 48	2640	P22314_ C179	UBA1 Ubiquitin-like modifier-activating enzyme 1	5340
P04083_C 343	ANXA1 Annexin A1	2641	Q53GQ0 C215	HSD17B12 Estradiol 17-beta-dehydrogenase 12	5341
Q8NFF5_ C236	FLAD1 FAD synthase	2642	P78527_ C223	PRKDC DNA-dependent protein kinase catalytic subunit	5342

P04150_C 367	NR3C1 Glucocorticoid receptor	2643	P78527_C1629	PRKDC DNA-dependent protein kinase catalytic subunit	5343
Q9H269_C490	VPS16 Vacuolar protein sorting-associated protein 16 homolog	2644	P42566_C824	EPS15 Epidermal growth factor receptor substrate 15	5344
Q969Z0_C417	TBRG4 Protein TBRG4	2645	Q5VUJ6_C256	LRCH2 Leucine-rich repeat and calponin homology domain-containing 2	5345
Q9ULC4_C113	MCTS1 Malignant T-cell-amplified sequence 1	2646	Q9H4I2_C11	ZHX3 Zinc fingers and homeoboxes protein 3	5346
Q15306_C343	IRF4 Interferon regulatory factor 4	2647	Q9H4I2_C335	ZHX3 Zinc fingers and homeoboxes protein 3	5347
Q15013_C124	MAD2L1BP MAD2L1-binding protein	2648	P42695_C631	NCAPD3 Condensin-2 complex subunit D3	5348
P45974_C532	USP5 Ubiquitin carboxyl-terminal hydrolase 5	2649	Q96HE7_C104	ERO1L ERO1-like protein alpha	5349
O95817_C179	BAG3 BAG family molecular chaperone regulator 3	2650	Q53HL2_C273	CDCA8 Borealin	5350
Q99797_C687	MIPEP Mitochondrial intermediate peptidase	2651	Q9Y2L5_C265	TRAPPC8 Trafficking protein particle complex subunit 8	5351
P35579_C896	MYH9 Myosin-9	2652	Q04721_C2085	NOTCH2 Neurogenic locus notch homolog protein 2	5352
O94855_C853	SEC24D Protein transport protein Sec24D	2653	Q04726_C26	TLE3 Transducin-like enhancer protein 3	5353
O14965_C393	AURKA Aurora kinase A	2654	Q6P2E9_C838	EDC4 Enhancer of mRNA-decapping protein 4	5354
Q9BQA1_C65	WDR77 Methylosome protein 50	2655	Q99567_C454	NUP88 Nuclear pore complex protein Nup88	5355
Q27J81_C284	INF2 Inverted formin-2	2656	P49189_C45	ALDH9A1 4-trimethylaminobutyraldehyde dehydrogenase	5356
P30048_C108	PRDX3 Thioredoxin-dependent peroxide reductase, mitochondrial	2657	Q14789_C3070	GOLGB1 Golgin subfamily B member 1	5357
P22102_C646	GART Trifunctional purine biosynthetic protein adenosin	2658	Q14789_C3144	GOLGB1 Golgin subfamily B member 1	5358
P62316_C63	SNRPD2 Small nuclear ribonucleoprotein Sm D2	2659	O43592_C38	XPOT Exportin-T	5359
P09884_C141	POLA1 DNA polymerase alpha catalytic subunit	2660	O43592_C938	XPOT Exportin-T	5360
Q7L591_C493	DOK3 Docking protein 3	2661	Q9NUQ8_C102	ABCF3 ATP-binding cassette subfamily F member 3	5361
O00159_C161	MYO1C Unconventional myosin-Ic	2662	P20810_C328	CAST Calpastatin	5362
O00151_C73	PDLIM1 PDZ and LIM domain protein 1	2663	P33176_C174	KIF5B Kinesin-1 heavy chain	5363
O00151_C263	PDLIM1 PDZ and LIM domain protein 1	2664	Q9GZQ3_C117	COMMD5 COMM domain-containing protein 5	5364
P62136_C171	PPP1CA Serine/threonine-protein phosphatase PP1-alpha catalytic subunit	2665	P49454_C2415	CENPF Centromere protein F	5365
P55060_C853	CSE1L Exportin-2	2666	Q76N89_C1574	HECW1 E3 ubiquitin-protein ligase HECW1	5366
O95232_C58	LUC7L3 Luc7-like protein 3	2667	Q9NQZ5_C362	STARD7 StAR-related lipid transfer protein 7, mitochondrial	5367

P29590_C 338	PML Protein PML	2668	Q9BQ15_C99	NABP2 SOSS complex subunit B1	5368
Q8IXK0_C673	PHC2 Polyhomeotic-like protein 2	2669	Q12905_C37	ILF2 Interleukin enhancer-binding factor 2	5369
Q14980_C1729	NUMA1 Nuclear mitotic apparatus protein 1	2670	P04406_C158	GAPDH Glyceraldehyde-3-phosphate dehydrogenase	5370
P63244_C286	GNB2L1 Guanine nucleotide-binding protein subunit beta-2-like 1	2671	PI1177_C306	PDHB Pyruvate dehydrogenase E1 component subunit beta,	5371
P62333_C347	PSMC6 26S protease regulatory subunit 10B R	2672	E7EQZ4_C60	SMN1 Survival motor neuron protein	5372
Q13501_C113	SQSTM1 Sequestosome-1	2673	Q6UN15_C216	FIP1L1 Pre-mRNA 3-end-processing factor FTP 1	5373
P60866_C36	RPS20 40S ribosomal protein S20	2674	Q96GJ1_C289	TRMT2B tRNA (uracil(54)-C(5))-methyltransferase homolog	5374
Q969E8_C17	TSR2 Pre-rRNA-processing protein TSR2 homolog	2675	Q9UEW8_C450	STK39 STE20/SPS 1-related proline-alanine-rich protein kinase	5375
Q93052_C262	LPP Lipoma-preferred partner	2676	Q15785_C236	TOMM34 Mitochondrial import receptor subunit TOM34	5376
P08758_C316	ANXA5 Annexin A5	2677	Q5T160_C11	RARS2 Probable arginine-tRNA ligase, mitochondrial	5377
075616_C150	ERAL1 GTPase Era, mitochondrial	2678	P40692_C142	MLH1 DNA mismatch repair protein MM	5378
Q9UHB9_C525	SRP68 Signal recognition particle 68 kDa protein	2679	Q15283_C314	RASA2 Ras GTPase-activating protein 2	5379
Q9H223_C175	EHD4 EH domain-containing protein 4	2680	Q96I25_C302	RBM17 Splicing factor 45	5380
P08107_C603	HSPA1B Heat shock 70 kDa protein 1A/1B	2681	Q96I25_C385	RBM17 Splicing factor 45	5381
P27708_C183	CAD CAD protein	2682	Q15334_C505	LLGL1 Lethal(2) giant larvae protein homolog 1	5382
Q9Y4L1_C805	HYOU1 Hypoxia up-regulated protein 1	2683	Q712K3_C191	UBE2R2 Ubiquitin-conjugating enzyme E2 R2	5383
P26358_C1125	DNMT1 DNA (cytosine-5)-methyltransferase 1	2684	095373_C90	IP07 Importin-7	5384
P36954_C52	POLR2I DNA-directed RNA polymerase II subunit RPB9	2685	Q9BV44_C426	THUMP3 THUMP domain-containing protein 3	5385
P49748_C156	ACADVL Very long-chain specific acyl-CoA dehydrogenase, mitochondrial	2686	014578_C105	CIT Citron Rho-interacting kinase	5386
Q9H2G2_C1212	SLK STE20-like serine/threonine-protein kinase	2687	014579_C34	COPE Coatomer subunit epsilon	5387
P35268_C25	RPL22 60S ribosomal protein L22	2688	Q9NXW9_C204	ALKBH4 Probable alpha-ketoglutarate-dependent dioxygenase	5388
P46939_C539	UTRNUTrophin	2689	Q9Y2H0_C736	DLGAP4 Disks large-associated protein 4	5389
P49368_C173	CCT3 T-complex protein 1 subunit gamma	2690	Q96CV9_C239	OPTN Optineurin	5390
P50135_C82	HNMT Histamine N-methyltransferase	2691	Q9Y3L3_C102	SH3BP1 SH3 domain-binding protein 1	5391
Q6Y7W6_C938	GIGYF2 PERQ amino acid-rich with GYF domain-containing protein 2	2692	Q96EV2_C1093	RBM33 RNA-binding protein 33	5392
095861_C59	BPNT] 3(2),5-bisphosphate nucleotidase 1	2693	Q9UM54_C1102	MY06 Unconventional myosin-VI	5393

P49023_C 290	PXN Paxillin	2694	Q15027_ C64	ACAP1 Arf-GAP with coiled-coil, ANK repeat and PH domain	5394
Q99873_C 216	PRMT1 Protein arginine N- methyltransferase 1	2695	O00541_ C391	PES1 Pescadillo homolog	5395
P02765_C 132	AHSG Alpha-2-HS- glycoprotein	2696	Q9Y277_ C36	VDAC3 Voltage-dependent anion- selective channel protein	5396
Q9H3M7_ C120	TXNIP Thioredoxin- interacting protein	2697	Q9Y277_ C229	VDAC3 Voltage-dependent anion- selective channel protein	5397
Q9UPN3_ C4825	MACF1 Microtubule-actin cross-linking factor 1, isoforms	2698	Q8NI27_ C743	THOC2 THO complex subunit 2	5398
Q9UPN9_ C150	TRIM33 E3 ubiquitin-protein ligase TRIM33	2699	O76094_ C349	SRP72 Signal recognition particle 72 kDa protein	5399
O75369_C 1158	FLNB Filamin-B	2700	Q14315_ C1348	FLNC Filamin-C	5400
P56545_C 140	CTBP2 C-terminal-binding protein 2	2701	Q14315_ C1735	FLNC Filamin-C	5401
Q00341_C 948	HDLBP Vigilin	2702	Q09666_ C1967	AHNAK Neuroblast differentiation- associated protein AHNA	5402
P35250_C 171	RFC2 Replication factor C subunit 2	2703	P14621_ C22	ACYP2 Acylphosphatase-2	5403
P46013_C 1285	MKI67 Antigen KI-67	2704	Q12974_ C101	PTP4A2 Protein tyrosine phosphatase type IVA 2	5404
O75083_C 225	WDR1 WD repeat-containing protein 1	2705	O75334_ C143	PPFIA2 Liprin-alpha-2	5405
O43252_C 165	PAPSS1 Bifunctional 3- phosphoadenosine 5- phosphosulfate	2706	O14979_ C277	HNRPDL Heterogeneous nuclear ribonucleoprotein D-like	5406
Q16512_C 317	PKN1 Serine/threonine-protein kinase N1	2707	Q8WUM 0 C1037	NUP133 Nuclear pore complex protein Nup133	5407
Q16881_C 339	TXNRD1 Thioredoxin reductase 1, cytoplasmic	2708	Q96PN7_ C876	TRERF1 Transcriptional-regulating factor 1	5408
P21333_C 478	FLNA Filamin-A	2709	Q9H9A6 C54	LRRC40 Leucine-rich repeat- containing protein 40	5409
P21333_C 2378	FLNA Filamin-A	2710	Q01167_ C357	FOXK2 Forkhead box protein K2	5410
O00268_C 867	TAF4 Transcription initiation factor TFIID subunit 4	2711	Q13310_ C128	PABPC4 Polyadenylate-binding protein 4	5411
O95340_C 117	PAPSS2 Bifunctional 3- phosphoadenosine 5- phosphosulfate	2712	P06493_ C119	CDK1 Cyclin-dependent kinase 1	5412
P42765_C 382	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	2713	P62937_ C52	PPIA Peptidyl-prolyl cis-trans isomerase A	5413
Q9UI12_ C85	ATP6V1H V-type proton ATPase subunit H	2714	Q9UBQ5 C190	EIF3K Eukaryotic translation initiation factor 3 subunit	5414
Q05655_C 127	PRKCD Protein kinase C delta type	2715	Q9NY93 C298	DDX56 Probable ATP-dependent RNA helicase DDX56	5415
P42166_C 629	TMPO Lamina-associated polypeptide 2, isoform alpha	2716	P50453_ C370	SERPINB9 Serpin B9	5416
O14929_C 27	HAT1 Histone acetyltransferase type B catalytic subunit L	2717	P12236_ C160	SLC25A6 ADP/ATP translocase 3	5417
Q9NYK5_ C133	MRPL39 39S ribosomal protein L39, mitochondrial	2718	Q6ZRQ5 C1068	MMS22L Protein MMS22-like	5418
O60234_C 96	GMFG Glia maturation factor gamma	2719	Q9BYI3_ C371	FAM126A Hyccin	5419

F8VZW7_C74	Uncharacterized protein	2720	P51148_C64	RAB5C Ras-related protein Rab-5C	5420
Q12888_C1040	TP53BP1 Tumor suppressor p53-binding protein 1	2721	P09110_C87	ACAA1 3-ketoacyl-CoA thiolase, peroxisomal	5421
Q5JTZ9_C609	AARS2 Alanine-tRNA ligase, mitochondrial	2722	Q9UL15_C118	BAG5 BAG family molecular chaperone regulator 5	5422
Q9Y383_C44	LUC7L2 Putative RNA-binding protein Luc7-like 2	2723	Q9UL12_C497	SARDH Sarcosine dehydrogenase, mitochondrial	5423
Q6PIR3_C99	MSANTD2 Myb/SANT-like DNA-binding domain-containing protei	2724	Q96CG3_C169	TIFA TRAF-interacting protein with FHA domain-containing	5424
Q99832_C364	CCT7 T-complex protein 1 subunit eta	2725	060841_C853	EIF5B Eukaryotic translation initiation factor 5B	5425
Q9NRW4_C124	DUSP22 Dual specificity protein phosphatase 22	2726	Q15306_C19	IRF4 Interferon regulatory factor 4	5426
Q8N163_C238	KIAA1967 DBIRD complex subunit KIAA1967	2727	Q9Y265_C94	RUVBL1 RuvB-like 1	5427
Q8N163_C443	KIAA1967 DBIRD complex subunit KIAA1967	2728	Q9Y263_C193	PLAA Phospholipase A-2-activating protein	5428
Q15149_C1136	PLEC Plectin	2729	Q9UBZ4_C27	APEX2 DNA-(apurinic or apyrimidinic site) lyase 2	5429
Q15149_C4454	PLEC Plectin	2730	075528_C255	TADA3 Transcriptional adapter 3	5430
P31146_C285	CORO1 A Coronin-IA	2731	Q14997_C710	PSME4 Proteasome activator complex subunit 4	5431
Q16555_C248	DPYSL2 Dihydropyrimidinase-related protein 2	2732	Q9P107_C895	GMIP GEM-interacting protein	5432
Q99567_C713	NUP88 Nuclear pore complex protein Nup88	2733	P35579_C740	MYH9 Myosin-9	5433
P21964_C119	COMT Catechol O-methyltransferase	2734	Q8TAQ2_C91	SMARCC2 SWI/SNF complex subunit SMARCC2	5434
P62857_C27	RPS28 40S ribosomal protein S28	2735	014966_C120	RAB7L1 Ras-related protein Rab-7L1	5435
Q9P287_C275	BCCIP BRCA2 and CDKN1A-interacting protein	2736	Q13325_C137	IFIT5 Interferon-induced protein with tetratricopeptide	5436
Q7LBC6_C1470	KDM3B Lysine-specific demethylase 3B	2737	Q7Z7A3_C290	CTU1 Cytoplasmic tRNA 2-thiolation protein 1	5437
P62140_C171	PPP1CB Serine/threonine-protein phosphatase PP1-beta catalytic subunit	2738	Q9ULT8_C2579	HECTD1 E3 ubiquitin-protein ligase HECTD1	5438
P33764_C68	S100A3 Protein S100-A3	2739	Q0VG06_C15	FAAP100 Fanconi anemia-associated protein of 100 kDa	5439
Q9UBQ7_C123	GRHPR Glyoxylate reductase/hydroxyp yruvate reductase	2740	Q13439_C1253	GOLGA4 Golgin subfamily A member 4	5440
Q9UJY4_C343	GGA2 ADP-ribosylation factor-binding protein GGA2	2741	Q9UPT9_C494	USP22 Ubiquitin carboxyl-terminal hydrolase 22	5441
060841_C1092	EIF5B Eukaryotic translation initiation factor 5B	2742	Q9HCJ3_C362	RAVER2 Ribonucleoprotein PTB-binding 2	5442
Q92945_C296	KHSRP Far upstream element-binding protein 2	2743	060306_C28	AQR Intron-binding protein aquarius	5443
Q9HAV4_C941	XP05 Exportin-5	2744	Q92879_C61	CELF1 CUGBP Elav-like family member 1	5444

014964_C 185	HGS Hepatocyte growth factor-regulated tyrosine kinase	2745	P10620_C50	MGST1 Microsomal glutathione S-transferase 1	5445
P23526_C 195	AHCY Adenosylhomocysteinase	2746	P01892_C125	HLA-A HLA class I histocompatibility antigen, A-2 alpha	5446
P52209_C 289	PGD 6-phosphogluconate dehydrogenase, decarboxylating	2747	Q9Y312_C370	AAR2 Protein AAR2 homolog	5447
Q9Y697_C 381	NFS1 Cysteine desulfurase, mitochondrial	2748	P55265_C392	ADAR Double-stranded RNA-specific adenosine deaminase	5448
Q9Y520_C 177	PRRC2C Protein PRRC2C	2749	P60900_C78	PSMA6 Proteasome subunit alpha type-6	5449
Q9H910_C 118	HN1L Hematological and neurological expressed 1-like protein	2750	Q63ZY3_C249	KANK2 KN motif and ankyrin repeat domain-containing protein 2	5450
Q6FI81_C 92	CLAPINI Anamorsin	2751	Q63ZY3_C412	KANK2 KN motif and ankyrin repeat domain-containing protein	5451
Q8WZA9_C 340	LRGQ Lmmunity-related GTPase family Q protein	2752	095159_C230	ZFPL1 Zinc finger protein-like 1	5452
Q8NDH3_C 81	NPEPL1 Probable aminopeptidase NPEPL1	2753	P62873_C294	GNB1 Guanine nucleotide-binding protein G(T)/G(S)/G(T)	5453
000571_C 317	DDX3X ATP-dependent RNA helicase DDX3X	2754	000567_C211	NOP56 Nucleolar protein 56	5454
P05091_C 179	ALDH2 Aldehyde dehydrogenase, mitochondrial	2755	Q15003_C397	NCAPH Condensin complex subunit 2	5455
P05091_C 472	ALDH2 Aldehyde dehydrogenase, mitochondrial	2756	Q9C0C2_C136	TNKS1BP1 182 kDa tankyrase-1-binding protein	5456
015235_C 132	MRPS12 28S ribosomal protein S12, mitochondrial	2757	Q9C0C9_C1099	UBE20 Ubiquitin-conjugating enzyme E20	5457
P42704_C 130	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	2758	Q12841_C233	FSTL1 Follistatin-related protein 1	5458
Q99590_C 566	SCAF1 Protein SCAF1	2759	075533_C1244	SF3B1 Splicing factor 3B subunit 1	5459
Q9NR56_C 19	MBNL1 Muscleblind-like protein 1	2760	075534_C106	CSDE1 Cold shock domain-containing protein E1	5460
Q9P2E9_C 1038	RRBP1 Ribosome-binding protein 1	2761	E7EVK2_C211	MTG1 Mitochondrial GTPase 1	5461
P52888_C 682	THOP1 Thimet oligopeptidase	2762	Q13158_C168	FADD Protein FADD	5462
P55212_C 264	CASP6 Caspase-6	2763	Q9NRA8_C125	EIF4ENIF1 Eukaryotic translation initiation factor 4E transporter	5463
Q6IBW4_C 342	NCAPH2 Condensin-2 complex subunit H2	2764	Q13155_C205	AIMP2 Aminoacyl tRNA synthase complex-interacting multifunctional protein 2	5464
PI8754_C 352	RCC1 Regulator of chromosome condensation	2765	Q14192_C10	FHL2 Four and a half LLM domains protein 2	5465
Q8TB52_C 433	FBXO30 F-box only protein 30	2766	Q8TEU7_C93	RAPGEF6 Rap guanine nucleotide exchange factor 6	5466
Q32MZ4_C 644	LRRFIP1 Leucine-rich repeat flightless-interacting protein	2767	Q14204_C978	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	5467
Q9NYL2_C 150	MLTK Mitogen-activated protein kinase kinase kinase MLT	2768	Q14204_C4644	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	5468

Q15393_C 1156	SF3B3 Splicing factor 3B subunit 3	2769	060684 - C296	KPNA6 Importin subunit alpha-7	5469
P63244_C 168	GNB2L1 Guanine nucleotide-binding protein subunit beta-2-like 1	2770	Q92844 - C318	TANK TRAF family member-associated NF-kappa-B activator	5470
Q53EL6_C C275	PDCD4 Programmed cell death protein 4	2771	Q9Y4H4 C160	GPSM3 G-protein-signaling modulator 3	5471
P56537_C 152	EIF6 Eukaryotic translation initiation factor 6	2772	Q8WXI9 C423	GATAD2B Transcriptional repressor p66-beta	5472
P09622_C 484	DLD Dihydrolipoyl dehydrogenase, mitochondrial	2773	P22102 - C93	GART Trifunctional purine biosynthetic protein adenosine	5473
Q9Y314_C C185	NOSIP Nitric oxide synthase-interacting protein	2774	P32320 - C102	CDA Cytidine deaminase	5474
Q96P16_C C151	RPRD1A Regulation of nuclear pre-mRNA domain-containing p	2775	Q13085 - C1116	ACACA Acetyl-CoA carboxylase 1	5475
P46821_C 2041	MAP1B Microtubule-associated protein 1B	2776	Q14511 - C18	NEDD9 Enhancer of filamentation 1	5476
060343_C 266	TBC1D4 TBC1 domain family member 4	2777	095551 - C273	TDP2 Tyrosyl-DNA phosphodiesterase 2	5477
Q96EB1_C C361	ELP4 Elongator complex protein 4	2778	Q13330 - C68	MTA1 Metastasis-associated protein MTA1	5478
Q86WB0_C C102	ZC3HC1 Nuclear-interacting partner of ALK	2779	A6NJ78 - C172	METTL15 Probable methyltransferase-like protein 15	5479
P49915_C 104	GMPS GMP synthase	2780	043491 - C424	EPB41L2 Band 4.1-like protein 2	5480
075608_C 144	LYPLA1 Acyl-protein thioesterase 1	2781	P82663 - C141	MRPS25 28S ribosomal protein S25, mitochondrial	5481
PI 1498_C 131	PC Pyruvate carboxylase, mitochondrial	2782	Q13428 - C1012	TCOF1 Treacle protein	5482
PI 1498_C 752	PC Pyruvate carboxylase, mitochondrial	2783	Q5JSP0 - C43	FGD3 FYVE, RhoGEF and PH domain-containing protein 3	5483
Q53H96_C C266	PYCRLPyrroline-5-carboxylate reductase 3	2784	Q14847 - C32	LASP1 LIM and SH3 domain protein 1	5484
Q96DE5_C C55	ANAPC16 Anaphase-promoting complex subunit 16	2785	Q9UHB7 C315	AFF4 AF4/FMR2 family member 4	5485
Q96KB5_C C112	PBK Lymphokine-activated killer T-cell-originated prot	2786	P48735 - C402	IDH2 Isocitrate dehydrogenase	5486
P55084_C 458	HADHB Trifunctional enzyme subunit beta, mitochondrial	2787	Q2TAL8 C529	QRICH1 Glutamine-rich protein 1	5487
P55735_C 234	SEC13 Protein SEC13 homolog	2788	Q9UJM3 C124	ERRFI1 ERBB receptor feedback inhibitor 1	5488
P56192_C 287	MARS Mewionine--tRNA ligase, cytoplasmic	2789	Q7L1V2 - C87	MON1B Vacuolar fusion protein MON1 homolog B	5489
P07384_C 115	CAPN1 Calpain-1 catalytic subunit	2790	Q96KP4 - C205	CNDP2 Cytosolic non-specific dipeptidase	5490
P08559_C 222	PDHA1 Pyruvate dehydrogenase E1 component subunit alpha,	2791	P62136 - C62	PPP1CA Serine/threonine-protein phosphatase PP1-alpha catalytic subunit alpha	5491
Q99714_C 91	HSD17B10 3-hydroxyacyl-CoA dehydrogenase type-2	2792	PI3984 - C116	GTF2F2 General transcription factor IIF subunit 2	5492
P33992_C 197	MCM5 DNA replication licensing factor MCM5	2793	Q7L775 - C337	EPM2AIP1 EPM2A-interacting protein 1	5493
P49757_C 611	NUMB Protein numb homolog	2794	P55209 - C258	NAPILI Nucleosome assembly protein 1-like 1	5494

015269_C 438	SPTLC1 Serine palmitoyltransferase 1	2795	Q9NQR4 C146	NIT2 Omega-amidase NIT2	5495
075935_C 173	DCTN3 Dynactin subunit 3	2796	Q13459 C1279	MYO9B Unconventional myosin-LXb	5496
Q8IU85_C 182	CAMK1D Calcium/calmodulin-dependent protein kinase type 1	2797	Q9NVX0 _C1 18	HAUS2 HAUS augmin-like complex subunit 2	5497
Q05519_C 455	SRSF11 Serine/arginine-rich splicing factor 11	2798	Q969S9 C248	GFM2 Ribosome-releasing factor 2, mitochondrial	5498
P36578_C 125	RPL4 60S ribosomal protein L4	2799	P14866 C260	HNRNPL Heterogeneous nuclear ribonucleoprotein L	5499
Q96E14_C 95	RMF2 RecQ-mediated genome instability protein 2	2800	Q13569 C233	TDG G/T mismatch-specific thymine DNA glycosylase	5500
Q96N67_C 457	DOCK7 Dedicator of cytokinesis protein 7	2801	095239 C28	KIF4A Chromosome-associated kinesin KIF4A	5501
Q7Z5K2_C 160	WAPAL Wings apart-like protein homolog	2802	Q71RC2 C599	LARP4 La-related protein 4	5502
P41214_C 489	EIF2D Eukaryotic translation initiation factor 2D	2803	Q71RC2 C623	LARP4 La-related protein 4	5503
043242_C 483	PSMD3 26S proteasome non- ATPase regulatory subunit 3	2804	P29590 C80	PML Protein PML	5504
075369_C 1280	FLNB Filamin-B	2805	P29590 C151	PML Protein PML	5505
Q8IWI9_C 2974	MGA MAX gene-associated protein	2806	P29590 C189	PML Protein PML	5506
015067_C 785	PFAS Phosphoribosylformylglycine midine synthase	2807	P29590 C227	PML Protein PML	5507
Q96GX9_C 16	APIP Probable methylthioribulose-1- phosphate dehydratase	2808	P29590 C479	PML Protein PML	5508
Q9BXP5_C 412	SRRT Serrate RNA effector molecule homolog	2809	Q09472 C1621	EP300 Histone acetyltransferase p300	5509
075083_C 382	WDR1 WD repeat-containing protein 1	2810	015235 C93	MRPS12 28S ribosomal protein S12, mitochondrial	5510
Q8WW9_C 535	HNRPLL Heterogeneous nuclear ribonucleoprotein L- like	2811	P24534 C161	EEF1B2 Elongation factor 1-beta	5511
Q7Z6Z7_C 1891	HUWE1 E3 ubiquitin-protein Ugase HUWE1	2812	P54819 C92	AK2 Adenylate kinase 2, mitochondrial	5512
Q7Z6Z7_C 3296	HUWE1 E3 ubiquitin-protein Ugase HUWE1	2813	Q9Y333 C26	LSM2 U6 snRNA-associated Sm-like protein LSM2	5513
Q14008_C 1500	CKAP5 Cytoskeleton- associated protein 5	2814	Q9UER7 C427	DAXX Death domain-associated protein 6	5514
Q9H3P2_C 44	WHSC2 Negative elongation factor A	2815	Q3KQU3 C373	MAP7D1 MAP7 domain-containing protein 1	5515
Q8NB37_C 154	PDDC1 Parkinson disease 7 domain-containing protein 1	2816	Q8N0W3 C129	FUK L-fucose kinase	5516
P48047_C 141	ATP5O ATP synthase subunit O, mitochondrial	2817	Q16401 C361	PSMD5 26S proteasome non-ATPase regulatory subunit 5	5517
Q8IUI8_C 95	CRLF3 Cytokine receptor-like factor 3	2818	Q99590 C478	SCAF1 Protein SCAF1 1	5518
Q9H6S3_C 261	EPS8L2 Epidermal growth factor receptor kinase substrate	2819	Q9BYX2 C686	TBC1D2 TBC1 domain family member 2A	5519

P21333_C 53	FLNA Filamin-A	2820	A2A288_ C64	ZC3H12D Probable ribonuclease ZC3H12D	5520
Q5T4S7_ C3864	UBR4 E3 ubiquitin-protein ligase UBR4	2821	Q9UBR2 C214	CTSZ Cathepsin Z	5521
P46060_C 82	RANGAP1 Ran GTPase- activating protein 1	2822	Q5U5Q3 C319	MEX3C RNA-binding E3 ubiquitin- protein ligase MEX3C	5522
O14929_C 299	HAT1 Histone acetyltransferase type B catalytic subunit	2823	O95059_ C31	RPP14 Ribonuclease P protein subunit p14	5523
P48059_C 272	LIMS1 LIM and senescent cell antigen-like-containing domains 1	2824	Q9NV56 _C170	MRGBP MRG-binding protein	5524
O15042_C 65	U2SURP U2 snRNP- associated SURP motif- containing protein	2825	O14617_ C574	AP3D1 AP-3 complex subunit delta-1	5525
Q7L2J0_C 244	MEPCE 7SK snRNA methylphosphate capping enzyme	2826	Q14980_ C1937	NUMA1 Nuclear mitotic apparatus protein 1	5526
Q4G176_ C399	ACSF3 Acyl-CoA synthetase family member 3, mitochondrial	2827	Q9BYV9 _C698	BACH2 Transcription regulator protein BACH2	5527
Q9H1B7_ C504	IRF2BPL Interferon regulatory factor 2-binding protein-lik	2828	P55072_ C184	VCP Transitional endoplasmic reticulum ATPase	5528
O95425_C 26	SVIL Supervillin	2829	P55072_ C209	VCP Transitional endoplasmic reticulum ATPase	5529
O75351_C 240	VPS4B Vacuolar protein sorting-associated protein 4B	2830	Q01433_ C848	AMPD2 AMP deaminase 2	5530
Q96DC7_ C57	TMCO6 Transmembrane and coiled-coil domain-containing pr	2831	P55211_ C172	CASP9 Caspase-9	5531
Q9ULW0 C594	TPX2 Targeting protein for Xklp2	2832	Q08378_ C455	GOLGA3 Golgin subfamily A member 3	5532
P50502_C 209	ST13 Hsc70-interacting protein	2833	Q12912_ C264	LRMP Lymphoid-restricted membrane protein	5533
P31146_C 51	CORO1A Coronin-1A	2834	Q07021_ C186	C1QBP Complement component 1 Q subcomponent-binding protein	5534
P31146_C 345	CORO1A Coronin-1A	2835	Q9NSE4_ C414	IARS2 Isoleucine-tRNA ligase, mitochondrial	5535
Q9H2M9_ C67	RAB3GAP2 Rab3 GTPase- activating protein non-catalytic subunit	2836	Q9NSE4_ C883	IARS2 Isoleucine-tRNA ligase, mitochondrial	5536
Q9UKV3_ C546	ACIN1 Apoptotic chromatin condensation inducer in the nucleus	2837	P14854_ C30	COX6B1 Cytochrome c oxidase subunit 6B1	5537
P78527_C 1229	PRKDC DNA-dependent protein kinase catalytic subunit	2838	Q96ER3_ C430	SAAL1 Protein SAAL1	5538
P78527_C 1364	PRKDC DNA-dependent protein kinase catalytic subunit	2839	P08238_ C592	HSP90AB1 Heat shock protein HSP 90-beta	5539
P42566_C 657	EPS15 Epidermal growth factor receptor substrate 15	2840	Q8IZ69_ C551	TRMT2A tRNA (uracil-5-)- methyltransferase homolog A	5540
P61981_C 112	YWHAG 14-3-3 protein gamma	2841	Q8NFX7 C120	STXBP6 Syntaxin-binding protein 6	5541
P20810_C 381	CAST Calpastatin	2842	Q15118_ C223	PDK1	5542

P55036_C 58	PSMD4 26S proteasome non-ATPase regulatory subunit 4	2843	Q9P2J5_C1052	LARS Leucine-tRNA ligase, cytoplasmic	5543
P50991_C 295	CCT4 T-complex protein 1 subunit delta	2844	Q9P2J5_C1053	LARS Leucine-tRNA ligase, cytoplasmic	5544
Q96TA1_C 230	FAM129B Niban-like protein 1	2845	Q8TF72_C1331	SHROOM3 Protein Shroom3	5545
P49848_C 141	TAF6 Transcription initiation factor TFIID subunit 6	2846	Q01415_C407	GALK2 N-acetylgalactosamine kinase	5546
Q14315_C 1066	FLNC Filamin-C	2847	Q8IYL3_C124	Clorf174 UPF0688 protein Clorf174	5547
094925_C 525	GLS Glutaminase kidney isoform, mitochondrial	2848	043143_C644	DHX15 Putative pre-mRNA-splicing factor ATP-dependent RN	5548
Q92796_C 519	DLG3 Disks large homolog 3	2849	Q99615_C247	DNAJC7 DnaJ homolog subfamily C member 7	5549
095571_C 219	ETHE1 Protein ETHE1, mitochondrial	2850	Q05086_C843	UBE3A Ubiquitin-protein ligase E3A	5550
Q9ULU8_C 800	CADPS Calcium-dependent secretion activator 1	2851	P53667_C349	LIMK1 LIM domain kinase 1	5551
P50453_C 335	SERPINB9 SerpinB9	2852	Q8IWW8_C1619	UBR2 E3 ubiquitin-protein ligase UBR2	5552
095999_C 215	BCL10 B-cell lymphoma/leukemia 10	2853	Q96T51_C81	RUFY1 RUN and FYVE domain-containing protein 1	5553
Q9H4Z3_C 29	PCIF1 Phosphorylated CTD-interacting factor 1	2854	P13797_C209	PLS3 Plastin-3	5554
P22692_C 204	IGFBP4 Insulin-like growth factor-binding protein 4	2855	P39880_C802	CUX1 Homeobox protein cut-like 1	5555
000148_C 223	DDX39A ATP-dependent RNA helicase DDX39A	2856	Q53EL6_C288	PDCD4 Programmed cell death protein 4	5556
Q5VYK3_C 814	ECM29 Proteasome-associated protein ECM29 homolog	2857	P12277_C283	CKB Creatine kinase B-type	5557
Q9NVE7_C 537	PANK4 Pantothenate kinase 4	2858	Q13617_C385	CUL2 Cullin-2	5558
095801_C 63	TTC4 Tetratricopeptide repeat protein 4	2859	Q8WXE1_C238	ATRIP ATR-interacting protein	5559
014204_C 2142	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	2860	Q8WXE1_C263	ATRIP ATR-interacting protein	5560
P48735_C 418	IDH2 Isocitrate dehydrogenase	2861	Q7Z4Q2_C20	HEATR3 HEAT repeat-containing protein 3	5561
015371_C 258	EIF3D Eukaryotic translation initiation factor 3 subunit	2862	Q15052_C564	ARHGEF6 Rho guanine nucleotide exchange factor 6	5562
000571_C 128	DDX3X ATP-dependent RNA helicase DDX3X	2863	P49902_C181	NT5C2 Cytosolic purine 5-nucleotidase	5563
Q8WVC0_C 530	LEO1 RNA polymerase-associated protein LEO1	2864	P49903_C119	SEPHS1 Selenide, water dikinase 1	5564
015235_C 64	MRPS12 28S ribosomal protein SI2, mitochondrial	2865	Q53EP0_C442	FNDC3B Fibronectin type III domain-containing protein 3B	5565
Q9P2I0_C 621	CPSF2 Cleavage and polyadenylation specificity factor subunit	2866	Q92905_C218	COPS5 COP9 signalosome complex subunit 5	5566
Q9H4X1_C 33	RGCC Regulator of cell cycle RGCC	2867	Q15I21_C27	PEA 15 Astrocytic phosphoprotein PEA-15	5567
Q7L5N1_C 299	COPS6 COP9 signalosome complex subunit 6	2868	Q9Y315_C118	DERA Putative deoxyribose-phosphate aldolase	5568
Q6NYC8_C 611	PPPIR18 Phostensin	2869	075909_C23	CCNK Cyclin-K	5569

P22626_C 50	HNRNPA2B1 Heterogeneous nuclear ribonucleoproteins A2/B1	2870	Q14232_C218	EIF2B1 Translation initiation factor eIF-2B subunit alpha	5570
P55072_C 105	VCP Transitional endoplasmic reticulum ATPase	2871	P53582_C22	METAPI Methionine aminopeptidase 1	5571
P11912_C 196	CD79A B-cell antigen receptor complex-associated protein	2872	Q8WZ42_C5248	TTN Titin	5572
Q9NSE4_C 91	IARS2 Isoleucine-tRNA ligase, mitochondrial	2873	Q6UB35_C828	MTHFD1L Monofunctional C1-tetrahydrofolate synthase, mitochondrial	5573
Q9NSE4_C 819	IARS2 Isoleucine-tRNA ligase, mitochondrial	2874	043516_C446	WIPF1 WAS/WASL-interacting protein family member 1	5574
Q9NYF8_C 688	BCLAF1 Bcl-2-associated transcription factor 1	2875	Q9UHB4_C486	NDOR1 NADPH-dependent diflavin oxidoreductase 1	5575
015393_C 750	SF3B3 Splicing factor 3B subunit 3	2876	P41252_C400	IARS Isoleucine-tRNA ligase, cytoplasmic	5576
Q16576_C 166	RBBP7 Histone-binding protein RBBP7	2877	Q9UHB6_C164	LIMA1 LIM domain and actin-binding protein 1	5577
Q9NZB2_C 279	FAM120A Constitutive coactivator of PPAR-gamma-like protein 1	2878	Q14141_C14	SEPT6 Septin-6	5578
Q15052_C 25	ARHGEF6 Rho guanine nucleotide exchange factor 6	2879	Q14149_C307	MORC3 MORC family CW-type zinc finger protein 3	5579
P09622_C 80	DLD Dihydrolipoyl dehydrogenase, mitochondrial	2880	075122_C528	CLASP2 CLIP-associating protein 2	5580
Q96EP0_C 551	RNF31 E3 ubiquitin-protein ligase RNF31	2881	P46821_C905	MAP1B Microtubule-associated protein 1B	5581
P50579_C 121	METAP2 Methionine aminopeptidase 2	2882	P46821_C963	MAP1B Microtubule-associated protein 1B	5582
Q7Z434_C 133	MAVS Mitochondrial antiviral-signaling protein	2883	060343_C295	TBC1D4 TBC1 domain family member 4	5583
Q29RF7_C 327	PDS5A Sister chromatid cohesion protein PDS5 homolog A	2884	Q96C36_C232	PYCR2 Pyrroline-5-carboxylate reductase 2	5584
Q86WB0_C 406	ZC3HC1 Nuclear-interacting partner of ALK	2885	P61011_C229	SRP54 Signal recognition particle 54 kDa protein	5585
Q9Y490_C 1953	TLN1 Talin-1	2886	Q9H223_C141	EHD4 EH domain-containing protein 4	5586
P43243_C 230	MATR3 Matrin-3	2887	014981_C1542	BTAF1 TATA-binding protein-associated factor 172	5587
P62913_C 72	RPL11 60S ribosomal protein L11	2888	P13796_C283	LCP1 Plastin-2	5588
000422_C 26	SAP18 Histone deacetylase complex subunit SAP18	2889	095071_C691	UBR5 E3 ubiquitin-protein ligase UBR5	5589
060921_C 200	HUS1 Checkpoint protein HUS1	2890	095071_C2768	UBR5 E3 ubiquitin-protein ligase UBR5	5590
096017_C 385	CHEK2 Serine/threonine-protein kinase Chk2	2891	Q9Y2L1_C476	DIS3 Exosome complex exonuclease RRP44	5591
P36969_C 93	GPX4 Phospholipid hydroperoxide glutathione peroxidase,	2892	A0FGR8_C181	ESYT2 Extended synaptotagmin-2	5592
Q96IZ0_C 173	PAWR PRKC apoptosis WT1 regulator protein	2893	P09960_C275	LTA4H Leukotriene A-4 hydrolase	5593
P36871_C 101	PGM1 Phosphoglucomutase-1	2894	Q06330_C454	RBPJ Recombining binding protein suppressor of hairless	5594

Q9BXF6_C337	RAB11FIP5 Rab11 family-interacting protein 5	2895	014519_C105	CDK2AP1 Cyclin-dependent kinase 2-associated protein 1	5595
Q99873_C262	PRMT1 Protein arginine N-methyltransferase 1	2896	Q15545_C72	TAF7 Transcription initiation factor TFHD subunit 7	5596
P09382_C43	LGALS1 Galectin-1	2897	Q15545_C92	TAF7 Transcription initiation factor TFIED subunit 7	5597
075934_C132	BCAS2 Pre-mRNA-splicing factor SPF27	2898	Q15543_C38	TAF13 Transcription initiation factor TFHD subunit 13	5598
Q92538_C685	GBF1 Golgi-specific brefeldin A-resistance guanine nucleotide exchange factor 1	2899	Q6P587_C22	FAHDI AcylpyruvaseFAHDI, mitochondrial	5599
P55039_C99	DRG2 Developmentally-regulated GTP-binding protein 2	2900	P51649_C93	ALDH5A1 Succinate-semialdehyde dehydrogenase, mitochondrial	5600
043414_C285	ERI3 ERI1 exoribonuclease 3	2901	Q15048_C15	LRRC14 Leucine-rich repeat-containing protein 14	5601
Q14974_C228	KPNB1 Importin subunit beta-1	2902	Q15042_C117	RAB3GAP1 Rab3 GTPase-activating protein catalytic subunit	5602
P30050_C17	RPL12 60S ribosomal protein L12	2903	Q15042_C873	RAB3GAP1 Rab3 GTPase-activating protein catalytic subunit	5603
P78347_C475	GTF2I General transcription factor II-I	2904	Q6R327_C1631	RICTOR Rapamycin-insensitive companion of mTOR	5604
Q9H3M7_C247	TXNIP Thioredoxin-interacting protein	2905	P49915_C530	GMPS GMP synthase	5605
P08047_C68	SP1 Transcription factor Spl	2906	Q9Y2K7_C840	KDM2A Lysine-specific demethylase 2A	5606
043242_C210	PSMD3 26S proteasome non-ATPase regulatory subunit 3	2907	P00973_C25	OAS1 2-5-oligoadenylate synthase 1	5607
Q9UPN3_C4206	MACF1 Microtubule-actin cross-linking factor 1, isoforms	2908	Q01780_C651	EXOSC10 Exosome component 10	5608
Q14103_C126	HNRNPD Heterogeneous nuclear ribonucleoprotein D0	2909	P12268_C468	IMPDH2 Inosine-5-monophosphate dehydrogenase 2	5609
Q9BY32_C33	ITPA Inosine triphosphate pyrophosphatase	2910	P07437_C129	TUBB Tubulin beta chain	5610
Q9BQ52_C670	ELAC2 Zinc phosphodiesterase ELAC protein 2	2911	Q01658_C94	DR1 Protein Drl	5611
015067_C318	PFAS Phosphoribosylformylglycine midine synthase	2912	Q9Y490_C29	TLN1 Talin-1	5612
Q9H9J2_C53	MRPL44 39S ribosomal protein L44, mitochondrial	2913	Q9Y490_C1478	TLN1 Talin-1	5613
Q00610_C151	CLTC Clathrin heavy chain 1	2914	P43243_C821	MATR3 Matrin-3	5614
P09497_C199	CLTB Clathrin light chain B	2915	Q86W50_C253	METTL16 Methyltransferase-like protein 16	5615
Q9Y617_C224	PSATI Phosphoserine aminotransferase	2916	P49005_C447	POLD2 DNA polymerase delta subunit 2	5616
P46013_C1007	MKI67 Antigen KI-67	2917	Q9H3H3_C199	Clorf68 UPF0696 protein Clorf68	5617
Q9BSD7_C101	NTPCR Cancer-related nucleoside-triphosphatase	2918	P27708_C484	CAD CAD protein	5618
Q7Z6Z7_C349	HUWE1 E3 ubiquitin-protein ligase HUWE1	2919	Q709C8_C1481	VPS13C Vacuolar protein sorting-associated protein 13C	5619

Q14919_C 54	DRAP1 Dr1-associated corepressor	2920	P23497_ C373	SP100 Nuclear autoantigen Sp-100	5620
Q9UNE7_ C199	STUB1 E3 ubiquitin-protein ligase CHIP	2921	Q9NXV2_ C25	KCTD5 BTB/POZ domain-containing protein KCTD5	5621
Q16881_C 515	TXNRD1 Thioredoxin reductase 1, cytoplasmic	2922	Q05209_ C470	PTPN12 Tyrosine-protein phosphatase non-receptor type 12	5622
P09936_C 220	UCHL1 Ubiquitin carboxyl-terminal hydrolase isozyme L1	2923	Q9P258_ C305	RCC2 Protein RCC2	5623
Q9NZJ9_ C147	NUDT4 Diphosphoinositol polyphosphate phosphohydrolase 2	2924	Q8N3R9_ C490	MPP5 MAGUK p55 subfamily member 5	5624
Q5T4S7_ C2554	UBR4 E3 ubiquitin-protein ligase UBR4	2925	Q13464_ C29	ROCK1 Rho-associated protein kinase 1	5625
Q96C19_ C53	EFHD2 EF-hand domain-containing protein D2	2926	Q7L5Y9_ C195	MAEA Macrophage erythroblast attacher	5626
Q8N6M0_ C292	OTUD6B OTU domain-containing protein 6B	2927	O15446_ C150	CD3EAP DNA-directed RNA polymerase I subunit RPA34	5627
Q8N201_ C1633	INTS1 Integrator complex subunit 1	2928	P54136_ C36	RARS Arginine--tRNA ligase, cytoplasmic	5628
O95294_C 301	RASAL1 RasGAP-activating-like protein 1	2929	P54136_ C638	RARS Arginine--tRNA ligase, cytoplasmic	5629
Q9UKX7_ C181	NUP50 Nuclear pore complex protein Nup50	2930	Q96F24_ C155	NRBF2 Nuclear receptor-binding factor 2	5630
Q92616_C 1595	GCN1L1 Translational activator GCN1	2931	Q9Y5L0_ C527	TNPO3 Transportin-3	5631
P49327_C 2024	FASN Fatty acid synthase	2932	Q86YV5_ C444	SGK223 Tyrosine-protein kinase SgK223	5632
Q16877_C 106	PFKFB4 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase	2933	O60502_ C663	MGEA5 Bifunctional protein NCOAT	5633
Q96JP5_C 182	ZFP91 E3 ubiquitin-protein ligase ZFP91	2934	O60502_ C896	MGEA5 Bifunctional protein NCOAT	5634
Q99538_C 50	LGMN Legumain	2935	Q13671_ C223	RIN1 Ras and Rab interactor 1	5635
Q96RS6_ C32	NUDCD1 NudC domain-containing protein 1	2936	O95067_ C131	CCNB2 G2/mitotic-specific cyclin-B2	5636
Q96RS6_ C513	NUDCD1 NudC domain-containing protein 1	2937	P38646_ C608	HSPA9 Stress-70 protein, mitochondrial	5637
Q8TBC4_ C28	UBA3 NEDD8-activating enzyme E1 catalytic subunit	2938	Q96MX6_ C70	WDR92 WD repeat-containing protein 92	5638
Q14839_C 1827	CHD4 Chromodomain-helicase-DNA-binding protein 4	2939	P49588_ C901	AARS Alanine--tRNA ligase, cytoplasmic	5639
Q9Y2D5_ C205	AKAP2 A-kinase anchor protein 2	2940	Q9HCC0_ C391	MCCC2 Methylcrotonoyl-CoA carboxylase beta chain, mitochondrial	5640
Q9UQ35_ C956	SRRM2 Serine/arginine repetitive matrix protein 2	2941	P47755_ C157	CAPZA2 F-actin-capping protein subunit alpha-2	5641
O60711_C 358	LPXN Leupaxin	2942	Q8TDD1_ C73	DDX54 ATP-dependent RNA helicase DDX54	5642
Q00013_C 454	MPP1 55 kDa erythrocyte membrane protein	2943	P47897_ C111	QARS Glutamine--tRNA ligase	5643
Q6PIL8_ C57	MRPL14 39S ribosomal protein L14, mitochondrial	2944	P06730_ C89	EIF4E Eukaryotic translation initiation factor 4E	5644
Q92973_C 620	TNPO1 Transportin-1	2945	P06730_ C136	EIF4E Eukaryotic translation initiation factor 4E	5645

P42575_C320	CASP2 Caspase-2	2946	Q7Z4W1_C150	DCXR L-xylulose reductase	5646
P35520_C431	CBS Cystathionine beta-synthase	2947	Q96QB1_C532	DLC1 Rho GTPase-activating protein 7	5647
095425_C1237	SVTL Supervillin	2948	P30740_C344	SERPINB1 Leukocyte elastase inhibitor	5648
Q9Y305_C299	ACOT9 Acyl-coenzyme A thioesterase 9, mitochondrial	2949	095758_C68	PTBP3 Polypyrimidine tract-binding protein 3	5649
P32321_C83	DCTD Deoxycytidylate deaminase	2950	P00966_C132	ASS1 Argininosuccinate synthase	5650
P61158_C189	ACTR3 Actin-related protein 3	2951	P62917_C115	RPL8 60S ribosomal protein L8	5651
P11413_C158	G6PD Glucose-6-phosphate 1-dehydrogenase	2952	Q00796_C106	SORD Sorbitol dehydrogenase	5652
P04181_C93	OAT Ornithine aminotransferase, mitochondrial	2953	075928_C346	PIAS2 E3 SUMO-protein ligase PIAS2	5653
P15880_C182	RPS2 40S ribosomal protein S2	2954	Q8TF42_C367	UBASH3B Ubiquitin-associated and SH3 domain-containing protein	5654
P01871_C88	IGHM Ig mu chain C region	2955	Q9NVR7_C298	TBCCD1 TBCC domain-containing protein 1	5655
P50991_C120	CCT4 T-complex protein 1 subunit delta	2956	Q9UK39_C302	CCRN4L Nocurmin	5656
P57678_C210	GEMIN4 Gem-associated protein 4	2957	Q99627_C20	COPS8 COP9 signalosome complex subunit 8	5657
094925_C287	GLS Glutaminase kidney isoform, mitochondrial	2958	Q9C0J8_C120	WDR33 pre-mRNA 3 end processing protein WDR33	5658
Q8N3D4_C1364	EHBPI1 EH domain-binding protein 1-like protein 1	2959	Q6ZUJ8_C358	PIK3AP1 Phosphoinositide 3-kinase adapter protein 1	5659
Q8IUJ8_C19	MYNA MYC-induced nuclear antigen	2960	P23246_C431	SFPQ Splicing factor, proline- and glutamine-rich	5660
Q9NXH9_C376	TRMT1 tRNA(guanine(26)-N(2))-dimethyltransferase	2961	P48506_C501	GCLC Glutamate-cysteine ligase catalytic subunit	5661
P00505_C382	GOT2 Aspartate aminotransferase, mitochondrial	2962	Q04637_C821	EIF4G1 Eukaryotic translation initiation factor 4 gamma 1	5662
A0JLT2_C62	MED19 Mediator of RNA polymerase I transcription subunit	2963	P52701_C108	MSH6 DNA mismatch repair protein Msh6	5663
015382_C135	BCAT2 Branched-chain-amino-acid aminotransferase, mitochondrial	2964	P11310_C156	ACADM Medium-chain specific acyl-CoA dehydrogenase, mitochondrial	5664
P52789_C606	HK2 Hexokinase-2	2965	Q96G03_C86	PGM2 Phosphoglucomutase-2	5665
Q9Y3C8_C116	UFC1 Ubiquitin-fold modifier-conjugating enzyme 1	2966	Q9NZ32_C352	ACTR10 Actin-related protein 10	5666
Q13439_C1269	GOLGA4 Golgin subfamily A member 4	2967	P32119_C70	PRDX2 Peroxiredoxin-2	5667
P63279_C43	UBE2I SUMO-conjugating enzyme UBC9	2968	Q5R314_C128	TTC38 Tetratricopeptide repeat protein 38	5668
P60900_C47	PSMA6 Proteasome subunit alpha type-6	2969	043318_C513	MAP3K7 Mitogen-activated protein kinase kinase kinase 7	5669
Q9H0L4_C222	CSTF2T Cleavage stimulation factor subunit 2 tau variant	2970	Q53H82_C21	LACTB2 Beta-lactamase-like protein 2	5670

Q86UX7_C128	FERMT3 Fermitin family homolog 3	2971	P63165_C52	SUMO1 Small ubiquitin-related modifier 1	5671
Q15003_C714	NCAPH Condensm complex subunit 2	2972	P33993_C566	MCM7 DNA replication licensing factor MCM7	5672
060684_C253	KPNA6 Importin subunit alpha-7	2973	P41567_C94	EIF1 Eukaryotic translation initiation factor 1	5673
075643_C1580	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicas	2974	P22830_C395	FECH Ferrochelatae, mitochondrial	5674
043765_C129	SGTA Small glutamine-rich tetratricopeptide repeat-containing, alpha	2975	P36871_C160	PGM1 Phosphoglucomutase-1	5675
Q9GZV5_C363	WWTR1 WW domain-containing transcription regulator protein 1	2976	Q9H0D6_C29	XRN2 5-3 exoribonuclease 2	5676
P27816_C654	MAP4 Microtubule-associated protein 4	2977	P31751_C124	AKT2 RAC-beta serine/threonine-protein kinase	5677
Q14847_C53	LASP1 LIM and SH3 domain protein 1	2978	P30622_C150	CLIP1 CAP-Gly domain-containing linker protein 1	5678
015371_C195	EIF3D Eukaryotic translation initiation factor 3 subunit	2979	Q06481_C133	APLP2 Amyloid-like protein 2	5679
P10768_C181	ESD S-formylglutathione hydrolase	2980	Q9NR12_C311	PDLIM7 PDZ and LIM domain protein 7	5680
P52895_C242	AKR1C2 Aldo-keto reductase family 1 member C2	2981	A6NHR9_C505	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	5681
Q9UBE0_C303	SAE1 SUMO-activating enzyme subunit 1	2982	A6NHR9_C1656	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	5682
P29590_C204	PML Protein PML	2983	075600_C134	GCAT 2-amino-3-ketobutyrate coenzyme A ligase, mitochondrial	5683
015231_C262	ZNF185 Zinc finger protein 185	2984	Q96IU2_C26	ZBED3 Zinc finger BED domain-containing protein 3	5684
075251_C183	NDUFS7 NADH dehydrogenase	2985	Q6PKG0_C1054	LARP1 La-related protein 1	5685
001082_C1900	SPTBN1 Spectrin beta chain, non-erythrocytic 1	2986	Q5VYS8_C343	ZCCHC6 Tenuinal uridylyltransferase 7	5686
Q9UHR5_C127	SAP30BP SAP30-binding protein	2987	P35580_C382	MYH10 Myosin-10	5687
Q9NR56_C43	MBNL1 Muscleblind-like protein 1	2988	P49023_C546	PXNPaxillin	5688
Q9P2E9_C892	RRBP1 Ribosome-binding protein 1	2989	Q9NVS9_C72	PNPO Pyridoxine-5-phosphate oxidase	5689
Q9P2E9_C933	RRBP1 Ribosome-binding protein 1	2990	Q9NQG7_C547	HPS4 Hermansky-Pudlak syndrome 4 protein	5690
Q9P2E9_C1057	RRBP1 Ribosome-binding protein 1	2991	Q14289_C562	PTK2B Protein-tyrosine kinase 2-beta	5691
P13640_C38	MT1G Metallothionein-IG	2992	Q96P47_C611	AGAP3 Arf-GAP with GTPase, ANK repeat and PH domain-containing protein 3	5692
Q9NSE4_C311	IARS2 Isoleucine-tRNA ligase, mitochondrial	2993	Q92621_C921	NUP205 Nuclear pore complex protein Nup205	5693
Q9Y2X7_C576	GIT1 ARF GTPase-activating protein GIT1	2994	Q9BTA9_C615	WAC WW domain-containing adapter protein with coiled-coil	5694

Q9H840_C44	GEMIN7 Gem-associated protein 7	2995	Q02241_C165	KIF23 Kinesin-like protein KIF23	5695
P14678_C45	SNRNPB Small nuclear ribonucleoprotein-associated protein	2996	Q02241_C412	KIF23 Kinesin-like protein KIF23	5696
P28340_C428	POLD1 DNA polymerase delta catalytic subunit	2997	P41229_C1047	KDM5C Lysine-specific demethylase 5C	5697
P28347_C53	TEAD1 Transcriptional enhancer factor TEF-1	2998	Q92538_C158	GBF1 Golgi-specific brefeldin A-resistance guanine nucleotide exchange factor 1	5698
P32780_C246	GTF2H1 General transcription factor IIH subunit 1	2999	Q9UEY8_C73	ADD3 Gamma-adducin	5699
Q86VP6_C71	CAND1 Cullin-associated NEDD8-dissociated protein 1	3000	Q70J99_C448	UNCI 3D Protein unc-13 horaolog D	5700
Q92597_C394	NDRG 1 Protein NDRG 1	3001	P20339_C63	RAB5 A Ras-related protein Rab-5 A	5701
Q8IW35_C484	CEP97 Centrosomal protein of 97 kDa	3002	Q9NZ08_C498	ERAP1 Endoplasmic reticulum aminopeptidase 1	5702
Q96JB5_C216	CDK5RAP3 CDK5 regulatory subunit-associated protein 3	3003	Q9NZ09_C45	UBAP1 Ubiquitin-associated protein 1	5703
Q96T51_C320	RUFY1 RUN and FYVE domain-containing protein 1	3004	Q96IQ9_C75	ZNF4 14 Zinc finger protein 414	5704
Q13503_C29	MED21 Mediator of RNA polymerase II transcription subunit	3005	Q96IQ9_C134	ZNF4 14 Zinc finger protein 414	5705
P49721_C46	PSMB2 Proteasome subunit beta type-2	3006	P55039_C270	DRG2 Developmentally-regulated GTP-binding protein 2	5706
075376_C2056	NCOR1 Nuclear receptor corepressor 1	3007	Q9H4A4_C254	RNPEP Aminopeptidase B	5707
Q86UP2_CI105	KTN1 Kinectin	3008	P15170_C453	GSPT1 Eukaryotic peptide chain release factor GTP-binding subunit ERF3A	5708
Q8TB45_C247	DEPTOR DEP domain-containing mTOR-interacting protein	3009	075152_C588	ZC3H11A Zinc finger CCCH domain-containing protein 11A	5709
P41252_C87	IARS Isoleucine-tRNA ligase, cytoplasmic	3010	Q9BWD1_C158	ACAT2 Acetyl-CoA acetyltransferase, cytosolic	5710
P41252_C120	IARS Isoleucine-tRNA ligase, cytoplasmic	3011	Q9UJX4_C203	ANAPC5 Anaphase-promoting complex subunit 5	5711
P41252_C433	IARS Isoleucine-tRNA ligase, cytoplasmic	3012	Q96E11_C154	MRRF Ribosome-recycling factor, mitochondrial	5712
Q06203_C496	PPAT Amidophosphoribosyltransferase	3013	Q16666_C679	IFI16 Gamma-interferon-inducible protein 16	5713
Q15437_C767	SEC23B Protein transport protein Sec23B	3014	000622_C100	CYR61 Protein CYR61	5714
Q9NQW6_C71	ANLN Actin-binding protein anillin	3015	000629_C417	KPNA4 Importin subunit alpha-4	5715
Q9UBF6_C61	RNF7 RING-box protein 2	3016	P40227_C282	CCT6A T-complex protein 1 subunit zeta	5716
P51649_C110	ALDH5A1 Succinate-semialdehyde dehydrogenase, mitochondrial	3017	Q12830_C2697	BPTF Nucleosome-remodeling factor subunit BPTF	5717
I3L420_C80	LSM14A Protein LSM14 homotog A	3018	P48960_C513	CD97 CD97 antigen	5718

Q13263_C 88	TRJM28 Transcription intermediary factor 1-beta	3019	Q9NRZ9 C836	HELLS Lymphoid-specific helicase	5719
Q5VTU8_C 19	ATP5EP2 ATP synthase subunit epsilon-like protein, mitochondrial	3020	P02765_C 230	AHSG Alpha-2-HS-glycoprotein	5720
P06733_C 337	ENO1 Alpha-enolase	3021	Q9NTZ6 C545	RBM12 RNA-binding protein 12	5721
P08559_C 94	PDHA1 Pyruvate dehydrogenase E1 component subunit alpha,	3022	P20618_C 89	PSMB1 Proteasome subunit beta type-1	5722
Q14166_C 642	TTL12 Tubulin-tyrosine ligase-like protein 12	3023	Q15365_C U8	PCBP1 Poly(rC)-binding protein 1	5723
Q9BW92_C 506	TARS2 Threonine-tRNA ligase, mitochondrial	3024	Q9BVL4 C629	SELO Selenoprotein O	5724
Q12824_C 223	SMARCB1 SWI/SNF-related matrix-associated actin- dependant	3025	B5ME19_C 79	EIF3CL Eukaryotic translation initiation factor 3 subunit	5725
000410_C 733	IP05 Importin-5	3026	Q13905_C 817	RAPGEF1 Rap guanine nucleotide exchange factor 1	5726
Q9BXV9_C 21	C14orf142 Uncharacterized protein C14orf142	3027	P29401_C 151	TKT Transketolase	5727
Q53GG5_C 77	PDLIM3 PDZ and LIM domain protein 3	3028	P29401_C 206	TKT Transketolase	5728
P36776_C 858	LONP1 Lon protease homolog, mitochondrial	3029	P35244_C 81	RPA3 Replication protein A 14 kDa subunit	5729
Q16531_C 652	DDB1 DNA damage-binding protein 1	3030	Q8WUB8_C 57	PHF10 PHD finger protein 10	5730
Q96PZ0_C 38	PUS7 Pseudouridylate synthase 7 homolog	3031	P49711_C 155	CTCF Transcriptional repressor CTCF	5731
Q9HBM6_C 121	TAF9B Transcription initiation factor TFIID subunit 9B	3032	Q9UKL0_C 35	RCOR1 REST corepressor 1	5732
A0AVT1_C 625	UBA6 Ubiquitin-like modifier- activating enzyme 6	3033	Q92835_C 506	INPP5D Phosphatidylinositol 3,4,5- trisphosphate 5-phosphatase 1	5733
P53384_C 31	NUBP1 Cytosolic Fe-S cluster assembly factor NUBP 1	3034	Q9H3M7_C 384	TXNIP Thioredoxin-interacting protein	5734
Q8TBE9_C 242	NANP N-acylneuraminase-9- phosphatase	3035	Q92598_C 650	HSPH1 Heat shock protein 105 kDa	5735
P10644_C 362	PRKAR1A cAMP-dependent protein kinase type I-alpha regulatory subunit alpha	3036	Q09161_C 36	NCBP1 Nuclear cap-binding protein subunit 1	5736
P49790_C 1065	NUP153 Nuclear pore complex protein Nup153	3037	Q99081_C 129	TCF12 Transcription factor 12	5737
Q00610_C 617	CLTC Clathrin heavy chain 1	3038	Q9Y4G6_C 810	TLN2 Talin-2	5738
Q00610_C 753	CLTC Clathrin heavy chain 1	3039	Q14566_C 637	MCM6 DNA replication licensing factor MCM6	5739
000506_C 357	STK25 Serine/threonine- protein kinase 25	3040	Q8NFQ8_C 468	TOR1AIP2 Torsin-1A-interacting protein 2	5740
Q6SJ93_C 523	FAM111B Protein FAM111B	3041	Q15185_C 20	PTGES3 Prostaglandin E synthase 3	5741
Q01581_C 86	HMGCS1 Hydroxymethylglutaryl-CoA synthase, cytoplasmic	3042	Q92619_C 599	HMHA1 Minor histocompatibility protein HA-1	5742
P35658_C 917	NUP214 Nuclear pore complex protein Nup214	3043	094903_C 15	PROSC Proline synthase co-transcribed bacterial homolog	5743

P46013_C 958	MKJ67 Antigen KI-67	3044	Q8N999_ C294	C12orf29 Uncharacterized protein C12orf29	5744
Q14005_C 975	H,16 Pro-interleukin- 16	3045	Q8NFC6 C2384	BODILI Biorientation of chromosomes in cell division protein	5745
P40937_C 73	RFC5 Replication factor C subunit 5	3046	Q7L8L6_ C689	FASTKD5 FAST kinase domain- containing protein 5	5746
Q14653_C 371	IRF3 Interferon regulatory factor 3	3047	043795_ C779	MYOIB Unconventional myosin-Ib	5747
P07900_C 420	HSP90AA1 Heat shock protein HSP 90-alpha	3048	Q9UPN3 C4388	MACF1 Microtubule-actin cross- linking factor 1, isoforms	5748
P21333_C 649	FLNA Filamin-A	3049	Q9UPN7 C455	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	5749
P21333_C 1260	FLNA Filamin-A	3050	075569_ C106	PRKRA Interferon-inducible double stranded RNA-dependent	5750
P21333_C 2160	FLNA Filamin-A	3051	Q9UPN9 C153	TRIM33 E3 ubiquitin-protein ligase TRIM33	5751
Q7Z3D6_ C265	C14orf159 UPF03 17 protein C14orf159, mitochondrial	3052	Q9UPN9 C754	TRIM33 E3 ubiquitin-protein ligase TRIM33	5752
000264_C 129	PGRMC1 Membrane- associated progesterone receptor component 1	3053	Q9UPN9 _C786	TRIM33 E3 ubiquitin-protein ligase TRIM33	5753
Q15345_C 123	LRRC41 Leucine-rich repeat- containing protein 4 1	3054	Q96HA1 C307	POM121 Nuclear envelope pore membrane protein POM 121	5754
P43490_C 397	NAMPT Nicotinamide phosphoribosyltransferase	3055	Q99460_ C633	PSMD1 26S proteasome non-ATPase regulatory subunit 1	5755
043504_C 66	HBXIP Hepatitis B virus X- interacting protein	3056	Q8WY36 C150	BBX HMG box transcription factor BBX	5756
P48307_C 130	TFPI2 Tissue factor pathway inhibitor 2	3057	Q8WY36 C712	BBX HMG box transcription factor BBX	5757
PI8074_C 663	ERCC2 TFIIH basal transcription factor complex helicase	3058	P40763_ C468	STAT3 Signal transducer and activator of transcription 3	5758
Q9NV35_ C23	NUDT15 Probable 8-oxo- dGTP diphosphatase NUDT15	3059	Q70E73_ C847	RAPH1 Ras-associated and pleckstrin homology domains-containing protein 1	5759
Q12888_C 896	TP53BP1 Tumor suppressor p53-binding protein 1	3060	Q9BZQ8 C891	FAM129A Protein Niban	5760
Q8TAC2_ C168	JOSD2 Josephin-2	3061	Q9NUU7 C224	DDX19A ATP-dependent RNA helicase DDX 19A	5761
Q6PIL8_ C90	MRPL14 39S ribosomal protein LI4, mitochondrial	3062	Q96KG9 C503	SCYL1 N-terminal kinase-like protein	5762
Q92576_C 441	PHF3 PHD finger protein 3	3063	Q96RU3_ C248	FNBP1 Formin-binding protein 1	5763
P63000_C 105	RAC1 Ras-related C3 botulinum toxin substrate 1	3064	Q14966_ C1023	ZNF638 Zinc finger protein 638	5764
094776_C 261	MTA2 Metastasis-associated protein MTA2	3065	Q96FZ5_ C12	CMTM7 CKLF-like MARVEL transmembrane domain-containing protein 7	5765
Q9P0K7_ C131	RAI14 Ankycorbin	3066	Q96FZ2_ C97	C3orf37 UPF0361 protein C3orf37	5766
092747_C 162	ARPC1 A Actin-related protein 2/3 complex subunit 1A	3067	P49770_ C194	EIF2B2 Translation initiation factor eIF-2B subunit beta	5767
Q8NE71_ C741	ABCF1 ATP-binding cassette sub-family F member 1	3068	P40306_ C215	PSMB10 Proteasome subunit beta typc- 10	5768
P58546_C 45	MTPN Myotrophin	3069	095639_ C41	CPSF4 Cleavage and polyadenylation specificity factor subunit	5769

Q10570_C 1044	CPSF1 Cleavage and polyadenylation specificity factor subunit 1	3070	P25208_C89	NFYB Nuclear transcription factor Y subunit beta	5770
Q15021_C 320	NCAPD2 Condensin complex subunit 1	3071	Q9BZ29_C628	DOCK9 Dedicator of cytokinesis protein 9	5771
Q6PIN0_C C252	CC2D1A Coiled-coil and C2 domain-containing protein 1A	3072	Q92688_C114	ANP32B Acidic leucine-rich nuclear phosphoprotein 32 family member B	5772
O43818_C 399	RRP9 U3 small nucleolar RNA-interacting protein 2	3073	Q9H6R7_C507	C2orf44 WD repeat-containing protein C2orf44	5773
Q92556_C 726	ELMO1 Engulfment and cell motility protein 1	3074	O15067_C1044	PFAS Phosphoribosylformylglycinamide synthase	5774
Q9NSP4_C C110	CENPM Centromere protein M	3075	P60891_C60	PRPS1 Ribose-phosphate pyrophosphokinase 1	5775
P22234_C 151	PAICS Multifunctional protein ADE2	3076	Q86WN1_C449	FCHSD1 FCH and double SH3 domains protein 1	5776
Q96RN5_C C698	MED15 Mediator of RNA polymerase II transcription subunit	3077	Q8TAA5_C97	GRPEL2 GrpE protein homolog 2, mitochondrial	5777
Q81WZ3_C C181	ANKHD1 Ankyrin repeat and KH domain-containing protein 1	3078	Q9NW64_C48	RBM22 Pre-mRNA-splicing factor RBM22	5778
H3BN98_C C109	Uncharacterized protein	3079	Q7Z4H7_C743	HAUS6 HAUS augmin-like complex subunit 6	5779
Q14683_C 1115	SMC1A Structural maintenance of chromosomes protein 1A	3080	Q13823_C336	GNL2 Nucleolar GTP-binding protein 2	5780
P33764_C 99	S100A3 Protein S100-A3	3081	P49790_C148	NUP153 Nuclear pore complex protein Nup153	5781
Q8NF50_C C143	DOCK8 Dedicator of cytokinesis protein 8	3082	Q01813_C664	PFKP 6-phosphofructokinase type C	5782
Q9NZT2_C C87	OGFR Opioid growth factor receptor	3083	P49792_C503	RANBP2 E3 SUMO-protein ligase RanBP2	5783
Q13620_C 248	CUL4B Cullin-4B	3084	P49792_C3040	RANBP2 E3 SUMO-protein ligase RanBP2	5784
P00505_C 187	GOT2 Aspartate aminotransferase, mitochondrial	3085	Q00341_C104	HDLBP Vigilin	5785
Q9Y262_C C417	EIF3L Eukaryotic translation initiation factor 3 subunit	3086	Q00610_C39	CLTC Clathrin heavy chain 1	5786
O75521_C 282	ECI2 Enoyl-CoA delta isomerase 2, mitochondrial	3087	Q00610_C459	CLTC Clathrin heavy chain 1	5787
Q01469_C 120	FABP5 Fatty acid-binding protein, epidermal	3088	Q00610_C562	CLTC Clathrin heavy chain 1	5788
O14965_C 33	AURKA Aurora kinase A	3089	Q5SRE5_C585	NUP188 Nucleoporin NUP188 homolog	5789
P24844_C 109	MYL9 Myosin regulatory light polypeptide 9	3090	Q9NVC6_C15	MED17 Mediator of RNA polymerase II transcription subunit	5790
Q9ULT8_C C2415	HECTD1 E3 ubiquitin-protein ligase HECTD1	3091	Q9NVC6_C110	MED17 Mediator of RNA polymerase II transcription subunit	5791
P81877_C 82	SSBP2 Single-stranded DNA-binding protein 2	3092	Q96T76_C599	MMS19 MMS19 nucleotide excision repair protein homolog	5792
Q9UJX3_C C329	ANAPC7 Anaphase-promoting complex subunit 7	3093	Q9Y618_C1297	NCOR2 Nuclear receptor corepressor 2	5793

Q9BW19_C663	KIFC1 Kinesin-like protein KIFC1	3094	Q9Y618_C2179	NCOR2 Nuclear receptor corepressor 2	5794
P51553_C333	IDH3G Isocitrate dehydrogenase	3095	Q969T4_C145	UBE2E3 Ubiquitin-conjugating enzyme E2 E3	5795
P32320_C53	CDA Cytidine deaminase	3096	Q9Y613_C936	FHOD1 FH1/FH2 domain-containing protein 1	5796
Q02750_C376	MAP2K1 Dual specificity mitogen-activated protein kinase	3097	P09543_C111	CNP 2,3-cyclic-nucleotide 3-phosphodiesterase	5797
094829_C163	IPO13 Importin-13	3098	P32929_C252	CTH Cystathionine gamma-lyase	5798
Q9UNH7_C149	SNX6 Sorting nexin-6	3099	075427_C283	LRCH4 Leucine-rich repeat and calponin homology domain-containing 4	5799
Q9UQ80_C149	PA2G4 Proliferation-associated protein 2G4	3100	P07339_C110	CTSD Cathepsin D	5800
P13674_C503	P4HA1 Prolyl 4-hydroxylase subunit alpha-1	3101	Q92734_C80	TFG Protein TFG	5801
095239_C153	KIF4A Chromosome-associated kinesin KIF4A	3102	Q00765_C118	REEP5 Receptor expression-enhancing protein 5	5802
P08134_C20	RHOC Rho-related GTP-binding protein RhoC	3103	Q9Y4P8_C328	WEPI2 WD repeat domain phosphoinositide-interacting protein 2	5803
P15121_C45	AKR1B1 Aldose reductase	3104	Q4V328_C243	GRIPAP1 GRIP1-associated protein 1	5804
P42704_C208	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	3105	Q86UX6_C425	STK32C Serine/threonine-protein kinase 32C	5805
Q9BYV9_C370	BACH2 Transcription regulator protein BACH2 SPACPFDK R.SPAC+PFDK.G	3106	P43155_C169	CRAT Carnitine O-acetyltransferase	5806
Q9P0V9_C22	SEPT10 Septin-10	3107	Q9BSJ8_C522	ESYT1 Extended synaptotagmin-1	5807
P51570_C203	GALK1 Galactokinase	3108	P35659_C161	DEK Protein DEK	5808
Q7Z5L9_C37	IRF2BP2 Interferon regulatory factor 2-binding protein 2	3109	P27695_C208	APEX1 DNA-(apurinic or apyrimidinic site) lyase	5809
Q86VP6_C1007	CAND1 Cullin-associated NEDD8-dissociated protein 1	3110	P46013_C715	MKI67 Antigen KI-67	5810
Q6KB66_C244	KRT80 Keratin, type II cytoskeletal 80	3111	P46013_C773	MKI67 Antigen KI-67	5811
P17980_C240	PSMC3 26S protease regulatory subunit 6A	3112	Q9UJ70_C217	NAGK N-acetyl-D-glucosamine kinase	5812
P13797_C566	PLS3 Plastin-3	3113	Q7Z5J4_C322	RAI1 Retinoic acid-induced protein 1	5813
015599_C271	SLC9A3R2 Na(+)/H(+) exchange regulatory cofactor NHE-RF2	3114	Q9NRG7_C78	SDR39U1 Epimerase family protein SDR39U1	5814
P41134_C45	ID1 DNA-binding protein inhibitor ID-1	3115	Q8WXH0_C6161	SYNE2 Nesprin-2	5815
Q06210_C264	GFPT1 Glucosamine-6-phosphate aminotransferase	3116	Q8TC07_C686	TBC1D15 TBC1 domain family member 15	5816
P12694_C178	BCKDHA 2-oxoisovalerate dehydrogenase subunit alpha,	3117	Q8N4N3_C254	KLHL36 Kelch-like protein 36	5817

	mitochondrial				
Q5XKP0_C60	QIL1 Protein QIL1	3118	Q99459_C769	CDC5L Cell division cycle 5-like protein	5818
Q9UMS4_C298	PRPF19 Pre-mRNA-processing factor 19	3119	P11216_C143	PYGB Glycogen phosphorylase, brain form	5819
Q9H2U2_C44	PPA2 Inorganic pyrophosphatase 2, mitochondrial	3120	Q6WCQ1_C831	MPRIP Myosin phosphatase Rho-interacting protein	5820
Q9H2U2_C283	PPA2 Inorganic pyrophosphatase 2, mitochondrial	3121	Q2TAZ0_C1458	ATG2A Autophagy-related protein 2 homolog A	5821
Q68CZ2_C615	TNS3 Tensin-3	3122	043324_C147	EEF1E1 Eukaryotic translation elongation factor 1 epsilon	5822
Q99933_C272	BAG1 BAG family molecular chaperone regulator 1	3123	Q96MF7_C140	NSMCE2 E3 SUMO-protein ligase NSE2	5823
Q86U42_C205	PABPN1 Polyadenylate-binding protein 2	3124	Q14653_C222	IRF3 Interferon regulatory factor 3	5824
Q14141_C42	SEPT6 Septin-6	3125	Q15428_C56	SF3A2 Splicing factor 3A subunit 2	5825
Q9H4B0_C390	OSGEPL1 Probable tRNA threonylcarbamoyladenine biosynthesis protein OSGEPL1	3126	Q9UJU2_C321	LEF1 Lymphoid enhancer-binding factor 1	5826
P13796_C140	LCP1 Plastin-2	3127	P60953_C18	CDC42 Cell division control protein 42 homolog	5827
Q06330_C397	RBPJ Recombining binding protein suppressor of hairless	3128	P60953_C81	CDC42 Cell division control protein 42 homolog	5828
Q6NVY1_C45	HIBCH 3-hydroxyisobutyryl-CoA hydrolase, mitochondrial	3129	Q9NYZ3_C539	GTSE1 G2 and S phase-expressed protein 1	5829
Q9BYB4_C175	GNBIL Guanine nucleotide-binding protein subunit beta-like protein 1	3130	Q9UHY7_C202	ENOPH1 Enolase-phosphatase E1	5830
P43681_C225	CHRNA4 Neuronal acetylcholine receptor subunit alpha-4	3131	094768_C190	STK17B Serine/threonine-protein kinase 17B	5831
Q9Y490_C2408	TLN1 Talin-1	3132	015530_C21	PDPK1 3-phosphoinositide-dependent protein kinase 1	5832
P39748_C163	FEN1 Flap endonuclease 1	3133	P21333_C810	FLNA Filamin-A	5833
P49137_C224	MAPKAPK2 MAP kinase-activated protein kinase 2	3134	P21333_C1723	FLNA Filamin-A	5834
096013_C276	PAK4 Serine/threonine-protein kinase PAK 4	3135	P21333_C1865	FLNA Filamin-A	5835
P49748_C477	ACADVL Very long-chain specific acyl-CoA dehydrogenase, m	3136	P21333_C2107	FLNA Filamin-A	5836
Q7Z4W1_C244	DCXR L-xylulose reductase	3137	Q9BWH6_C84	RPAPI RNA polymerase II-associated protein 1	5837
P33992_C355	MCM5 DNA replication licensing factor MCM5	3138	P51610_C292	HCFC1 Host cell factor 1	5838
A6NHR9_C59	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	3139	P51610_C298	HCFC1 Host cell factor 1	5839
O15460_C	P4HA2 Prolyl 4-hydroxylase	3140	P51610_C	HCFC1 Host cell factor 1	5840

529	subunit alpha-2		C1187		
Q12824_C350	SMARCB1 SWI/SNF-related matrix-associated actin-dependent	3141	Q99683_C928	MAP3K5 Mitogen-activated protein kinase kinase kinase 5	5841
000410_C944	IPOS Importin-5	3142	Q9BWM7_C193	SFXN3 Sideroflexin-3	5842
Q96CP2_C64	FLYWCH2 FLYWCH family member 2	3143	Q96EM0_C205	L3HYPDH Trans-L-3-hydroxyproline dehydratase	5843
Q15080_C84	NCF4 Neutrophil cytosol factor 4	3144	Q96SZ5_C258	ADO 2-aminoethanethiol dioxxygenase	5844
Q02241_C483	KIF23 Kinesin-like protein KIF23	3145	Q93100_C348	PHKB Phosphorylase b kinase regulatory subunit beta	5845
Q9NSV4_CI02	DIAPH3 Protein diaphanous homolog 3	3146	075410_C715	TACC1 Transforming acidic coiled-coil-containing protein	5846
Q96N67_C1944	DOCK7 Dedicator of cytokinesis protein 7	3147	P35711_C492	SOX5 Transcription factor SOX-5	5847
P16885_C1200	PLCG2 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase gamma-2	3148	Q9BXW9_C607	FANCD2 Fanconi anemia group D2 protein	5848
015366_C301	PCBP2 Poly(rC)-binding protein 2	3149	Q9Y4W2_C456	LAS1L Ribosomal biogenesis protein LAS1L	5849
Q92598_C290	HSPH1 Heat shock protein 105 kDa	3150	P27635_C80	RPL10 60S ribosomal protein L10	5850
P53384_C277	NUBP1 Cytosolic Fe-S cluster assembly factor NUBP1	3151	095294_C611	RASAL1 RasGAP-activating-like protein 1	5851
Q15181_C254	PPA1 Inorganic pyrophosphatase	3152	Q9Y4E6_CI103	WDR7 WD repeat-containing protein 7	5852
Q7Z5K2_C344	WAPAL Wings apart-like protein homolog	3153	Q92616_C939	GCNLI Translational activator GCN1	5853
Q7Z5K2_C906	WAPAL Wings apart-like protein homolog	3154	Q92615_C633	LARP4B La-related protein 4B	5854
Q8NFC6_C285	BOD1L1 Biorientation of chromosomes in cell division protein	3155	Q99661_C455	KIF2C Kinesin-like protein KEF2C	5855
P53634_C258	CTSC Dipeptidyl peptidase 1	3156	Q9Y4E8_C264	USP15 Ubiquitin carboxyl-terminal hydrolase 15	5856
Q96G25_C31	MED8 Mediator of RNA polymerase II transcription subunit	3157	P24468_C213	NR2F2 COUP transcription factor 2	5857
P10644_C39	PRKAR1A cAMP-dependent protein kinase type I-alpha regulat	3158	P43490_C39	NAMPT Nicotinamide phosphoribosyltransferase	5858
000273_C38	DFFA DNA fragmentation factor subunit alpha	3159	Q8TE73_C4621	DNAH5 Dynein heavy chain 5, axonemal	5859
P49792_C2577	RANBP2 E3 SUMO-protein ligase RanBP2	3160	Q99996_C3868	AKAP9 A-kinase anchor protein 9	5860
P49792_C2791	RANBP2 E3 SUMO-protein ligase RanBP2	3161	P46060_C141	RANGAPI Ran GTPase-activating protein 1	5861
Q93009_C961	USP7 Ubiquitin carboxyl-terminal hydrolase 7	3162	Q8WV28_C343	BLNK B-cell linker protein	5862
Q00610_C491	CLTC Clathrin heavy chain 1	3163	Q8WV24_C242	PHLDA1 Pleckstrin homology-like domain family A member 1	5863
060547_C92	GMDS GDP-mannose 4,6 dehydratase	3164	P49327_C313	FASN Fatty acid synthase	5864

Q9HOP0_C73	NT5C3 Cytosolic 5-nucleotidase 3	3165	P49327_C1881	FASN Fatty acid synthase	5865
075427_C105	LRCH4 Leucine-rich repeat and calponin homology domain-containing 4	3166	075348_C104	ATP6V1G1 V-type proton ATPase subunit G 1	5866
Q4G0N4_C58	NADKDI NAD kinase domain-containing protein 1	3167	Q9UDR5_C342	AASS Alpha-aminoadipic semialdehyde synthase, mitochondrial	5867
Q9Y4P8_C393	WIPI2 WD repeat domain phosphoinositide-interacting protein	3168	Q13363_C312	CTBP1 C-terminus-binding protein 1	5868
P27695_C65	APEX1 DNA-(apurinic or apyrimidic site) lyase	3169	014929_C376	HATI Histone acetyltransferase type B catalytic subunit	5869
Q15004_C99	KIAA0101 PCNA-associated factor	3170	014920_C464	IKBKB Inhibitor of nuclear factor kappa-B kinase subunit	5870
P17858_C114	PFKL 6-phosphofructokinase, liver type	3171	Q9NYK6_C73	EURL Protein EURL homolog	5871
P17858_C334	PFKL 6-phosphofructokinase, liver type	3172	Q99536_C50	VAT1 Synaptic vesicle membrane protein VAT-1 homolog	5872
Q96PK6_C90	RBM14 RNA-binding protein 14	3173	Q8N1G2_C9	FTSJD2 Cap-specific mRNA (nucleoside-2'-O-)-methyltransferase	5873
Q09028_C167	RBBP4 Histone-binding protein RBBP4	3174	Q96ME1_C459	FBXL1 8 F-box/LRR-repeat protein 18	5874
Q8TC07_C24	TBC1D15 TBC1 domain family member 15	3175	Q9BSQ5_C170	CCM2 Malcavernin	5875
Q7Z6Z7_C2721	HUWE1 E3 ubiquitin-protein ligase HUWE1	3176	000688_C133	FKBP3 Peptidyl-prolyl cis-trans isomerase FKBP3	5876
Q9H6S3_C369	EPS8L2 Epidermal growth factor receptor kinase substrate	3177	Q96FX7_C217	TRMT61A tRNA (adenine(58)-N(1))-methyltransferase catalytic subunit	5877
Q9Y281_C80	CFL2 Cofilin-2	3178	Q15691_C45	MAPRE1 Microtubule-associated protein RP/EB family member	5878
Q96IZ6_C171	METTL2A Methyltransferase-like protein 2A	3179	Q9NS87_C576	KIF15 Kinesin-like protein KIF 15	5879
Q96EM0_C39	L3HYDPH Trans-L-3-hydroxyproline dehydratase	3180	PI3489_C220	RNH1 Ribonuclease inhibitor	5880
Q92616_C2255	GCN1L1 Translational activator GCN1	3181	Q9BPY3_C319	FAM118B Protein FAM118B	5881
P43490_C401	NAMPT Nicotinamide phosphoribosyltransferase	3182	Q63HN8_C4348	RNF213 E3 ubiquitin-protein ligase RNF213	5882
P22087_C268	FBL rRNA 2'-O-methyltransferase fibrillar	3183	Q14839_C1018	CHD4 Chromodomain-helicase-DNA-binding protein 4	5883
Q92503_C644	SEC14L1 SEC14-like protein 1	3184	Q14839_C1019	CHD4 Chromodomain-helicase-DNA-binding protein 4	5884
Q9UI10_C69	EIF2B4 Translation initiation factor eIF-2B subunit delta	3185	Q14839_C1121	CHD4 Chromodomain-helicase-DNA-binding protein 4	5885
P49327_C161	FASN Fatty acid synthase	3186	Q9HD33_C87	MRPL47 39S ribosomal protein L47, mitochondrial	5886
P49327_C1141	FASN Fatty acid synthase	3187	014745_C206	SLC9A3R1 Na(+)/H(+) exchange regulatory cofactor NHE-RF1	5887
P49327_C1227	FASN Fatty acid synthase	3188	015287_C314	FANCG Fanconi anemia group G protein	5888
Q9ULZ3_C173	PYCARD Apoptosis-associated speck-like protein containing	3189	Q7L2J0_C429	MEPCE 7SK snRNA methylphosphate capping enzyme	5889
Q8WUI4_C904	HDAC7 Histone deacetylase 7	3190	Q9BUK6_C561	MSTO1 Protein misato homolog 1	5890

Q7L2J0_C 324	MEPCE 7SK snRNA methylphosphate capping enzyme	3191	Q9H5N1_C422	RABEP2 Rab GTPase-binding effector protein 2	5891
Q9BUK6_C46	MSTO1 Protein misato homolog 1	3192	Q7Z3K3_C1267	POGZ Pogo transposable element with ZNF domain	5892
P54577_C424	YARS Tyrosine-tRNA ligase, cytoplasmic	3193	Q96EN8_C558	MOCOS Molybdenum cofactor sulfurase	5893
Q8WU90_C105	ZC3H15 Zinc finger CCCH domain-containing protein 15	3194	P18074_C491	ERCC2 TFIIF basal transcription factor complex helicase	5894
Q9Y305_C194	ACOT9 Acyl-coenzyme A thioesterase 9, mitochondrial	3195	Q9UKU7_C251	ACAD8 Isobutyryl-CoA dehydrogenase, mitochondrial	5895
Q15149_C1098	PLEC Plectin	3196	Q96IY1_C175	NSL1 Kinetochore-associated protein NSL1 homolog	5896
Q14669_C535	TRIP12 E3 ubiquitin-protein ligase TRIP12	3197	Q06136_C121	KDSR 3-ketodihydrospingosine reductase	5897
Q9BTT0_C123	ANP32E Acidic leucine-rich nuclear phosphoprotein 32 family member E	3198	075947_C101	ATP5H ATP synthase subunit d, mitochondrial	5898
Q92989_C338	CLP1 Polyribonucleotide 5-hydroxyl-kinase Clpl	3199	P14921_C99	ETS1 Protein C-ets-1	5899
P06132_C59	UROD Uroporphyrinogen decarboxylase	3200	Q9NRY4_C924	ARHGAP35 Rho GTPase-activating protein 35	5900
Q96EY7_C139	PTCD3 Pentatricopeptide repeat-containing protein 3, mitochondrial	3201	060832_C74	DKC1 H/ACA ribonucleoprotein complex subunit 4	5901
P78527_C90	PRKDC DNA-dependent protein kinase catalytic subunit	3202	095352_C524	ATG7 Ubiquitin-like modifier-activating enzyme ATG7	5902
P78527_C1312	PRKDC DNA-dependent protein kinase catalytic subunit	3203	095359_C2573	TACC2 Transforming acidic coiled-coil-containing protein	5903
P78527_C1767	PRKDC DNA-dependent protein kinase catalytic subunit	3204	Q6ZT12_C1858	UBR3 E3 ubiquitin-protein ligase UBR3	5904
Q92747_C279	ARPC1A Actin-related protein 2/3 complex subunit 1A	3205	Q92990_C537	GLMN Glomulin	5905
Q14671_C234	PUM1 Pumilio homolog 1	3206	Q9Y383_C193	LUC7L2 Putative RNA-binding protein Luc7-like 2	5906
060216_C585	RAD21 Double-strand-break repair protein rad21 homolog	3207	075400_C39	PRPF40A Pre-mRNA-processing factor 40 homolog A	5907
Q5VZF2_C19	MBNL2 Muscblind-like protein 2	3208	P00519_C1100	ABL1 Tyrosine-protein kinase ABL1	5908
Q9UEW8_C525	STK39 STE20/SPS1-related proline-alanine-rich protein kinase	3209	P17676_C11	CEBPB CCAAT/enhancer-binding protein beta	5909
000232_C255	PSMD12 26S proteasome non-ATPase regulatory subunit 12	3210	P53990_C125	IST1 IST1 homolog	5910
000233_C81	PSMD9 26S proteasome non-ATPase regulatory subunit 9	3211	P08729_C274	KRT7 Keratin, type II cytoskeletal 7	5911
Q5GLZ8_C392	HERC4 Probable E3 ubiquitin-protein ligase HERC4	3212	015357_C1187	INPPL1 Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 2	5912
014579_C212	COPE Coatomer subunit epsilon	3213	Q8DC01_C970	SUGP2 SURP and G-patch domain-containing protein 2	5913
Q7Z4G1_C35	COMMD6 COMM domain-containing protein 6	3214	Q9Y4D8_C1488	HECTD4 Probable E3 ubiquitin-protein ligase HECTD4	5914
P17812_C218	CTPS1 CTP synthase 1	3215	060711_C376	LPXN Leupaxin	5915

095394_C 200	PGM3 Phosphoacetylglucosamine mutase	3216	Q96TV0_ C197	NGLY1 Peptide-N(4)-(N-acetyl-beta- glucosaminyl)asparagin	5916
Q7LBC6_ C1357	KDM3B Lysine-specific demethylase 3B	3217	P35637_ C428	FUS RNA-binding protein FUS	5917
Q99496_C 72	RNF2 E3 ubiquitin-protein ligase RING2	3218	Q6KC79_ C1066	NIPBL Nipped-B-like protein	5918
Q9UNW1 C232	MINPP1 Multiple inositol polyphosphate phosphatase 1	3219	Q92973_ C467	TNPO1 Transportin-1	5919
P50453_C 259	SERPINB9 Serpin B9	3220	Q92973_ C683	TNPO1 Transportin-1	5920
Q9NZT2_ C417	OGFR Opioid growth factor receptor	3221	Q9BTE1_ C160	DCTN5 Dynactin subunit 5	5921
095573_C 450	ACSL3 Long-chain-fatty-acid- -CoA ligase 3	3222	P54577_ C501	YARS Tyrosine-tRNA ligase, cytoplasmic	5922
060841_C 720	EIF5B Eukaryotic translation initiation factor 5B	3223	095218_ C74	ZRANB2 Zinc finger Ran-binding domain-containing protein	5923
P29317_C 612	EPHA2 Ephrin type-A receptor 2	3224	Q9NPI1_ C367	BRD7 Bromodomain-containing protein 7	5924
014561_C 140	NDUFAB1 Acyl carrier protein, mitochondrial	3225	Q92576_ C1771	PHF3 PHD finger protein 3	5925
Q9NXH9_ C639	TRMT1 tRNA (guanine(26)- N(2))-dimethyltransferase	3226	092575_ C186	UBXN4 UBX domain-containing protein 4	5926
Q9H6Y2_ C306	WDR55 WD repeat-containing protein 55	3227	P24928_ C13	POLR2A DNA-directed RNA polymerase II subunit RPB1	5927
A0JLT2_ C263	MED19 Mediator of RNA polymerase II transcription subunit	3228	P24928_ C451	POLR2A DNA-directed RNA polymerase II subunit RPB1	5928
Q10567_C 565	APIB1 AP-1 complex subunit beta-1	3229	P24928_ C1287	POLR2A DNA-directed RNA polymerase II subunit RPB1	5929
P08243_C 115	ASNS Asparagine synthetase	3230	Q8IVH4_ C100	MMAA Methylmalonic aciduria type A protein, mitochondrial	5930
P08243_C 158	ASNS Asparagine synthetase	3231	Q68E01_ C596	INTS3 Integrator complex subunit 3	5931
P46736_C 273	BRCC3 Lys-63-specific deubiquitinase BRCC36	3232	Q15751_ C2525	HERC1 Probable E3 ubiquitin-protein ligase HERC1	5932
Q01469_C 67	FABP5 Fatty acid-binding protein, epidermal	3233	Q15751_ C4811	HERC1 Probable E3 ubiquitin-protein ligase HERC1	5933
043175_C 116	PHGDH D-3- phosphoglycerate dehydrogenase	3234	Q8N680_ C296	ZBTB2 Zinc finger and BTB domain- containing protein 2	5934
014818_C 91	PSMA7 Proteasome subunit alpha type-7	3235	Q13371_ C35	PDCL Phosducin-like protein	5935
Q9BRA2_ C110	TXNDC17 Thioredoxin domain-containing protein 17	3236	Q9ULW3_ C37	ABT1 Activator of basal transcription 1	5936
P01892_C 363	HLA-A HLA class I histocompatibility antigen, A-2 alpha	3237	095602_ C613	POLR1A DNA-directed RNA polymerase I subunit RPA1	5937
P84085_C 159	ARF5 ADP-ribosylation factor 5	3238	095602_ C1332	POLR1A DNA-directed RNA polymerase I subunit RPA1	5938
P62879_C 204	GNB2 Guanine nucleotide- binding protein G(I)/G(S)/G(T)	3239	094776_ C44	MTA2 Metastasis-associated protein MTA2	5939
Q9C0C9_ C244	UBE20 Ubiquitin-conjugating enzyme E2 0	3240	P61081_ cm	UBE2M NEDD8-conjugating enzyme Ubc12	5940

Q9C0C9_C598	UBE20 Ubiquitin-conjugating enzyme E2 0	3241	P85037_C665	FOKK1 Forkhead box protein K1	5941
Q14204_C3573	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	3242	P62263_C31	RPS14 40S ribosomal protein S14	5942
060684_C238	KPNA6 Importin subunit alpha-7	3243	Q08945_C200	SSRP1 FACT complex subunit SSRP1	5943
P20073_C413	ANXA7 Annexin A7	3244	Q9ULE6_C750	PALD1 Paladin	5944
075643_C1127	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicase	3245	Q96F07_C223	CYFIP2 Cytoplasmic FMR1-interacting protein 2	5945
P32320_C31	CDA Cytidine deaminase	3246	Q15329_C121	E2F5 Transcription factor E2F5	5946
P11586_C236	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	3247	095163_C213	IKBKAP Elongator complex protein 1	5947
H3BN57_C113	BLOC1S5-TXNDC5 Protein BLOC1S5-TXNDC5	3248	Q6NXT1_C265	ANKRD54 Ankyrin repeat domain-containing protein 54	5948
Q53HC9_C95	TSSC1 Protein TSSC1	3249	Q96EY5_C90	FAM125A Multivesicular body subunit 12A	5949
P27816_C67	MAP4 Microtubule-associated protein 4	3250	Q96CW6_C62	SLC7A60S Probable RNA polymerase II nuclear localization protein	5950
P84090_C33	ERH Enhancer of rudimentary homolog	3251	Q7L1Q6_C349	BZW1 Basic leucine zipper and W2 domain-containing protein	5951
000487_C299	PSMD14 26S proteasome non-ATPase regulatory subunit 14	3252	P15880_C188	RPS2 40S ribosomal protein S2	5952
Q8N8R5_C43	C2orf69 UPF0565 protein C2orf349	3253	Q5VT52_C88	RPRD2 Regulation of nuclear pre-mRNA domain-containing protein 2	5953
P52948_C1027	NUP98 Nuclear pore complex protein Nup98-Nup96	3254	Q9BZ17_C319	UPF3B Regulator of nonsense transcripts 3B	5954
P52948_C1068	NUP98 Nuclear pore complex protein Nup98-Nup96	3255	Q9Y6K9_C131	IKBK NF-kappa-B essential modulator	5955
Q4G0P3_C1853	HYDIN Hydrocephalus-inducing protein homolog	3256	P78527_C1507	PRKDC DNA-dependent protein kinase catalytic subunit	5956
Q08J23_C502	NSUN2 tRNA (cytosine(34)-C(5))-methyltransferase	3257	P78527_C1791	PRKDC DNA-dependent protein kinase catalytic subunit	5957
015231_C542	ZNF185 Zinc finger protein 185	3258	P78537_C61	BLOC1S1 Biogenesis of lysosome-related organelles complex	5958
P21291_C122	CSRP1 Cysteine and glycine-rich protein 1	3259	Q9Y6J0_C717	CABIN1 Calcineurin-binding protein cabin-1	5959
043447_C122	PPIH Peptidyl-prolyl cis-trans isomerase H	3260	Q15819_C69	UBE2V2 Ubiquitin-conjugating enzyme E2 variant 2	5960
P08237_C170	PFKM 6-phosphofructokinase, muscle type	3261	P52564_C38	MAP2K6 Dual specificity mitogen-activated protein kinase	5961
Q1KMD3_C602	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein 2	3262	Q8N556_C684	AFAP1 Actin filament-associated protein 1	5962
P51991_C94	HNRNPA3 Heterogeneous nuclear ribonucleoprotein A3	3263	Q6P4F2_C151	FDX1L Adrenodoxin-like protein, mitochondrial	5963
P35237_C36	SERPINB6 Serpin B6	3264	Q43598_C117	RCL Deoxyribonucleoside 5-monophosphate N-glycosidase	5964
Q96FJ2_C24	DYNLL2 Dynein light chain 2, cytoplasmic	3265	P07996_C813	THBS1 Thrombospondin-1	5965
Q9BTZ2_C209	DHRS4 Dehydrogenase/reductase SDR family member 4	3266	P07996_C946	THBS1 Thrombospondin-1	5966

Q9UMS4_C230	PRPF19 Pre-mRNA-processing factor 19	3267	P07996_C1167	THBS1 Thrombospondin-1	5967
Q9Y6A5_C459	TACC3 Transforming acidic coued-coil-containing protein	3268	P41182_C175	BCL6 B-cell lymphoma 6 protein	5968
Q86TIO_C604	TBC1D1 TBC1 domain family member 1	3269	Q9BQC3_C251	DPH2 Diphthamide biosynthesis protein 2	5969
Q9H0W9_C226	Clorf54 Ester hydrolase Clorf54	3270	043572_C242	AKAP10 A-kinase anchor protein 10, mitochondrial	5970
P18031_C121	PTPN1 Tyrosine-protein phosphatase non-receptor type 1	3271	Q96RQ3_C129	MCCC1 Methylcrotonoyl-CoA carboxylase subunit alpha, mitochondrial	5971
060343_C1286	TBC1D4 TBC1 domain family member 4	3272	Q96RQ3_C509	MCCC1 Methylcrotonoyl-CoA carboxylase subunit alpha, mitochondrial	5972
060759_C210	CYTIP Cytohesin-interacting protein	3273	Q9ULV4_C23	CORO1C Coronin-1C	5973
P10398_C192	ARAF Serine/threonine-protein kinase A-Raf	3274	Q7Z6M1_C29	RABEPK Rab9 effector protein with kelch motifs	5974
Q71SY5_C111	MED25 Mediator of RNA polymerase II transcription subunit	3275	Q9NX38_C74	FAM206A Protein FAM206A	5975
Q9Y490_C1392	TLN1 Talin-1	3276	Q96HW7_C926	INTS4 Integrator complex subunit 4	5976
P43246_C873	MSH2 DNA mismatch repair protein Msh2	3277	Q9HCD6_C431	TANC2 Protein TANC2	5977
P23381_C305	WARS Tryptophan-tRNA ligase, cytoplasmic	3278	Q13418_C239	ILK Integrin-linked protein kinase	5978
Q9NXV2_C28	KCTD5 BTB/POZ domain-containing protein KCTD5	3279	P55036_C87	PSMD4 26S proteasome non-ATPase regulatory subunit 4	5979
P21399_C369	ACO1 Cytoplasmic aconitate hydratase	3280	P62072_C29	TIMM10 Mitochondrial import inner membrane translocase subunit	5980
Q06830_C52	PRDX1 Peroxiredoxin-1	3281	Q7Z222_C474	EFTUD1 Elongation factor Tu GTP-binding domain-containing	5981
Q96D46_C20	NMD3 60S ribosomal export protein NMD3	3282	000231_C257	PSMD11 26S proteasome non-ATPase regulatory subunit 11	5982
Q9Y6C9_C79	MTCH2 Mitochondrial carrier homolog 2	3283	P05023_C374	ATP1A1 Sodium/potassium-transporting ATPase subunit alpha	5983
000429_C446	DNM1L Dynamin-1-like protein	3284	P45985_C379	MAP2K4 Dual specificity mitogen-activated protein kinase	5984
P50552_C64	VASP Vasodilator-stimulated phosphoprotein	3285	P17029_C63	ZKSCAN1 Zinc finger protein with KRAB and SCAN domains 1	5985
Q00796_C120	SORD Sorbitol dehydrogenase	3286	Q9BSW2_C341	EFCAB4B EF-hand calcium-binding domain-containing protein	5986
P42126_C114	ECU Enoyl-CoA delta isomerase 1, mitochondrial	3287	Q9P2R3_C34	ANKFY1 Ankyrin repeat and FYVE domain-containing protein	5987
P49368_C213	CCT3 T-complex protein 1 subunit gamma	3288	Q9P2R3_C716	ANKFY1 Ankyrin repeat and FYVE domain-containing protein	5988
Q9NY27_C105	PPP4R2 Serine/threonine-protein phosphatase 4 regulatory	3289	P31040_C536	SDHA Succinate dehydrogenase	5989
P49756_C83	RBM25 RNA-binding protein 25	3290	P09104_C357	ENO2 Gamma-enolase	5990
F5H5P2_C231	Uncharacterized protein	3291	076075_C108	DFFB DNA fragmentation factor subunit beta	5991

Q14C86_C741	GAPVD1 GTPase-activating protein and VPS9 domain-containing protein 1	3292	Q9P2D3_C1546	HEATR5B HEAT repeat-containing protein 5B	5992
Q969V6_C326	MKL1 MKIVrayocardin-like protein 1	3293	Q9P2D6_C575	FAM135A Protein FAM135A	5993
Q9P2N5_C21	RBM27 RNA-binding protein 27	3294	Q15334_C697	LLGL1 Lethal(2) giant larvae protein homolog 1	5994
P53396_C229	ACLY ATP-citrate synthase	3295	P17735_C332	TAT Tyrosine aminotransferase	5995
Q8WVT3_C160	TRAPPC12 Trafficking protein particle complex subunit 12	3296	Q9NXW9_C159	ALKBH4 Probable alpha-ketoglutarate-dependent dioxygenase	5996
043678_C24	NDUFA2 NADH dehydrogenase	3297	Q5BKX5_C271	C19orf54 UPF0692 protein C19orf54	5997
Q961F1_C270	AJUBA LIM domain-containing protein ajuba	3298	Q92888_C752	ARHGEF1 Rho guanine nucleotide exchange factor 1	5998
Q14974_C158	KPNB1 Importin subunit beta-1	3299	Q96EV8_C302	DTNBP1 Dysbindin	5999
P21266_C178	GSTM3 Glutathione S-transferase Mu 3	3300	A6NC98_C1382	CCDC88B Coiled-coil domain-containing protein 88B	6000
000622_C322	CYR61 Protein CYR61	3301	Q9UQR0_C324	SCML2 Sex comb on midleg-like protein 2	6001
Q96N67_C193	DOCK7 Dedicator of cytokinesis protein 7	3302	P04083_C263	ANXA1 Annexin A1	6002
Q15369_C74	TCEB1 Transcription elongation factor B polypeptide 1	3303	Q3V6T2_C1729	CCDC88A Girdin	6003
A6NDU8_C57	C5orf51 UPF0600 protein C5orf51	3304	Q12906_C278	ILF3 Interleukin enhancer-binding factor 3	6004
Q9P219_C1871	CCDC88C Protein Daple	3305	Q14315_C2555	FLNC Filamin-C	6005
Q09161_C73	NCBP1 Nuclear cap-binding protein subunit 1	3306	Q14315_C2660	FLNC Filamin-C	6006
Q69YN2_C141	CWF19L1 CWF19-like protein 1	3307	043813_C108	LANCL1 LanC-like protein 1	6007
Q70E73_C1045	RAPH1 Ras-associated and pleckstrin homology domains-containing protein 1	3308	Q8IY67_C297	RAVER1 Ribonucleoprotein PTB-binding 1	6008
Q93008_C1237	USP9X Probable ubiquitin carboxyl-terminal hydrolase FAF	3309	043818_C416	RRP9 U3 small nucleolar RNA-interacting protein 2	6009
Q9UQ13_C144	SHOC2 Leucine-rich repeat protein SHOC-2	3310	Q9UI43_C126	FTSJ2 Putative ribosomal RNA methyltransferase 2	6010
Q9BXP5_C715	SRRT Serrate RNA effector molecule homolog	3311	P04150_C287	NR3C1 Glucocorticoid receptor	6011
Q96P65_C201	QRFPR Pyroglutamylated RFamide peptide receptor	3312	Q96JH7_C897	VCPIP1 Deubiquitinating protein VCIP135	6012
P46013_C261	MKI67 Antigen KI-67	3313	Q9UJA5_C243	TRMT6 tRNA (adenine(58)-N(1))-methyltransferase non-catalytic subunit TRM6	6013
P17858_C630	PFKL 6-phosphofructokinase, liver type	3314	Q9UJA5_C492	TRMT6 tRNA (adenine(58)-N(1))-methyltransferase non-catalytic subunit TRM6	6014
075083_C285	WDR1 WD repeat-containing protein I	3315	Q6PJG6_C820	BRAT1 BRCA1-associated ATM activator 1	6015

Q43252_C 78	PAPSS1 Bifunctional 3-phosphoadenosine 5-phosphosulfate	3316	Q7LBC6_C509	KDM3B Lysine-specific demethylase 3B	6016
Q6WCQ1_C724	MPRIIP Myosin phosphatase Rho-interacting protein	3317	P62140_C104	PPP1CB Serine/threonine-protein phosphatase PP1-beta catalytic subunit beta	6017
Q14008_C1360	CKAP5 Cytoskeleton-associated protein 5	3318	P62140_C244	PPP1CB Serine/threonine-protein phosphatase PP1-beta catalytic subunit beta	6018
P40939_C349	HADHA Trifunctional enzyme subunit alpha, mitochondrial	3319	Q5JPH6_C314	EARS2 Probable glutamate--tRNA ligase, mitochondrial	6019
P21333_C2293	FLNA Filamin-A	3320	P12429_C246	ANXA3 Annexin A3	6020
P30566_C483	ADSL Adenylosuccinate lyase	3321	Q5D0E6_C468	DALRD3 DALR anticodon-binding domain-containing protein 3	6021
Q9Y285_C493	FARSA Phenylalanine--tRNA ligase alpha subunit	3322	Q13315_C2991	ATM Serine-protein kinase ATM	6022
Q06124_C318	PTPN11 Tyrosine-protein phosphatase non-receptor type 11	3323	P51116_C109	FXR2 Fragile X mental retardation syndrome-related protein	6023
Q96SZ5_C18	ADO 2-aminoethanethiol dioxygenase	3324	Q14683_C1210	SMC1A Structural maintenance of chromosomes protein 1A	6024
Q96CM8_C122	ACSF2 Acyl-CoA synthetase family member 2, mitochondrial	3325	P11766_C268	ADH5 Alcohol dehydrogenase class-3	6025
P46063_C606	RECQL ATP-dependent DNA helicase Q1	3326	P11766_C282	ADH5 Alcohol dehydrogenase class-3	6026
P53618_C248	COPB1 Coatomer subunit beta	3327	Q8NI08_C302	NCOA7 Nuclear receptor coactivator 7	6027
P53618_C684	COPB1 Coatomer subunit beta	3328	Q9HD64_C33	XAGE1E G antigen family D member 2	6028
Q9UI10_C465	EIF2B4 Translation initiation factor eIF-2B subunit delta	3329	Q15796_C312	SMAD2 Mothers against decapentaplegic homolog 2	6029
Q9UI10_C509	EIF2B4 Translation initiation factor eIF-2B subunit delta	3330	Q9UBC1_C304	NFKBIL1 NF-kappa-B inhibitor-like protein 1	6030
Q8WV28_C271	BLNK B-cell linker protein	3331	Q9HB65_C15	ELL3 RNA polymerase II elongation factor ELL3	6031
P49327_C2273	FASN Fatty acid synthase	3332	Q9HB65_C102	ELL3 RNA polymerase II elongation factor ELL3	6032
Q9UGV2_C359	NDRG3 Protein NDRG3	3333	Q9NUL3_C491	STAU2 Double-stranded RNA-binding protein Staufen homolo	6033
Q99436_C87	PSMB7 Proteasome subunit beta type-7	3334	Q9BYI3_C300	FAM126A Hyccin	6034
Q86YS7_C867	KIAA0528 Uncharacterized protein KIAA0528	3335	P51149_C143	RAB7A Ras-related protein Rab-7a	6035
P48444_C286	ARCNI1 Coatomer subunit delta	3336	P09110_C26	ACAA1 3-ketoacyl-CoA thiolase, peroxisomal	6036
Q86V48_C560	LUZP1 Leucine zipper protein 1	3337	Q9UL15_C360	BAG5 BAG family molecular chaperone regulator 5	6037
Q9UQ35_C1029	SRRM2 Serine/arginine repetitive matrix protein 2	3338	P55263_C160	ADK Adenosine kinase	6038
Q9BSH5_C109	HDHD3 Haloacid dehalogenase-like hydrolase domain-containing 3	3339	Q9UL12_C799	SARDH Sarcosine dehydrogenase, mitochondrial	6039

092973_C 790	TNPO1 Transportin-1	3340	015061_C1225	SYNM Synemin	6040
Q8N3F8_C597	MICAL1 MICAL-like protein 1	3341	Q9NP64_C52	ZCCHC17 Nucleolar protein of 40 kDa	6041
095425_C1949	SVIL Supervillin	3342	Q96S59_C527	RANBP9 Ran-binding protein 9	6042
Q8IVH2_C447	F0XP4 Forkhead box protein P4	3343	015382_C195	BCAT2 Branched-chain-amino-acid aminotransferase, mitochondrial	6043
Q15149_C965	PLEC Plectin	3344	015382_C345	BCAT2 Branched-chain-amino-acid aminotransferase, mitoch	6044
P25788_C42	PSMA3 Proteasome subunit alpha type-3	3345	P45974_C838	USP5 Ubiquitin carboxyl-terminal hydrolase 5	6045
Q9HB40_C152	SCPEP1 Retinoid-inducible serine carboxypeptidase	3346	014497_C1874	ARID1A AT-rich interactive domain-containing protein 1A	6046
Q08945_C139	SSRP1 FACT complex subunit SSRP1	3347	075521_C368	ECI2 Enoyl-CoA delta isomerase 2, mitochondrial	6047
000577_C272	PURA Transcriptional activator protein Pur-alpha	3348	Q92769_Cm	HDAC2 Histone deacetylase 2	6048
Q96EY5_C33	FAM125A Multivesicular body subunit 12A	3349	Q96AE4_C148	FUBP1 Far upstream element-binding protein 1	6049
P13639_C536	EEF2 Elongation factor 2	3350	Q8NFI3_C454	ENGASE Cytosolic endo-beta-N-acetylglucosaminidase	6050
P28799_C178	GRN Granulins	3351	Q9P107_C336	GMIP GEM-interacting protein	6051
Q14258_C475	TRIM25 E3 ubiquitin/ISG15 ligase TRIM25	3352	Q01469_C47	FABP5 Fatty acid-binding protein, epidermal	6052
075694_C874	NUP155 Nuclear pore complex protein Nup155	3353	Q6PCE3_C303	PGM2L1 Glucose 1,6-bisphosphate synthase	6053
P49189_C267	ALDH9A1 4-trimethylaminobutyraldehyde dehydrogenase	3354	Q9HAV0_C204	GNB4 Guanine nucleotide-binding protein subunit beta-4	6054
043592_C522	XPOT Exportin-T	3355	Q9Y3C8_C69	UFC1 Ubiquitin-fold modifier-conjugating enzyme 1	6055
Q9NUQ3_C127	TXLNG Gamma-taxilin	3356	Q8N806_C374	UBR7 Putative E3 ubiquitin-protein ligase UBR7	6056
094760_C178	DDAH1 N(G),N(G)-dimethylarginine dimethylaminohydrolase	3357	043172_C299	PRPF4 U4/U6 small nuclear ribonucleoprotein Prp4	6057
P61163_C222	ACTR1A Alpha-centractin	3358	094851_C552	MICAL2 Protein-methionine sulfoxide oxidase MICAL2	6058
Q12905_C311	ILF2 Interleukin enhancer-binding factor 2	3359	060716_C692	CTNND1 Catenin delta-1	6059
Q14814_C217	MEF2D Myocyte-specific enhancer factor 2D	3360	094855_C1022	SEC24D Protein transport protein Sec24D	6060
P50990_C430	CCT8 T-complex protein 1 subunit theta	3361	Q9BQS8_C1062	FYCO1 FYVE and coiled-coil domain-containing protein 1	6061
P49848_C644	TAF6 Transcription initiation factor TFUD subunit 6	3362	Q9BSC4_C16	NOL10 Nucleolar protein 10	6062
000541_C153	PES1 Pescadillo homolog	3363	Q9H5X1_C90	FAM96A MIP18 family protein FAM96A	6063
P17812_C30	CTPS1 CTP synthase 1	3364	Q13325_C429	IFIT5 Interferon-induced protein with tetratricopeptide	6064
Q9P287_C213	BCCIP BRCA2 and CDKN1A-interacting protein	3365	Q13325_C476	IFIT5 Interferon-induced protein with tetratricopeptide	6065

Q7LBC6_C1212	KDM3B Lysine-specific demethylase 3B	3366	P23526_C228	AHCY Adenosylhomocysteinase	6066
Q9Y3P9_C155	RABGAP1 Rab GTPase-activating protein 1	3367	Q9UG63_C586	ABCF2 ATP-binding cassette subfamily F member 2	6067
Q99497_C53	PARK7 Protein DJ-1	3368	Q9BQA1_C26	WDR77 Methylosome protein 50	6068
095571_C98	ETHE1 Protein ETHE1, mitochondrial	3369	Q9BQA1_C172	WDR77 Methylosome protein 50	6069
Q8WUM0_C530	NUP133 Nuclear pore complex protein Nup133	3370	Q9BQA1_C208	WDR77 Methylosome protein 50	6070
P11387_C630	TOPI DNA topoisomerase 1	3371	Q9UKJ3_C569	GPATCH8 G patch domain-containing protein 8	6071
P25098_C340	ADRBK1 Beta-adrenergic receptor kinase 1	3372	Q15654_C47	TRIP6 Thyroid receptor-interacting protein 6	6072
Q15796_C70	SMAD2 Mothers against decapentaplegic homolog 2	3373	P36873_C202	PPP1CC Serine/threonine-protein phosphatase PPI-gamma cat	6073
Q8NF50_C170	DOCK8 Dedicator of cytokinesis protein 8	3374	Q8WXF1_C216	PSPC1 Paraspeckle component 1	6074
Q8NF50_C186	DOCK8 Dedicator of cytokinesis protein 8	3375	Q13555_C273	CAMK2G Calcium/calmodulin-dependent protein kinase type 1	6075
Q8N5N7_C52	MRPL50 39S ribosomal protein L50, mitochondrial	3376	P55265_C622	ADAR Double-stranded RNA-specific adenosine deaminase	6076
Q86UW9_C351	DTX2 Probable E3 ubiquitin-protein ligase DTX2	3377	P60900_C115	PSMA6 Proteasome subunit alpha type-6	6077
I3L3Q1_C657	Uncharacterized protein	3378	P50336_C183	PPOX Protoporphyrinogen oxidase	6078
Q96QA5_C174	GSDMA Gasdennin-A	3379	Q63ZY3_C88	KANK2 KN motif and ankyrin repeat domain-containing prot	6079
Q9Y263_C605	PLAA Phospholipase A-2-activating protein	3380	Q9HB71_C173	CACYBP Calcyclin-binding protein	6080
075521_C312	ECI2 Enoyl-CoA delta isomerase 2, mitochondrial	3381	Q9P2T1_C224	GMPR2 GMP reductase 2	6081
P08243_C44	ASNS Asparagine synthetase	3382	Q5VIR6_C365	VPS53 Vacuolar protein sorting-associated protein 53 homolog	6082
Q9BQS8_C293	FYCO1 FYVE and coiled-coil domain-containing protein 1	3383	P51003_C677	PAPOLA Poly(A) polymerase alpha	6083
Q96QK1_C699	VPS35 Vacuolar protein sorting-associated protein 35	3384	Q9NVE5_C50	USP40 Ubiquitin carboxyl-terminal hydrolase 40 R.NQGGTC*YLNSLLQTLHFTPEFR. E	6084
Q8NDI1_C849	EHBP1 EH domain-binding protein 1	3385	Q9Y2Z2_C315	MTO1 Protein MTO1 homolog, mitochondrial	6085
P19367_C158	HK1 Hexokinase-1	3386	P30042_C52	C21orf33 ESI protein homolog, mitochondrial	6086
014818_C63	PSMA7 Proteasome subunit alpha type-7	3387	Q96CX6_C170	LRRC58 Leucine-rich repeat-containing protein 58	6087
Q13439_C1085	GOLGA4 Golgin subfamily A member 4	3388	Q96CX2_C50	KCTD12 BTB/POZ domain-containing protein KCTD12	6088
P63279_C93	UBE2I SUMO-conjugating enzyme UBC9	3389	P18887_C20	XRCCI DNA repair protein XRCC1	6089
Q15003_C114	NCAPH Condensin complex subunit 2	3390	Q9C0C9_C1288	UBE20 Ubiquitin-conjugating enzyme E2 0	6090
075534_C730	CSDE1 Cold shock domain-containing protein E1	3391	000762_C114	UBE2C Ubiquitin-conjugating enzyme E2 C	6091

Q8WVB6_C373	CHTF18 Chromosome transmission fidelity protein 18 homolog	3392	Q9Y520_C481	PRRC2C Protein PRRC2C	6092
Q14204_C3033	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	3393	Q9Y520_C953	PRRC2C Protein PRRC2C	6093
Q9UN37_C233	VPS4A Vacuolar protein sorting-associated protein 4A	3394	075828_C227	CBR3 Carbonyl reductase	6094
Q8WV99_C171	ZFAND2B AN1-type zinc finger protein 2B	3395	075534_C42	CSDE1 Cold shock domain-containing protein E1	6095
P22102_C237	GART Trifunctional purine biosynthetic protein adenosine	3396	P09651_C175	HNRNPA1 Heterogeneous nuclear ribonucleoprotein A1	6096
075643_C133	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicase	3397	Q9H7T3_C143	C10orf95 Uncharacterized protein C10orf95	6097
P32322_C95	PYCR1 Pyrroline-5-carboxylate reductase 1, mitochondrial	3398	Q96R06_C382	SPAG5 Sperm-associated antigen 5	6098
Q9H1K1_C138	ISCU Iron-sulfur cluster assembly enzyme ISCU, mitochondrial	3399	043837_C185	IDH3B Isocitrate dehydrogenase	6099
Q6IA69_C428	NADSYN1 Glutamine-dependent NAD(+) synthetase	3400	Q96AD5_C312	PNPLA2 Patatin-like phospholipase domain-containing prote	6100
Q9UQ80_C296	PA2G4 Proliferation-associated protein 2G4	3401	Q96BD8_C142	SKA1 Spindle and kinetochore-associated protein 1	6101
Q9NP81_C64	SARS2 Serine- tRNA ligase, mitochondrial	3402	Q8NFH4_C311	NUP37 Nucleoporin Nup37	6102
Q6L8Q7_C180	PDE12 2,5-phosphodiesterase 12	3403	Q9NRA8_C767	EDF4ENIF1 Eukaryotic translation initiation factor 4E transp	6103
Q15102_C205	PAFAH1B3 Platelet-activating factor acetylhydrolase IB subunit	3404	Q9NTM9_C248	CUTC Copper homeostasis protein cutC homolog	6104
Q9Y448_C296	SKAP Small kinetochore-associated protein	3405	Q8TEU7_C1491	RAPGEF6 Rap guanine nucleotide exchange factor 6	6105
Q01082_C1389	SPTBN1 Spectrin beta chain, non-erythrocytic 1	3406	Q14207_C842	NPAT Protein NPAT	6106
P42704_C113	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	3407	Q14204_C1932	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	6107
060784_C415	TOM1 Target of Myb protein 1	3408	Q14204_C4510	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	6108
P42858_C1998	HTT Huntingtin	3409	060684_C273	KPNA6 Importin subunit alpha-7	6109
A2A288_C517	ZC3H12D Probable ribonuclease ZC3H12D	3410	Q92841_C447	DDX17 Probable ATP-dependent RNA helicase DDX1 7	6110
P31930_C453	UQCRC1 Cytochrome b-cl complex subunit 1, mitochondrial	3411	P07814_C1497	EPRS Bifunctional glutamate/proline-tRNA ligase	6111
P31939_C287	ATIC Bifunctional purine biosynthesis protein PURH	3412	P19174_C247	PLCG1 1-phosphatidylinositol4,5-bisphosphate phosphodie	6112
Q14980_C2009	NUMA1 Nuclear mitotic apparatus protein 1	3413	P19174_C646	PLCG1 1-phosphatidylinositol 4,5-bisphosphate phosphodie	6113
Q9NSE4_C364	IARS2 Isoleucine-tRNA ligase, mitochondrial	3414	P22102_C466	GART Trifunctional purine biosynthetic protein adenosin	6114
Q9NSE4_C521	IARS2 Isoleucine-tRNA ligase, mitochondrial	3415	075643_C238	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicase	6115

Q96ER3_C248	SAAL1 Protein SAAL1	3416	O75643_C576	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicas	6116
Q5M775_C493	SPECC1 Cytospin-B	3417	Q04759_C17	PRKCQ Protein kinase C theta type	6117
Q9P2J5_C446	LARS Leucine--tRNA ligase, cytoplasmic	3418	O94992_C122	HEXIM1 Protein HEXIM1	6118
P35236_C204	PTPN7 Tyrosine-protein phosphatase non-receptor type 7	3419	P61106_C26	RAB14 Ras-related protein Rab-14	6119
P14324_C204	FDPS Farnesyl pyrophosphate synthase	3420	P50851_C982	LRBA Lipopolysaccharide-responsive and beige-like ancho	6120
P53597_C142	SUCLG1 Succinyl-CoA ligase	3421	P50851_C1228	LRBA Lipopolysaccharide-responsive and beige-like ancho	6121
Q9GZT3_C48	SLIRP SRA stem-loop-interacting RNA-binding protein, mitochondrial	3422	Q6FI81_C237	CIAPIN1 Anamorsin	6122
P10619_C403	CTSA Lysosomal protective protein	3423	Q6FI81_C274	CIAPIN1 Anamorsin	6123
Q9UDY2_C601	TJP2 Tight junction protein ZO-2	3424	Q6FI81_C285	CIAPIN1 Anamorsin	6124
Q13501_C290	SQSTM1 Sequestosome-1	3425	Q96RL1_C283	UIMC1 BRCA1-A complex subunit RAP80	6125
Q53EL6_C150	PDCD4 Programmed cell death protein 4	3426	O60264_C165	SMARCA5 SWI/SNF-related matrix-associated actin-dependent	6126
Q13618_C636	CUL3 Cullin-3	3427	P11586_C152	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	6127
Q93052_C465	LPP Lipoma-preferred partner	3428	Q86Y56_C138	HEATR2 HEAT repeat-containing protein 2	6128
Q92900_C683	UPF1 Regulator of nonsense transcripts 1	3429	Q15648_C681	MED1 Mediator of RNA polymerase II transcription subunit	6129
Q9Y5P6_C230	GMPPB Mannose-1-phosphate guanylttransferase beta	3430	Q6P4I2_C106	WDR73 WD repeat-containing protein 73	6130
O14981_C936	BTA1 TATA-binding protein-associated factor 172	3431	P62318_C20	SNRPD3 Small nuclear ribonucleoprotein Sm D3	6131
Q9NR31_C102	SAR1A GTP-binding protein SAR1a	3432	Q53HC9_C198	TSSC1 Protein TSSC1	6132
Q92623_C30	TTC9 Tetratricopeptide repeat protein 9A	3433	Q9BRF8_C143	CPPED1 Calcineurin-like phosphoesterase domain-containing	6133
P41743_C595	PRKCI Protein kinase C iota type	3434	O95630_C221	STAMPB STAM-binding protein	6134
Q6NVY1_C163	HIBCH 3-hydroxyisobutyryl-CoA hydrolase, mitochondrial	3435	P30101_C92	PDIA3 Protein disulfide-isomerase A3	6135
Q29RF7_C14	PDS5A Sister chromatid cohesion protein PDS5 homolog A	3436	P48200_C201	IREB2 Iron-responsive element-binding protein 2	6136
Q9NQW6_C819	ANLN Actin-binding protein anillin	3437	O14730_C22	RIOK3 Serine/threonine-protein kinase RIO3	6137
Q9Y490_C1434	TLN1 Talin-1	3438	P09884_C306	POLA1 DNA polymerase alpha catalytic subunit	6138
Q86W50_C432	METTL16 Methyltransferase-like protein 16	3439	P09884_C1224	POLA1 DNA polymerase alpha catalytic subunit	6139
Q8IV48_C75	ERI1 3-5 exoribonuclease 1	3440	P12034_C202	FGF5 Fibroblast growth factor 5	6140
Q9Y3Z3_C341	SAMHD1 SAM domain and HD domain-containing protein	3441	P10768_C243	ESD S-formylglutathione hydrolase	6141

	1				
P38646_C 366	HSPA9 Stress-70 protein, mitochondrial	3442	Q7L2E3_ C1183	DHX30 Putative ATP-dependent RNA helicase DHX30	6142
P47755_C 111	CAPZA2 F-actin-capping protein subunit alpha-2	3443	Q9UJM3 C113	ERRFI1 ERBB receptor feedback inhibitor 1	6143
P06730_C 170	EIF4E Eukaryotic translation initiation factor 4E	3444	Q9UJM3 C204	ERRFI1 ERBB receptor feedback inhibitor 1	6144
Q9NR09_ C1517	BIRC6 Baculoviral IAP repeat-containing protein 6	3445	Q8WTW 3 C318	COG1 Conserved oligomeric Golgi complex subunit 1	6145
P00491_C 78	PNP Purine nucleoside phosphorylase	3446	Q96KP1_ C638	EXOC2 Exocyst complex component 2	6146
P08397_C 261	HMBS Porphobilinogen deaminase	3447	P62136_ C245	PPP1CA Serine/threonine-protein phosphatase PP1-alpha cat	6147
Q7KZF4_ C736	SND1 Staphylococcal nuclease domain-containing protein	3448	Q9NQR4 C44	NIT2 Omega-amidase NIT2	6148
O60292_C 235	SIPA1L3 Signal-induced proliferation-associated 1-like protein 3	3449	P52948 C1711	NUP98 Nuclear pore complex protein Nup98-Nup96	6149
Q14166_C 528	TTL12 Tubulin-tyrosine ligase-like protein 12	3450	O15014_ C178	ZNF609 Zinc finger protein 609	6150
Q14166_C 572	TTL12 Tubulin-tyrosine ligase-like protein 12	3451	P13674_ C167	P4HA1 Prolyl 4-hydroxylase subunit alpha-1	6151
Q13257_C 106	MAD2L1 Mitotic spindle assembly checkpoint protein MAD2A	3452	O95232_ C43	LUC7L3 Luc7-like protein 3	6152
Q9NY27_ C134	PPP4R2 Serine/threonine- protein phosphatase 4 regulatory	3453	Q96JM3_ C119	CHAMP1 Chromosome alignment- maintaining phosphoprotein 1	6153
P30405_C 104	PPIF Peptidyl-prolyl cis-trans isomerase F, mitochondrial	3454	Q12857_ C404	NFIA Nuclear factor 1 A-type	6154
Q9H0D6_ C296	XRN2 5-3 exoribonuclease 2	3455	O75818_ C49	RPP40 Ribonuclease P protein subunit p40	6155
Q8TDG2_ C182	ACTRT1 Actin-related protein T1	3456	Q8WYJ6 C102	SEPT1 Septin-1	6156
O00410_C 473	IPO5 Importin-5	3457	O75815_ C360	BCAR3 Breast cancer anti-estrogen resistance protein 3	6157
Q5VUA4_ C2168	ZNF318 Zinc finger protein 318	3458	Q08J23_ C235	NSUN2 tRNA (cytosine(34)-C(5))- methyltransferase	6158
Q8IXB1_ C700	DNAJC10 DnaJ homolog subfamily C member 10	3459	Q08J23_ C758	NSUN2 tRNA (cytosine(34)-C(5))- methyltransferase	6159
P53621_C 975	COPA Coatamer subunit alpha	3460	Q9H2U1 C135	DHX36 Probable ATP-dependent RNA helicase DHX36	6160
P00441_C 147	SOD1 Superoxide dismutase	3461	Q86VQ1 C51	GLCCII Glucocorticoid-induced transcript 1 protein	6161
Q00534_C 306	CDK6 Cyclin-dependent kinase 6	3462	Q04695_ C336	KRT17 Keratin, type I cytoskeletal 17	6162
P02545_C 570	LMNA Prelamin-A/C	3463	Q9Y530_ C33	C6orf130 O-acetyl-ADP-ribose deacetylase C6orf130	6163
P16885_C 791	PLCG2 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase gamma-2	3464	Q9Y530_ C122	C6orf130 O-acetyl-ADP-ribose deacetylase C6orf130	6164
A0AVT1_ C546	UBA6 Ubiquitin-like modifier- activating enzyme 6	3465	O43929_ C16	ORC4 Origin recognition complex subunit 4	6165
Q15369_C	TCEB1 Transcription	3466	Q66K14_	TBC1D9B TBC1 domain family	6166

11	elongation factor B polypeptide 1		C289	member 9B	
Q9BVL2_C252	NUPL1 Nucleoporin p58/p45	3467	Q8N0W3_C484	FUK L-fucose kinase	6167
015091_C367	KIAA0391 Mitochondrial ribonuclease P protein 3	3468	Q8N0W3_C582	FUK L-fucose kinase	6168
Q92835_C902	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1	3469	P61812_C309	TGFB2 Transforming growth factor beta-2	6169
092835_C1088	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1	3470	Q86X10_C923	RALGAPB Ral GTPase-activating protein subunit beta	6170
Q9H3M7_C36	TXNIP Thioredoxin-interacting protein	3471	095833_C219	CLIC3 Chloride intracellular channel protein 3	6171
Q9H3M7_C333	TXNIP Thioredoxin-interacting protein	3472	J3KR12_C95	Uncharacterized protein	6172
Q92598_C845	HSPH1 Heat shock protein 105 kDa	3473	P12931_C280	SRC Proto-oncogene tyrosine-protein kinase Src	6173
Q8NEM2_C612	SHCBP1 SHC SH2 domain-binding protein 1	3474	Q13535_C2336	ATR Serine/threonine-protein kinase ATR	6174
Q92619_C324	HMHA1 Minor histocompatibility protein HA-1	3475	Q6PIW4_C200	FIGNL1 Fidgetin-like protein 1	6175
094906_C913	PRPF6 Pre-mRNA-processing factor 6	3476	Q6PIW4_C672	FIGNL1 Fidgetin-like protein 1	6176
Q5TA50_C163	GLTPD1 Glycolipid transfer protein domain-containing protein 1	3477	P31939_C575	ATIC Bifunctional purine biosynthesis protein PURH	6177
Q9UPN7_C172	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	3478	Q15291_C212	RBBP5 Retinoblastoma-binding protein 5	6178
Q9P289_C392	MST4 Serine/threonine-protein kinase MST4	3479	014618_C227	CCS Copper chaperone for superoxide dismutase	6179
Q16270_C87	IGFBP7 Insulin-like growth factor-binding protein 7	3480	Q9BPW8_C106	NIPSNAP1 Protein NipSnap homolog 1	6180
P48556_C112	PSMD8 26S proteasome non-ATPase regulatory subunit 8	3481	Q9BPW8_C138	NIPSNAP1 Protein NipSnap homolog 1	6181
P49792_C1196	RANBP2 E3 SUMO-protein ligase RanBP2	3482	Q8IUC6_C192	TICAM1 TIR domain-containing adapter molecule 1	6182
P49792_C2407	RANBP2 E3 SUMO-protein ligase RanBP2	3483	Q9P0V3_C787	SH3BP4 SH3 domain-binding protein 4	6183
Q93008_C1212	USP9X Probable ubiquitin carboxyl-terminal hydrolase FAF	3484	P52888_C18	THOP1 Thimet oligopeptidase	6184
Q9Y617_C98	PSATI Phosphoserine aminotransferase	3485	Q9H6T3_C519	RPAP3 RNA polymerase II-associated protein 3	6185
Q9Y617_C152	PSAT1 Phosphoserine aminotransferase	3486	Q07157_C1727	TJP1 Tight junction protein ZO-1	6186
Q96AB3_C84	ISOC2 Isochorismatase domain-containing protein 2, mitochondrial	3487	Q15061_C380	WDR43 WD repeat-containing protein 43	6187
Q9H726_C416	KAT8 Histone acetyltransferase KAT8	3488	Q15067_C449	ACOX1 Peroxisomal acyl-coenzyme A oxidase 1	6188
Q01581_C224	HMGCS1 Hydroxymethylglutaryl-CoA	3489	Q6PIX5_C1093	TAF2 Transcription initiation factor TFIID subunit 2	6189

	synthase, cytoplasmic				
P62633_C 57	CNBP Cellular nucleic acid-binding protein	3490	P67936_C154	TPM4 Tropomyosin alpha-4 chain	6190
P39023_C 114	RPL3 60S ribosomal protein L3	3491	Q92918_C484	MAP4K1 Mitogen-activated protein kinase kinase kinase kin	6191
P21333_C 210	FLNA Filamin-A	3492	015226_C37	NKRF NF-kappa-B-repressing factor	6192
P21333_C 1353	FLNA Filamin-A	3493	Q9P2J5_C527	LARS Leucine-tRNA ligase, cytoplasmic	6193
095347_C 585	SMC2 Structural maintenance of chromosomes protein 2	3494	Q96GY3_C28	LIN37 Protein lin-37 homolog	6194
000469_C 562	PLOD2 Procollagen-lysine-2-oxoglutarate 5-dioxygenase 2	3495	Q96GY3_C176	LIN37 Protein lin-37 homolog	6195
P45880_C 13	VDAC2 Voltage-dependent anion-selective channel protein	3496	Q8TF72_C1104	SHROOM3 Protein Shroom3	6196
Q96CM8_C462	ACSF2 Acyl-CoA synthetase family member 2, mitochondrial	3497	Q8TF72_C1367	SHROOM3 Protein Shroom3	6197
P18583_C 92	SON Protein SON	3498	P62906_C164	RPL10A 60S ribosomal protein L10a	6198
Q9UKX7_C165	NUP50 Nuclear pore complex protein Nup50	3499	Q86VP6_C356	CAND1 Cullin-associated NEDD8-dissociated protein 1	6199
Q9UKX7_C416	NUP50 Nuclear pore complex protein Nup50	3500	Q92597_C49	NDRG1 Protein NDRG1	6200
Q99661_C 287	KIF2C Kinesin-like protein KIF2C	3501	P35237_C370	SERPINB6 Serpin B 6	6201
P42765_C 179	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	3502	P30876_C177	POLR2B DNA-directed RNA polymerase II subunit RPB2	6202
P49327_C 779	FASN Fatty acid synthase	3503	P30876_C622	POLR2B DNA-directed RNA polymerase H subunit RPB2	6203
P49327_C 1828	FASN Fatty acid synthase	3504	P14324_C62	FDPS Farnesyl pyrophosphate synthase	6204
075347_C 67	TBCA Tubuhn-specific chaperone A	3505	Q9Y3F4_C152	STRAP Serine-threonine kinase receptor-associated protei	6205
P63010_C 95	AP2B1 AP-2 complex subunit beta	3506	P27144_C22	AK4 Adenylate kinase isoenzyme 4, mitochondrial	6206
Q9UDR5_C87	AASS Alpha-aminoacidic semialdehyde synthase, mitochondrial	3507	Q14135_C167	VGLL4 Transcription cofactor vestigial-like protein 4	6207
P40925_C 154	MDH1 Malate dehydrogenase, cytoplasmic	3508	Q14135_C205	VGLL4 Transcription cofactor vestigial-like protein 4	6208
Q13363_C 38	CTBP1 C-terminal-binding protein I	3509	043143_C750	DHX15 Putative pre-mRNA-splicing factor ATP-dependent RN	6209
P41091_C 311	EIF2S3 Eukaryotic translation initiation factor 2 subunit	3510	Q8IW35_C599	CEP97 Centrosomal protein of 97 kDa	6210
Q9UKI8_C81	TLK1 Serine/threonine-protein kinase tousled-like 1	3511	P67775_C165	PPP2CA Serine/threonine-protein phosphatase 2A catalytic	6211
Q13523_C 962	PRPF4B Serine/threonine-protein kinase PRP4 homolog	3512	P67775_C196	PPP2CA Serine/threonine-protein phosphatase 2A catalytic	6212
Q12768_C 385	KIAA0196 WASH complex subunit strumpellin	3513	Q92667_C64	AKAP1 A-kinase anchor protein 1, mitochondrial	6213
Q14203_C 636	DCTN1 Dynactin subunit 1	3514	Q32MZ4_C726	LRRFIP1 Leucine-rich repeat flightless-interacting protein	6214
Q96RS6_	NUDCD1 NudC domain-	3515	Q32MZ4	LRRFIP1 Leucine-rich repeat	6215

C111	containing protein 1		_C750	flightless-interacting protein	
Q7L2J0_C153	MEPCE 7SK snRNA methylphosphate capping enzyme	3516	Q99615_C58	DNAJC7 DnaJ homolog subfamily C member 7	6216
Q8N0Z6_C439	TTC5 Tetratricopeptide repeat protein 5	3517	Q99615_C175	DNAJC7 DnaJ homolog subfamily C member 7	6217
P13716_C223	ALAD Delta-aminolevulinic acid dehydratase	3518	Q99615_C225	DNAJC7 DnaJ homolog subfamily C member 7	6218
P12270_C1127	TPR Nucleoprotein TPR	3519	Q05086_C198	UBE3A Ubiquitin-protein ligase E3A	6219
Q92973_C205	TNPO1 Transportin-1	3520	Q52LW3_C1215	ARHGAP29 Rho GTPase-activating protein 29	6220
P24928_C981	POLR2A DNA-directed RNA polymerase II subunit RPB1	3521	Q52LW3_C1239	ARHGAP29 Rho GTPase-activating protein 29	6221
P52597_C22	HNRNPF Heterogeneous nuclear ribonucleoprotein F	3522	Q9UN51_C700	TIMELESS Protein timeless homolog	6222
Q8TD30_C376	GPT2 Alanine aminotransferase 2	3523	O94885_C1120	SASH1 SAM and SH3 domain-containing protein 1	6223
Q9Y305_C128	ACOT9 Acyl-coenzyme A thioesterase 9, mitochondrial	3524	P10619_C281	CTSA Lysosomal protective protein	6224
Q8N163_C754	KIAA1967 DBIRD complex subunit KIAA1967	3525	Q9UHQ1_C192	NARF Nuclear prelamin A recognition factor	6225
Q15149_C530	PLEC Plectin	3526	Q9P2N6_C459	KANSL3 KAT8 regulatory NSL complex subunit 3	6226
Q15149_C545	PLEC Plectin	3527	Q9ULC5_C322	ACSL5 Long-chain-fatty-acid--CoA ligase 5	6227
Q9BX68_C75	HINT2 Histidine triad nucleotide-binding protein 2, mitochondrial	3528	O75116_C428	ROCK2 Rho-associated protein kinase 2	6228
Q9ULW0_C145	TPX2 Targeting protein for Xklp2	3529	P62330_C90	ARF6 ADP-ribosylation factor 6	6229
O14744_C22	PRMT5 Protein arginine N-methyltransferase 5	3530	Q96G74_C434	OTUD5 OTU domain-containing protein 5	6230
Q5JRX3_C692	PITRM1 Presequence protease, mitochondrial	3531	Q13444_C667	ADAM15 Disintegrin and metalloproteinase domain-contains	6231
P07195_C132	LDHB L-lactate dehydrogenase B chain	3532	Q5UIP0_C1904	RIF1 Telomere-associated protein RIF1	6232
Q96F07_C98	CYFIP2 Cytoplasmic FMR1-interacting protein 2	3533	Q9NZB2_C919	FAM120A Constitutive coactivator of PPAR-gamma-like protei	6233
Q9P0K7_C584	RAI14 Ankyrin	3534	O94805_C32	ACTL6B Actin-like protein 6B	6234
P22314_C494	UBA1 Ubiquitin-like modifier-activating enzyme 1	3535	Q9UDY8_C71	MALT1 Mucosa-associated lymphoid tissue lymphoma translo	6235
P78527_C478	PRKDC DNA-dependent protein kinase catalytic subunit	3536	P06400_C590	RB1 Retinoblastoma-associated protein	6236
P78527_C3187	PRKDC DNA-dependent protein kinase catalytic subunit	3537	P55199_C433	ELL RNA polymerase II elongation factor ELL	6237
P78527_C3781	PRKDC DNA-dependent protein kinase catalytic subunit	3538	P55199_C494	ELL RNA polymerase II elongation factor ELL	6238
P42566_C586	EPS15 Epidermal growth factor receptor substrate 15	3539	Q96KR1_C525	ZFR Zinc finger RNA-binding protein	6239
Q86U28_C146	ISCA2 Iron-sulfur cluster assembly 2 homolog, mitochondrial	3540	Q9H0K6_C640	PUS7L Pseudouridylate synthase 7 homolog-like protein	6240

Q96HE7_C131	ER01L ERO1-like protein alpha	3541	Q96K76_C856	USP47 Ubiquitin carboxyl-terminal hydrolase 47	6241
Q04724_C526	TLE1 Transducin-like enhancer protein 1	3542	014727_C115	APAF1 Apoptotic protease-activating factor 1	6242
Q14789_C2664	GOLGB1 Golgin subfamily B member 1	3543	Q96N21_C52	ENTUD2 AP-4 complex accessory subunit tepsin	6243
Q9NUQ3_C101	TXLNG Gamma-taxilin	3544	Q9HC38_C171	GLOD4 Glyoxalase domain-containing protein 4	6244
Q9ULX6_C128	AKAP8L A-kinase anchor protein 8-like	3545	Q9HC38_C221	GLOD4 Glyoxalase domain-containing protein 4	6245
Q12905_C271	ILF2 Interleukin enhancer-binding factor 2	3546	Q9NSD9_C76	FARSB Phenylalanine-tRNA ligase beta subunit	6246
P23588_C457	EIF4B Eukaryotic translation initiation factor 4B	3547	075376_C1274	NCOR1 Nuclear receptor corepressor 1	6247
P50991_C379	CCT4 T-complex protein 1 subunit delta	3548	075376_C2322	NCOR1 Nuclear receptor corepressor 1	6248
P50991_C450	CCT4 T-complex protein 1 subunit delta	3549	Q15058_C291	KIF14 Kinesin-like protein KIF14	6249
B0V043_C682	VARS Valyl-tRNA synthetase	3550	Q15050_C52	RRS1 Ribosome biogenesis regulatory protein homolog	6250
P22307_C495	SCP2 Non-specific lipid-transfer protein	3551	Q15052_C667	ARHGEF6 Rho guanine nucleotide exchange factor 6	6251
Q13472_C244	TOP3A DNA topoisomerase 3-alpha	3552	000592_C344	PODXL Podocalyxin	6252
014315_C1103	FLNC Filamin-C	3553	P49903_C317	SEPHS1 Selenide, water dikinase 1	6253
043747_C539	APIGI AP-1 complex subunit gamma-1	3554	E7EVH7_C562	KLC1 Kinesin light chain 1	6254
P23434_C85	GCSH Glycine cleavage system H protein, mitochondrial	3555	Q9Y6A5_C242	TACC3 Transforming acidic coiled-coil-containing protein	6255
Q9H9A6_C23	LRRC40 Leucine-rich repeat-containing protein 40	3556	Q6P1K8_C299	GTF2H2D General transcription factor IIH subunit 2-like pr	6256
Q8TXH7_C195	TH1L Negative elongation factor C/D	3557	Q3B7T1_C589	EDRF1 Erythroid differentiation-related factor 1	6257
P22681_C840	CBL E3 ubiquitin-protein ligase CBL	3558	Q9H0W8_C411	SMG9 Protein SMG9	6258
Q9NVS2_C186	MRPS18A 28S ribosomal protein S18a, mitochondrial	3559	Q86XP3_C281	DDX42 ATP-dependent RNA helicase DDX42	6259
Q8NF50_C2091	DOCK8 Dedicator of cytokinesis protein 8	3560	Q08257_C45	CRYZ Quinone oxidoreductase	6260
P09110_C123	ACAA1 3-ketoacyl-CoA thiolase, peroxisomal	3561	075879_C170	PET112 Glutamyl-tRNA(Gln) amidotransferase subunit B, mitochondrial	6261
Q8TAF3_C342	WDR48 WD repeat-containing protein 48	3562	Q92696_C354	RABGGTA Geranylgeranyl transferase type-2 subunit alpha	6262
Q96S55_C347	WRNIP1 ATPase WRNIP1	3563	Q15772_C1052	SPEG Striated muscle preferentially expressed protein k	6263
P45973_C133	CBX5 Chromobox protein homolog 5	3564	075616_C348	ERAL1 GTPase Era, mitochondrial	6264
Q92785_C53	DPF2 Zinc finger protein ubi-d4	3565	Q6UB35_C291	MTHFDIL Monofunctional C1-tetrahydrofolate synthase, mitochondrial	6265
043175_C254	PHGDHD-3-phosphoglycerate	3566	Q8N392_C323	ARHGAP18 Rho GTPase-activating protein 18	6266

	dehydrogenase				
PI1388_C 405	TOP2A DNA topoisomerase 2-alpha	3567	Q9UHR6 C188	ZNHIT2 Zinc finger HIT domain- containing protein 2	6267
Q14699_C 211	RFTNI Raftlin	3568	P57081 C95	WDR4 tRNA (guanine-N(7)-) methyltransferase subunit WDR	6268
P19367_C 823	HK1 Hexokinase-1	3569	Q9H4L4 C274	SEN3 Senrin-specific protease 3	6269
Q9BV38_C 384	WDR18 WD repeat-containing protein 18	3570	Q14149 C632	MORC3 MORC family CW-type zinc finger protein 3	6270
Q27J81_C 38	INF2 Inverted formin-2	3571	095455 C175	TGDS dTDP-D-glucose 4,6- dehydratase	6271
Q27J81_C 1093	INF2 Inverted formin-2	3572	095453 C169	PARN Poly(A)-specific ribonuclease PARN	6272
Q16740_C 86	CLPP Putative ATP-dependent Clp protease proteolytic subunit	3573	Q99426 C216	TBCB Tubulin-folding cofactor B	6273
P55010_C 59	EIF5 Eukaryotic translation initiation factor 5	3574	Q16566 C202	CAMK4 Calcium/calmodulin- dependent protein kinase type I	6274
P50213_C 331	IDH3A Isocitrate dehydrogenase	3575	Q9Y5P6 C113	GMPPB Mannose-1-phosphate guanyltransferase beta	6275
09Y692 C113	GMEB1 Glucocorticoid modulatory element-binding protein	3576	Q9UBT2 C158	UBA2 SUMO-activating enzyme subunit 2	6276
Q9C0C9 C341	UBE20 Ubiquitin-conjugating enzyme E2 O	3577	Q96C36 C225	PYCR2 Pyrroline-5-carboxylate reductase 2	6277
015392_C 84	BIRC5 Baculoviral IAP repeat-containing protein 5	3578	Q6NS38 C192	ALKBH2 Alpha-ketoglutarate- dependent dioxygenase alkB homoiog 2	6278
075533_C 1035	SF3B1 Splicing factor 3B subunit 1	3579	Q86SQ0 C385	PHLDB2 Pleckstrin homology-like domain family B member 2	6279
Q14192_C 132	FHL2 Four and a half LIM domains protein 2	3580	Q6DKI1 C184	RPL7L1 60S ribosomal protein L7-like 1	6280
P33991_C 162	MCM4 DNA replication licensing factor MCM4	3581	Q06203 C503	PPAT Amidophosphoribosyltransferase	6281
060684_C 208	KPNA6 Importin subunit alpha-7	3582	Q7Z616 C965	ARHGAP30 Rho GTPase-activating protein 30	6282
Q92841_C 277	DDX17 Probable ATP- dependent RNA helicase DDX17	3583	Q9ULP9 C223	TBC1D24 TBC1 domain family member 24	6283
P07814_C 692	EPRS Bifunctional glutamate/proline-tRNA ligase	3584	P34897 C343	SHMT2 Serine hydroxymethyltransferase, mitochondrial	6284
P07814_C 1076	EPRS Bifunctional glutamate/proline-tRNA ligase	3585	P49736 C315	MCM2 DNA replication licensing factor MCM2	6285
P22102_C 733	GART Trifunctional purine biosynthetic protein adenosine- 3	3586	095071 C2094	UBR5 E3 ubiquitin-protein ligase UBR5	6286
P32322_C 159	PYCR1 Pyrroline-5- carboxylate reductase 1, mitochondrial	3587	095071 C2173	UBR5 E3 ubiquitin-protein ligase UBR5	6287
075794_C 212	CDC123 Cell division cycle protein 123 homoiog	3588	Q96L91 C162	EP400 E1A-binding protein p400	6288
002750_C 341	MAP2K1 Dual specificity mitogen-activated protein	3589	Q6XZF7 C1434	DNMBE Dynamin-binding protein	6289

	kinase				
Q96RL1_C257	UIMC1 BRCA1-A complex subunit RAP80	3590	P34949_C11	MPI Mannose-6-phosphate isomerase	6290
015371_C196	EIF3D Eukaryotic translation initiation factor 3 subunit	3591	Q15437_C180	SEC23B Protein transport protein Sec23B	6291
Q7L2E3_C346	DHX30 Putative ATP-dependent RNA helicase DHX30	3592	P09960_C543	LTA4H Leukotriene A-4 hydrolase	6292
000159_C763	MYOIC Unconventional myosin-Ic	3593	P30460_C349	HLA-B HLA class I histocompatibility antigen, B-8 alpha	6293
Q8WTW3_C72	COG1 Conserved oligomeric Golgi complex subunit 1	3594	Q9BVS4_C449	RIOK2 Serine/threonine-protein kinase RI02	6294
Q96KP1_C627	EXOC2 Exocyst complex component 2	3595	015027_C1273	SEC16A Protein transport protein Sec16A	6295
P62136_C155	PPP1CA Serine/threonine-protein phosphatase PP1-alpha catalytic	3596	015027_C1619	SEC16A Protein transport protein Sec16A	6296
Q9UMH7_C348	SNX6 Sorting nexin-6	3597	Q9NQW7_C279	XPNPEP1 Xaa-Pro aminopeptidase 1	6297
Q86UY8_C276	NT5DC3 5-nucleotidase domain-containing protein 3	3598	Q96EB6_C380	SIRT1 NAD-dependent protein deacetylase sirtuin-1	6298
P14866_C151	HNRNPL Heterogeneous nuclear ribonucleoprotein L	3599	P10398_C514	ARAF Serine/threonine-protein kinase A-Raf	6299
P40123_C32	CAP2 Adenylyl cyclase-associated protein 2	3600	Q15046_C456	KARS Lysine-tRNA ligase	6300
Q86VQ1_C461	GLCCI1 Glucocorticoid-induced transcript 1 protein	3601	Q15046_C534	KARS Lysine-tRNA hgase	6301
Q13451_C394	FKBP5 Peptidyl-prolyl cis-trans isomerase FKBP5	3602	Q12802_C1548	AKAP13 A-kinase anchor protein 13	6302
Q9P2E9_C1216	RRBP1 Ribosome-binding protein 1	3603	Q12802_C2101	AKAP13 A-kinase anchor protein 13	6303
P51570_C351	GALK1 Galactokinase	3604	Q9H7B4_C421	SMYD3 SET and MYND domain-containing protein 3	6304
Q9NSE4_C155	IARS2 Isoleucine-tRNA Hgase, mitochondrial	3605	Q13867_C40	BLMH Bleomycin hydrolase	6305
Q9BTC0_C976	DIDO1 Death-inducer obhterator 1	3606	Q13867_C189	BLMH Bleomycin hydrolase	6306
P07355_C335	ANXA2 Annexin A2	3607	Q13404_C71	UBE2V1 Ubiquitin-conjugating enzyme E2 variant 1	6307
Q5M775_C578	SPECC1 Cytospin-B	3608	Q9BVA0_C344	KATNB1 Katanin p80 WD40-containing subunit B1	6308
P17987_C218	TCPI T-complex protein 1 subunit alpha	3609	060504_C521	SORBS3 Vinexin	6309
Q99614_C149	TTC1 Tetratricopeptide repeat protein 1	3610	P07437_C127	TUBB Tubulin beta chain	6310
075663_C75	TIPRL TIP41-like protein	3611	Q96SW2_C287	CRBN Protein cereblon	6311
Q52LW3_C1066	ARHGAP29 Rho GTPase-activating protein 29	3612	Q9Y490_C1023	TLN1 Talin-1	6312
H3BQZ7_C405	Uncharacterized protein	3613	Q9Y490_C2161	TLN1 Talin-1	6313
Q9BUL9_C16	RPP25 Ribonuclease P protein subunit p25	3614	Q86W56_C963	PARG Poly(ADP-ribose) glycohydrolase	6314
Q15286_C	RAB35 Ras-related protein	3615	P49005_	POLD2 DNA polymerase delta subunit	6315

163	Rab-35		C83	2	
PI6278_C 393	GLB1 Beta-galactosidase	3616	P49005_ C404	POLD2 DNA polymerase delta subunit 2	6316
Q9HC38_ C197	GLOD4 Glyoxalase domain- containing protein 4	3617	P49006_ C134	MARCKSL1 MARCKS-related protein	6317
Q9UM22_ C88	EPDR1 Mammalian ependymin-related protein 1	3618	Q05932_ C209	FPGS Folylpolylglutamate synthase, mitochondrial	6318
Q15056_C 85	EIF4H Eukaryotic translation initiation factor 4H	3619	Q9Y3D6 C41	FIS1 Mitochondrial fission 1 protein	6319
P23284_C 202	PPIB Peptidyl-prolyl cis-trans isomerase B	3620	094916_ C270	NFAT5 Nuclear factor of activated T- cells 5	6320
P46777_C 100	RPL5 60S ribosomal protein L5	3621	P27708_ C1374	CAD CAD protein	6321
Q68C22_ C928	TNS3 Tensin-3	3622	Q96LB3_ C53	IFT74 Intraflagellar transport protein 74 homolog	6322
Q68CZ2_ C1251	TNS3 Tensin-3	3623	Q96EY9_ C13	ADAT3 tRNA-specific adenosine deaminase-like protein 3	6323
P18031_C 215	PTPNI Tyrosine-protein phosphatase non-receptor type 1	3624	075608_ C211	LYPLA1 Acyl-protein thioesterase 1	6324
095456_C 106	PSMG1 Proteasome assembly chaperone 1	3625	P22033_ C433	MUT Methylmalonyl-CoA mutase, mitochondrial	6325
095453_C 543	PARN Poly(A)-specific ribonuclease PARN	3626	043290_ C560	SART1 U4/U6.U5 tri-snRNP- associated protein 1	6326
Q5VTL8_ C113	PRPF38B Pre-mRNA-splicing factor 38B	3627	043617_ C31	TRAPPC3 Trafficking protein particle complex subunit 3	6327
P31948_C 370	STIP1 Stress-induced- phosphoprotein 1	3628	Q9P258_ C337	RCC2 Protein RCC2	6328
095071_C 1476	UBR5 E3 ubiquitin-protein ligase UBR5	3629	P61313_ C110	RPL15 60S ribosomal protein LI5	6329
Q9NQW6 C260	ANLN Actin-binding protein anillin	3630	095684_ C244	FGFRIOP FGFR1 oncogene partner	6330
Q9NQW6 C437	ANLN Actin-binding protein anillin	3631	Q17RN3_ C36	FAM98C Protein FAM98C	6331
Q9NQW6 C512	ANLN Actin-binding protein anillin	3632	PI1498_ C372	PC Pyruvate carboxylase, mitochondrial	6332
P51649_C 502	ALDH5A1 Succinate- semialdehyde dehydrogenase, mitochondria	3633	Q13263_ C152	TRIM28 Transcription intermediary factor 1-beta	6333
PI1802_C 78	CDK4 Cyclin-dependent kinase 4	3634	Q13263_ C717	TRIM28 Transcription intermediary factor 1-beta	6334
P49915_C 631	GMPS GMP synthase	3635	075131_ C385	CPNE3 Copine-3	6335
Q9UKN8_ C116	GTF3C4 General transcription factor 3C polypeptide 4	3636	Q16762_ C64	TST Thiosulfate sulfurtransferase	6336
060504_C 482	SORBS3 Vinexin	3637	Q02790_ C103	FKBP4 Peptidyl-prolyl cis-trans isomerase FKBP4	6337
Q9Y490_ C956	TLN1 Talin-1	3638	Q02790_ C342	FKBP4 Peptidyl-prolyl cis-trans isomerase FKBP4	6338
P23381_C 309	WARS Tryptophan-tRNA ligase, cytoplasmic	3639	P26358_ C41	DNMT1 DNA (cytosine-5)- methyltransferase 1	6339
P27708_C 1696	CAD CAD protein	3640	P26358_ C580	DNMT1 DNA (cytosine-5)- methyltransferase 1	6340
O75607_C	NPM3 Nucleoplasmin-3	3641	Q8TEM1	NUP210 Nuclear pore membrane	6341

79			_C767	glycoprotein 210	
O75131_C 506	CPNE3 Copine-3	3642	P61006_ C23	RAB8A Ras-related protein Rab-8A	6342
P38646_C 66	HSPA9 Stress-70 protein, mitochondrial	3643	O15446_ C55	CD3EAP DNA-directed RNA polymerase I subunit RPA34	6343
P49588_C 671	AARS Alanine--tRNA ligase, cytoplasmic	3644	P54136_ C115	RARS Arginine--tRNA ligase, cytoplasmic	6344
P07602_C 33	PSAP Proactivator polypeptide	3645	P36551_ C319	CPOX Coproporphyrinogen-III oxidase, mitochondrial	6345
P28065_C 63	PSMB9 Proteasome subunit beta type-9	3646	Q86YV5 C155	SGK223 Tyrosine-protein kinase SgK223	6346
P15498_C 794	VAV1 Proto-oncogene vav	3647	Q86YV5 C221	SGK223 Tyrosine-protein kinase SgK223	6347
P08559_C 273	PDHA1 Pyruvate dehydrogenase E1 component subunit alpha,	3648	Q96PV6_ C529	LENG8 Leukocyte receptor cluster member 8	6348
Q8WZ82_ C129	OVCA2 Ovarian cancer- associated gene 2 protein	3649	P30520_ C182	ADSS Adenylosuccinate synthetase isozyme 2	6349
P46939_C 1627	UTRN Utrophin	3650	Q9NV88 C578	INTS9 Integrator complex subunit 9	6350
Q14166_C 361	TTL12 Tubulin--tyrosine ligase-like protein 12	3651	P49589_ C182	CARS Cysteine--tRNA ligase, cytoplasmic	6351
O43314_C 488	PPIP5K2 Inositol hexakisphosphate and diphosphoinositol- pentakisphosphate kinase 2	3652	P15374_ C50	UCHL3 Ubiquitin carboxyl-terminal hydrolase isozyme L3	6352
P60981_C 147	DSTN Destrin	3653	P55735_ C299	SEC13 Protein SEC13 homolog	6353
A6NHR9_ C444	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	3654	Q9NR09_ C1547	BIRC6 Baculoviral IAP repeat- containing protein 6	6354
Q9Y2X0_ C539	MED16 Mediator of RNA polymerase II transcription subunit	3655	A8MVX7 C100	Uncharacterized protein	6355
Q5VYS8_ C70	ZCCHC6 Terminal uridylyltransferase 7	3656	P56192_ C333	MARS Methionine--tRNA ligase, cytoplasmic	6356
P24298_C 450	GPT Alanine aminotransferase 1	3657	Q8NAG6 C517	ANKLE1 Ankyrin repeat and LEM domain-containing protein 1	6357
P42331_C 448	ARHGAP25 Rho GTPase- activating protein 25	3658	P55884_ C302	EIF3B Eukaryotic translation initiation factor 3 subunit	6358
Q14573_C 1638	ITPR3 Inositol 1,4,5- trisphosphate receptor type 3	3659	Q86V15_ C35	CASZ1 Zinc finger protein castor homolog 1	6359
O75717_C 716	WDHD1 WD repeat and HMG-box DNA-binding protein 1	3660	Q9H2G2 C1153	SLK STE20-like serine/threonine- protein kinase	6360
Q9NYV4_ C723	CDK12 Cyclin-dependent kinase 12	3661	Q99570_ C899	PIK3R4 Phosphoinositide 3-kinase regulatory subunit 4	6361
P62487_C 38	POLR2G DNA-directed RNA polymerase II subunit RPB7	3662	Q9BVP2 C251	GNL3 Guanine nucleotide-binding protein-like 3	6362
Q96199_C 369	SUCLG2 Succinyl-CoA ligase	3663	Q13813_ C1454	SPTAN1 Spectrin alpha chain, non- erythrocytic 1	6363
O00629_C 57	KPNA4 Importin subunit alpha-4	3664	Q6P3S1_ C21	DENND1B DENN domain-containing protein 1B	6364

Q9BW85_C275	CCDC94 Coiled-coil domain-containing protein 94	3665	P07737_C71	PFN1 Profilin-1	6365
Q9NUQ6_C367	SPATS2L SPATS2-like protein	3666	O00425_C546	IGF2BP3 Insulin-like growth factor 2 mRNA-binding protein	6366
Q5VWQ0_C282	RSBN1 Round spermatid basic protein 1	3667	Q9H832_C154	UBE2Z Ubiquitin-conjugating enzyme E2 Z	6367
Q92835_C1050	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1	3668	Q9H832_C261	UBE2Z Ubiquitin-conjugating enzyme E2 Z	6368
Q9Y6E0_C415	STK24 Serine/threonine-protein kinase 24	3669	Q9UKV8_C188	EIF2C2 Protein argonaute-2	6369
P49458_C39	SRP9 Signal recognition particle 9 kDa protein	3670	Q00796_C350	SORD Sorbitol dehydrogenase	6370
O43795_C613	MYO1B Unconventional myosin-1b	3671	Q9Y376_C121	CAB39 Calcium-binding protein 39	6371
Q9UPN3_C4429	MACF1 Microtubule-actin cross-linking factor 1, isoforms	3672	P00492_C66	HPRT1 Hypoxanthine-guanine phosphoribosyltransferase	6372
P16152_C122	CBR1 Carbonyl reductase	3673	Q9NVR5_C727	DNAAF2 Protein kintoun	6373
Q9BWU0_C224	SLC4A1AP Kanadaplin	3674	P15498_C652	VAV1 Proto-oncogene vav	6374
O75369_C2115	FLNB Filamin-B	3675	Q92499_C668	DDX1 ATP-dependent RNA helicase DDX1	6375
P48147_C255	PREP Prolyl endopeptidase	3676	P08559_C261	PDHA1 Pyruvate dehydrogenase E1 component subunit alpha,	6376
Q6PL24_C161	TMED8 Protein TMED8	3677	Q81UY3_C274	GRAMD2 GRAM domain-containing protein 2	6377
P21980_C10	TGM2 Protein-glutamine gamma-glutamyltransferase 2	3678	Q96PE3_C854	INPP4A Type I inositol 3,4-bisphosphate 4-phosphatase	6378
Q16270_C59	IGFBP7 Insulin-like growth factor-binding protein 7	3679	Q9NPD8_C86	UBE2T Ubiquitin-conjugating enzyme E2 T	6379
P25205_C446	MCM3 DNA replication licensing factor MCM3	3680	Q9H307_C439	PNN Pinin	6380
Q16181_C280	SEPT7 Septin-7	3681	P46939_C2003	UTRN Utrophin	6381
P83369_C52	LSM11 U7 snRNA-associated Sm-like protein LSM11	3682	P46939_C2098	UTRN Utrophin	6382
Q01813_C123	PFKP 6-phosphofructokinase type C	3683	P46939_C3076	UTRN Utrophin	6383
P49792_C3071	RANBP2 E3 SUMO-protein ligase RanBP2	3684	Q04637_C934	EIF4G1 Eukaryotic translation initiation factor 4 gamma 1	6384
O76031_C586	CLPX ATP-dependent Clp protease ATP-binding subunit clp	3685	D6RAD4_C204	CDK7 Cyclin-dependent kinase 7	6385
Q5T2R2_C315	PDSS1 Decaprenyl-diphosphate synthase subunit 1	3686	P52701_C579	MSH6 DNA mismatch repair protein Msh6	6386
Q96T76_C356	MMS19 MMS19 nucleotide excision repair protein homolog	3687	O60292_C1322	SIPA1L3 Signal-induced proliferation-associated 1-like protein	6387
Q12996_C646	CSTF3 Cleavage stimulation factor subunit 3	3688	Q16831_C17	UPP1 Uridine phosphorylase 1	6388
P35250_C255	RFC2 Replication factor C subunit 2	3689	P49368_C372	CCT3 T-complex protein 1 subunit gamma	6389
Q5VVQ6_C97	YOD1 Ubiquitin thioesterase OTU1	3690	O75962_C1717	TRIO Triple functional domain protein	6390

Q9BXP5_C640	SRRT Serrate RNA effector molecule homolog	3691	075962_C2327	TRIO Triple functional domain protein	6391
P62701_C181	RPS4X 40S ribosomal protein S4, X isoform	3692	Q53H82_C100	LACTB2 Beta-lactamase-like protein 2	6392
Q09028_C138	RBBP4 Histone-binding protein RBBP4	3693	Q5TC12_C321	ATPAF1 ATP synthase mitochondrial F1 complex assembly factor 1	6393
Q8WXH0_C39	SYNE2 Nesprin-2	3694	P33992_C221	MCM5 DNA replication licensing factor MCM5	6394
P62633_C111	CNBP Cellular nucleic acid-binding protein	3695	P12081_C455	HARS Histidine-tRNA ligase, cytoplasmic	6395
Q8N4X5_C292	AFAP12 Actin filament-associated protein 1-like 2	3696	Q15418_C432	RPS6KA1 Ribosomal protein S6 kinase alpha-1	6396
Q9HAS0_C182	C17orf75 Protein Njmu-R1	3697	P49590_C236	HARS2 Probable histidine-tRNA ligase, mitochondrial	6397
094806_C29	PRKD3 Serine/threonine-protein kinase D3	3698	014893_C63	GEMIN2 Gem-associated protein 2	6398
Q7Z6Z7_C2181	HUWE1 E3 ubiquitin-protein ligase HUWE1	3699	Q9H0D6_C557	XRN2 5-3 exoribonuclease 2	6399
P14598_C111	NCF1 Neutrophil cytosol factor 1	3700	Q4G0F5_C334	VPS26B Vacuolar protein sorting-associated protein 26B	6400
P23193_C212	TCEA1 Transcription elongation factor A protein 1	3701	P08567_C59	PLEK Pleckstrin	6401
P60953_C105	CDC42 Cell division control protein 42 homolog	3702	P50135_C196	HNMT Histamine N-methyltransferase	6402
Q03426_C339	MVK Mevalonate kinase	3703	Q9BXF6_C66	RAB11FIP5 Rab11 family-interacting protein 5	6403
Q9H6S3_C358	EPS8L2 Epidermal growth factor receptor kinase substrate	3704	P51668_C m	UBE2D1 Ubiquitin-conjugating enzyme E2 D1	6404
P30566_C113	ADSL Adenylosuccinate lyase	3705	Q5T0L3_C212	C1orf111 Uncharacterized protein Clorf111	6405
P51610_C352	HCFC1 Host cell factor 1	3706	A6NHR9_C897	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	6406
Q92616_C1275	GCN1L1 Translational activator GCN1	3707	A6NHR9_C1899	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	6407
Q92616_C2469	GCN1L1 Translational activator GCN1	3708	Q12824_C167	SMARCB1 SWI/SNF-related matrix-associated actin-dependent	6408
Q92614_C1080	MYO18A Unconventional myosin-XVnia	3709	Q969R8_C438	ITFG2 Integrin-alpha FG-GAP repeat-containing protein 2	6409
Q9BZK7_C434	TBL1XR1 F-box-like/WD repeat-containing protein TBL1XR1	3710	PI7544_C61	ATF7 Cyclic AMP-dependent transcription factor ATF-7	6410
P53618_C623	COPB1 Coatamer subunit beta	3711	000410_C1057	IP05 Importin-5	6411
Q8TEX9_C42	IP04 Importin-4	3712	Q9BT25_C354	HAUS8 HAUS augmin-like complex subunit 8	6412
P49327_C1548	FASN Fatty acid synthase	3713	095861_C206	BPNT1 3(2),5-bisphosphate nucleotidase 1	6413
Q16875_C155	PFKFB3 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase	3714	015260_C32	SURF4 Surfeit locus protein 4	6414
P20839_C331	IMPDH1 Inosine-5-monophosphate dehydrogenase 1	3715	P35580_C1238	MYH10 Myosin-10	6415

P40926_C 138	MDH2 Malate dehydrogenase, mitochondrial	3716	P35270 - C171	SPR Sepiapterin reductase	6416
P80297_C 50	MT1X Metallothionein-IX	3717	P42330 - C193	AKR1C3 Aldo-keto reductase family 1 member C3	6417
Q12769_C 1166	NUP160 Nuclear pore complex protein Nup 160	3718	P42331 - C302	ARHGAP25 Rho GTPase-activating protein 25	6418
P48059_C 100	LIMS1 LIM and senescent cell antigen-like-containing domain	3719	Q9Y230 - C227	RUVBL2 RuvB-like 2	6419
Q8TBC4 - C82	UBA3 NEDD8-activating enzyme E1 catalytic sub-unit	3720	Q92621 - C877	NUP205 Nuclear pore complex protein Nup205	6420
P26639_C 107	TARS Threonine-tRNA ligase, cytoplasmic	3721	Q92621 - CI297	NUP205 Nuclear pore complex protein Nup205	6421
PI3804_C 53	ETFA Electron transfer flavoprotein subunit alpha, mitochondrial	3722	P42025 - C222	ACTR1B Beta-centractin	6422
A6NE09 - C148	RPSAP58 Protein RPSAP58	3723	Q5H9R7 - C844	PPP6R3 Serine/threonine-protein phosphatase 6 regulatory	6423
Q12888_C 513	TP53BP1 Tumor suppressor p53-binding protein 1	3724	Q02241 - C447	KIF23 Kinesin-like protein KIF23	6424
Q02252_C 368	ALDH6A1 Methylmalonate- semialdehyde dehydrogenase	3725	094915 - C888	FRYL Protein furry homolog-like	6425
P29144_C 967	TPP2 Tripeptidyl-peptidase 2	3726	P53621 - C245	COPA Coatomer subunit alpha	6426
Q9H1B7 - C63	IRF2BPL Interferon regulatory factor 2-binding protein-like	3727	P53621 - C522	COPA Coatomer subunit alpha	6427
Q99836_C 280	MYD88 Myeloid differentiation primary response protein M	3728	043678 - C58	NDUFA2 NADH dehydrogenase	6428
P43487_C 158	RANBP1 Ran-specific GTPase-activating protein	3729	Q14116 - C74	IL18 Interleukin-18	6429
Q6KC79 - C304	NIPBL Nipped-B-like protein	3730	Q86Y37 - C362	CACUL1 CDK2-associated and cullin domain-containing protein	6430
Q9BTE3 - C200	MCMBP Mini-chromosome maintenance complex-binding protein	3731	Q99704 - C115	DOK1 Docking protein 1	6431
P42574_C 170	CASP3 Caspase-3	3732	075153 - C214	KIAA0664 Clustered mitochondria protein homolog	6432
Q9NPI6 - C39	DCP1A mRNA-decapping enzyme 1A	3733	Q99961 - C147	SH3GL1 Endophilin-A2	6433
095425_C 1101	SVIL Supravillin	3734	043294 - C416	TGFB1I1 Transforming growth factor beta- 1-induced transcript 1	6434
Q9NS86 - C169	LANCL2 LanC-like protein 2	3735	Q7Z7H8 - C213	MRPL10 39S ribosomal protein L10, mitochondrial	6435
Q8NC60 - C393	NOA1 Nitric oxide-associated protein 1	3736	Q961F1 - C182	AJUBA LIM domain-containing protein ajuba	6436
014773_C 537	TPP1 Tripeptidyl-peptidase 1	3737	Q8NC26 - C51	ZNF114 Zinc finger protein 114	6437
P61088_C 87	UBE2N Ubiquitin-conjugating enzyme E2 N	3738	Q8NC26 - C136	ZNF114 Zinc finger protein 114	6438
Q5JRX3 - C241	PITRMI Presequence protease, mitochondrial	3739	P21266 - C39	GSTM3 Glutathione S-transferase Mu 3	6439
Q5JRX3 - C869	PITRMI Presequence protease, mitochondrial	3740	Q8WXA9 C494	SREK1 Splicing regulatory glutamine/lysine-rich protein	6440
Q9BRP1 - C100	PDCD2L Programmed cell death protein 2-like	3741			

[0408] Table 4 illustrates an exemplary list of cysteine-containing proteins identified in a human T cell. Table 4 further shows the accession number (or the protein identifier) of the protein, cysteine residue number, and an illustrative peptide fragment containing the cysteine of interest (denoted by C*).

Table 4

Identifier	Protein Name	SEQ ID NO:	Identifier	Protein Name	SEQ ID NO:
Q13418_C239	ILK Integrin-linked protein kinase	6441	P37235_C185	HPCAL1 Hippocalcin-like protein 1	8047
P07203_C156	GPX1 Glutathione peroxidase 1	6442	Q9BSJ8_C370	ESYT1 Extended synaptotagmin-1	8048
P00390_C102	GSR Glutathione reductase, mitochondrial	6443	P51610_C227	HCFC1 Host cell factor 1	8049
P07203_C78	GPX1 Glutathione peroxidase 1	6444	P49753_C401	ACOT2 Acyl-coenzyme A thioesterase 2, mitochondrial	8050
Q9BRA2_C43	TXNDC17 Thioredoxin domain-containing protein 17	6445	J3QR44_C430	CDK11B Cyclin-dependent kinase 11B	8051
Q01844_C524	EWSR1 RNA-binding protein EWS	6446	P21127_C440	CDK11B Cyclin-dependent kinase 11B	8052
Q99798_C385	ACO2 Aconitate hydratase, mitochondrial	6447	O43149_C69	ZZEF1 Zinc finger ZZ-type and EF-hand domain-containing	8053
P18031_C215	PTPN1 Tyrosine-protein phosphatase non-receptor type 1	6448	Q9NZB2_C531	FAM120A Constitutive coactivator of PPAR-gamma-like protein 1	8054
Q9Y2R4_C536	DDX52 Probable ATP-dependent RNA helicase DDX52	6449	Q6PJT7_C261	ZC3H14 Zinc finger CCCH domain-containing protein 14	8055
P53621_C921	COPA Coatamer subunit alpha	6450	Q9Y613_C31	FHOD1 FH1/FH2 domain-containing protein 1	8056
P31930_C380	UQCRC1 Cytochrome b-c1 complex subunit 1, mitochondrial	6451	Q9Y4F9_C596	FAM65B Protein FAM65B	8057
P09211_C48	GSTP1 Glutathione S-transferase P	6452	Q93084_C614	ATP2A3 Sarcoplasmic/endoplasmic reticulum calcium ATPase	8058
P46459_C264	NSF Vesicle-fusing ATPase	6453	P78527_C25	PRKDC DNA-dependent protein kinase catalytic subunit	8059
Q9NR56_C43	MBNL1 Muscleblind-like protein 1	6454	Q15027_C501	ACAP1 Arf-GAP with coiled-coil, ANK repeat and PH domain 1	8060
Q5VZF2_C43	MBNL2 Muscleblind-like protein 2	6455	Q9H2M9_C1336	RAB3GAP2 Rab3 GTPase-activating protein non-catalytic subunit	8061
P49368_C455	CCT3 T-complex protein 1 subunit gamma	6456	P62857_C27	RPS28 40S ribosomal protein S28	8062
P47756_C62	CAPZB F-actin-capping protein subunit beta	6457	P60981_C163	DSTN Destrin	8063
P57737_C42	CORO7 Coronin-7	6458	Q96SK2_C158	TMEM209 Transmembrane protein 209	8064
Q9BV79_C263	MECR Trans-2-enoyl-CoA reductase, mitochondrial	6459	P15153_C178	RAC2 Ras-related C3 botulinum toxin substrate 2	8065

P13010_C 339	XRCC5 X-ray repair cross-complementing protein 5	6460	P37802_C 124	TAGLN2 Transgelin-2	8066
Q9H2U2_C C302	PPA2 Inorganic pyrophosphatase 2, mitochondrial	6461	Q63HN8_C C3554	RNF213 E3 ubiquitin-protein ligase RNF213	8067
P13010_C 346	XRCC5 X-ray repair cross-complementing protein 5	6462	Q94915_C C888	FRYL Protein furry homolog-like	8068
Q16875_C 102	PFKFB3 6-phosphofructo-2-kinase/fructose-2,6-bisphosphata	6463	Q9UPR0_C C90	PLCL2 Inactive phospholipase C-like protein 2	8069
P14866_C 452	HNRNPL Heterogeneous nuclear ribonucleoprotein L	6464	Q96ME7_C C324	ZNF512 Zinc finger protein 512	8070
Q99798_C 448	ACO2 Aconitate hydratase, mitochondrial	6465	Q8IZ73_C C431	RPUSD2 RNA pseudouridylate synthase domain-containing protein	8071
Q99798_C 451	ACO2 Aconitate hydratase, mitochondrial	6466	Q5SNT2_C C498	TMEM201 Transmembrane protein 201	8072
Q9C0B1_C C326	FTO Alpha-ketoglutarate-dependent dioxygenase FTO	6467	Q14980_C C1937	NUMA1 Nuclear mitotic apparatus protein 1	8073
Q92947_C 115	GCDH Glutaryl-CoA dehydrogenase, mitochondrial	6468	Q9BSD7_C C184	NTPCR Cancer-related nucleoside-triphosphatase	8074
Q92597_C 168	NDRG1 Protein NDRG1	6469	P56192_C 441	MARS Methionine--tRNA ligase, cytoplasmic	8075
P09874_C 298	PARP1 Polymerase 2	6470	Q9BWW4_C C80	SSBP3 Single-stranded DNA-binding protein 3	8076
P55036_C 58	PSMD4 26S proteasome non-ATPase regulatory subunit 4	6471	P62834_C 139	RAP1A Ras-related protein Rap-1A	8077
A6NHR9_C C1433	SMCHD1 Structural maintenance of chromosomes flexible hinge domain-containing protein 1	6472	P49448_C 172	GLUD2 Glutamate dehydrogenase 2, mitochondrial	8078
Q2M218_C C270	AAK1 AP2-associated protein kinase 1	6473	P00367_C 172	GLUD1 Glutamate dehydrogenase 1, mitochondrial	8079
O14880_C 56	MGST3 Microsomal glutathione S-transferase 3	6474	P23396_C 134	RPS3 40S ribosomal protein S3	8080
Q9C0J8_C C120	WDR33 pre-mRNA 3 end processing protein WDR33	6475	O75947_C C101	ATP5H ATP synthase subunit d, mitochondrial	8081
Q96ME7_C C430	ZNF512 Zinc finger protein 512	6476	Q9HC38_C C171	GLOD4 Glyoxalase domain-containing protein 4	8082
Q01813_C 641	PFKP 6-phosphofructokinase type C	6477	O00233_C C59	PSMD9 26S proteasome non-ATPase regulatory subunit 9	8083
P21333_C 810	FLNA Filamin-A	6478	P14866_C 472	HNRNPL Heterogeneous nuclear ribonucleoprotein L	8084
P07858_C 108	CTSB Cathepsin B	6479	Q04206_C C105	RELA Transcription factor p65	8085
Q9UGI8_C C22	TES Testin	6480	Q96FW1_C C23	OTUB1 Ubiquitin thioesterase OTUB1	8086
P48047_C 141	ATP5O ATP synthase subunit O, mitochondrial	6481	Q9UI30_C C33	TRMT112 tRNA methyltransferase 112 homolog	8087
P27707_C 59	DCK Deoxycytidine kinase	6482	O43815_C C316	STRN Striatin	8088
Q9C0J8_C C249	WDR33 pre-mRNA 3 end processing protein WDR33	6483	P08047_C 755	SP1 Transcription factor Sp1	8089
Q9UMS4_C C298	PRPF19 Pre-mRNA-processing factor 19	6484	P60174_C 104	TPI1 Triosephosphate isomerase	8090

P25705_C 294	ATP5A1 ATP synthase subunit alpha, mitochondrial	6485	O75362_ C286	ZNF217 Zinc finger protein 217	8091
H3BQZ7_ C518	Uncharacterized protein	6486	O60496_ C36	DOK2 Docking protein 2	8092
Q1KMD3 C518	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein 2	6487	P49792_C 2791	RANBP2 E3 SUMO-protein ligase RanBP2	8093
Q8IW45_ C82	CARKD ATP-dependent (S)- NAD(P)H-hydrate dehydratase	6488	Q13428_ C38	TCOF1 Treacle protein	8094
P09110_C 177	ACAA1 3-ketoacyl-CoA thiolase, peroxisomal	6489	Q8TD47_ C41	RPS4Y2 40S ribosomal protein S4, Y isoform 2	8095
P34949_C 11	MPI Mannose-6-phosphate isomerase	6490	P22090_C 41	RPS4Y1 40S ribosomal protein S4, Y isoform 1	8096
Q7RTV0_ C49	PHF5A PHD finger-like domain- containing protein 5A	6491	Q8NDH3 C504	NPEPL1 Probable aminopeptidase NPEPL1	8097
Q9BWD1 C65	ACAT2 Acetyl-CoA acetyltransferase, cytosolic	6492	Q96P11_ C362	NSUN5 Putative methyltransferase NSUN5	8098
P48735_C 154	IDH2 Isocitrate dehydrogenase	6493	Q8N3X1_ C877	FBNP4 Formin-binding protein 4	8099
P51665_C 116	PSMD7 26S proteasome non-ATPase regulatory subunit 7	6494	Q92685_ C21	ALG3 Dol-P- Man:Man(5)GlcNAc(2)-PP- Dol alpha-1,3- mannosyltransferase	8100
Q6YN16_ C218	HSDL2 Hydroxysteroid dehydrogenase-like protein 2	6495	Q00013_ C242	MPP1 55 kDa erythrocyte membrane protein	8101
P14866_C 581	HNRNPL Heterogeneous nuclear ribonucleoprotein L	6496	Q9BTX1_ C468	TMEM48 Nucleoporin NDC1	8102
P78417_C 32	GSTO1 Glutathione S-transferase omega-1	6497	Q96RU3_ C609	FBNP1 Formin-binding protein 1	8103
P51610_C 1872	HCFC1 Host cell factor 1	6498	P31749_C 310	AKT1 RAC-alpha serine/threonine-protein kinase	8104
Q86WV6_ C206	TMEM173 Transmembrane protein 173	6499	Q9Y243_ C307	AKT3 RAC-gamma serine/threonine-protein kinase	8105
P08559_C 181	PDHA1 Pyruvate dehydrogenase E1 component subunit alpha, somatic form, mitochondrial	6500	P31751_C 311	AKT2 RAC-beta serine/threonine-protein kinase	8106
O60318_C 1285	MCM3AP 80 kDa MCM3-associated protein	6501	O95248_ C1374	SBF1 Myotubularin-related protein 5	8107
P78527_C 4106	PRKDC DNA-dependent protein kinase catalytic subunit	6502	O94953_ C694	KDM4B Lysine-specific demethylase 4B	8108
P31943_C 34	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	6503	O95295_ C66	SNAPIN SNARE-associated protein Snapin	8109
P62333_C 170	PSMC6 26S protease regulatory subunit 10B	6504	Q9Y4W2 C690	LAS1L Ribosomal biogenesis protein LAS1L	8110
O14776_C 1062	TCERG1 Transcription elongation regulator 1	6505	P29375_C 838	KDM5A Lysine-specific demethylase 5A	8111
Q9Y3Z3_ C341	SAMHD1 SAM domain and HD domain-containing protein 1	6506	P52948_C 1068	NUP98 Nuclear pore complex protein Nup98-Nup96	8112
Q96GM5_ C460	SMARCD1 SWI/SNF-related matrix- associated actin-dependent	6507	Q9Y5Y2_ C269	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	8113
P29350_C 361	PTPN6 Tyrosine-protein phosphatase non-receptor type 6	6508	P12814_C 370	ACTN1 Alpha-actinin-1	8114
P14625_C 645	HSP90B1 Endoplasmic	6509	O75131_ C506	CPNE3 Copine-3	8115
P10515_C 586	DLAT Dihydrolipoyllysine-residue acetyltransferase component of	6510	Q7Z2W4_ C38	ZC3HAV1 Zinc finger CCCH- type antiviral protein 1	8116

	pyruvate dehydrogenase complex, mitochondrial				
P02042_C 94	HBD Hemoglobin subunit delta	6511	P51610_C 1886	HCFC1 Host cell factor 1	8117
P14174_C 81	MIF Macrophage migration inhibitory factor	6512	P51610_C 1895	HCFC1 Host cell factor 1	8118
P04083_C 343	ANXA1 Annexin A1	6513	P40939_C 322	HADHA Trifunctional enzyme subunit alpha, mitochondrial	8119
P04406_C 247	GAPDH Glyceraldehyde-3-phosphate dehydrogenase	6514	Q63HN8_ C3261	RNF213 E3 ubiquitin-protein ligase RNF213	8120
094901_C 657	SUN1 SUN domain-containing protein 1	6515	I3L3Q1_ C264	Uncharacterized protein	8121
Q9UH99_ C563	SUN2 SUN domain-containing protein 2	6516	Q6ZSZ5_ C306	ARHGEF18 Rho guanine nucleotide exchange factor 18	8122
P13796_C 42	LCP1 Plastin-2	6517	Q9BRJ7_ C88	NUDT16L1 Protein syndesmos	8123
095985_C 217	TOP3B DNA topoisomerase 3-beta-1	6518	P52701_C 615	MSH6 DNA mismatch repair protein Msh6	8124
P00367_C 376	GLUDI Ghitamate dehydrogenase 1, mitochondrial	6519	Q9Y4K1_ C976	AIM1 Absent in melanoma 1 protein	8125
P49840_C 380	GSK3A Glycogen synthase kinase-3 alpha	6520	Q15631_ C225	TSN Translin	8126
P12814_C 154	ACTN1 Alpha-actinin-1	6521	Q9H9L4_ C117	KANSL2 KAT8 regulatory NSL complex subunit 2	8127
P55084_C 458	HADHB Trifunctional enzyme subunit beta, mitochondrial	6522	Q66K74_ C435	MAP1S Microtubule- associated protein 1S	8128
P63220_C 56	RPS21 40S ribosomal protein S21	6523	Q66K74_ C440	MAP1S Microtubule- associated protein 1S	8129
043707_C 173	ACTN4 Alpha-actinin-4	6524	075319_ C325	DUSP1 1 RNA/RNP complex- 1-interacting phosphatase	8130
Q49A26_ C356	GLYR1 Putative oxidoreductase GLYR1	6525	Q02543_ C16	RPL18A 60S ribosomal protein L18a	8131
Q9NYL9_ C231	TMOD3 Tropomodulin-3	6526	Q96HA1_ C307	POM121 Nuclear envelope pore membrane protein POM 121	8132
Q63HN8_ C2943	RNF213 E3 ubiquitin-protein ligase RNF213	6527	Q6PJE2_ C42	POMZP3 POM121 and ZP3 fusion protein	8133
P27987_C 740	ITPKB Inositol-trisphosphate 3-kinase B	6528	A8CG34_ C284	POM121C Nuclear envelope pore membrane protein POM 121C	8134
Q96F15_ C185	GIMAP5 GTPase IMAP family member 5	6529	014523_ C359	C2CD2L C2 domain- containing protein 2-like	8135
Q13501_C 131	SQSTM1 Sequestosome-1	6530	Q99986_ C50	VRK1 Serine/threonine- protein kinase VRK1	8136
P00441_C 147	SOD1 Superoxide dismutase	6531	P62995_C 118	TRA2B Transformer-2 protein homolog beta	8137
Q92616_C 1362	GCN1 L1 Translational activator GCN1	6532	P62995_C 119	TRA2B Transformer-2 protein homolog beta	8138
Q08J23_C 321	NSUN2 tRNA (cytosine(34)-C(5))- methyltransferase	6533	Q15050_ C52	RRS1 Ribosome biogenesis regulatory protein homolog	8139
Q01518_C 416	CAPI Adenylyl cyclase-associated protein 1	6534	P08575_C 608	PTPRC Receptor-type tyrosine-protein phosphatase C	8140
P55735_C 245	SEC13 Protein SEC13 homolog	6535	043704_ C22	SULT1B1 Sulfotransferase family cytosolic IB member 1	8141

P08133_C 59	ANXA6 Annexin A6	6536	P46060_C 573	RANGAP1 Ran GTPase-activating protein 1	8142
P62910_C 96	RPL32 60S ribosomal protein L32	6537	E9PMF8_C 542	PTPRC Receptor-type tyrosine-protein phosphatase C	8143
P62306_C 66	SNRPF Small nuclear ribonucleo protein F	6538	Q13469_C 386	NFATC2 Nuclear factor of activated T-cells, cytoplasmic 2	8144
I3L420_C 311	LSM14A Protein LSM14 homolog A	6539	A6NHR9_C 1710	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing I	8145
Q8ND56_C 375	LSM14A Protein LSM14 homolog A	6540	043159_C 451	RRP8 Ribosomal RNA-processing protein 8	8146
P57737_C 187	COR07 Coronin-7	6541	Q99439_C 274	CNN2 Calponin-2	8147
Q96FS4_C 609	SIPA1 Signal-induced proliferation-associated protein 1	6542	Q99439_C 290	CNN2 Calponin-2	8148
Q8TD19_C 487	NEK9 Serine/threonine-protein kinase Nek9	6543	006330_C 397	RBPJ Recombining binding protein suppressor of hairless	8149
Q99567_C 561	NUP88 Nuclear pore complex protein Nup88	6544	043264_C 568	ZW10 Centromere/kinetochore protein zw10 homolog	8150
P21333_C 631	FLNA Filamin-A	6545	Q8N806_C 35	UBR7 Putative E3 ubiquitin-protein ligase UBR7	8151
P26583_C 23	HMGB2 High mobility group protein B2	6546	Q9UGV2_C 359	NDRG3 Protein NDRG3	8152
P09429_C 23	HMGB1 High mobility group protein B1	6547	P08758_C 316	ANXA5 Annexin A5	8153
099460_C 898	PSMD1 26S proteasome non-ATPase regulatory subunit 1	6548	Q92878_C 1296	RAD50 DNA repair protein RAD50	8154
Q92785_C 53	DPF2 Zinc finger protein ubi-d4	6549	BOV043_C 12	VARS Valyl-tRNA synthetase	8155
Q16822_C 431	PCK2 Phosphoenolpyruvate carboxykinase	6550	094903_C 261	PROSC Proline synthase co-transcribed bacterial homolog	8156
095671_C 441	ASMTLN-acetylserotonin O-methyltransferase-like protein	6551	P53041_C 11	PPP5C Serine/threonine-protein phosphatase 5	8157
Q9UGI8_C 412	TES Testin	6552	Q92608_C 1655	DOCK2 Dedicator of cytokinesis protein 2	8158
Q13574_C 905	DGKZ Diacylglycerol kinase zeta	6553	P35236_C 62	PTPN7 Tyrosine-protein phosphatase non-receptor type 7	8159
Q9UGI8_C 416	TES Testin	6554	Q86YV0_C 896	RASAL3 RAS protein activator like-3	8160
Q9NZA1_C 191	CLIC5 Chloride intracellular channel protein 5	6555	Q6P1X6_C 98	C8orf82 UPF0598 protein C8orf82	8161
P43354_C 566	NR4A2 Nuclear receptor subfamily 4 group A member 2	6556	Q8TDN6_C 52	BRX1 Ribosome biogenesis protein BRX1 homolog	8162
P22736_C 566	NR4A1 Nuclear receptor subfamily 4 group A member 1	6557	Q15424_C 225	SAFB Scaffold attachment factor B1	8163
Q96EP0_C 504	RNF31 E3 ubiquitin-protein ligase RNF31	6558	Q14151_C 224	SAFB2 Scaffold attachment factor B2	8164
P30048_C 229	PRDX3 Thioredoxin-dependent peroxide reductase, mitochondrial	6559	Q8WXH0_C 6161	SYNE2 Nesprin-2	8165
P21333_C 210	FLNA Filamin-A	6560	P45880_C 13	VDAC2 Voltage-dependent anion-selective channel protein	8166

Q08AF3_C627	SLFN5 Schlafen family member 5	6561	Q92575_C144	UBXN4 UBX domain-containing protein 4	8167
Q92608_C465	DOCK2 Dedicator of cytokinesis protein 2	6562	P07741_C83	APRT Adenine phosphoribosyltransferase	8168
075592_C1868	MYCBP2 Probable E3 ubiquitin-protein ligase MYCBP2	6563	Q9BWH6_C1039	RPAP1 RNA polymerase II-associated protein 1	8169
P21333_C205	FLNA Filamin-A	6564	Q96EP0_C551	RNF31 E3 ubiquitin-protein ligase RNF31	8170
P21333_C2160	FLNA Filamin-A	6565	Q9BYG3_C237	MKI67IP MKI67 FHA domain-interacting nucleolar phosphoprotein	8171
P30626_C57	SRI Sorcin	6566	P17655_C39	CAPN2 Calpain-2 catalytic subunit	8172
Q9P2T1_C348	GMFR2 GMP reductase 2	6567	Q12789_C42	GTF3C1 General transcription factor 3C polypeptide 1	8173
Q52LJ0_C295	FAM98B Protein FAM98B	6568	000410_C1078	IMP5 Importin-5	8174
Q13813_C956	SPTAN1 Spectrin alpha chain, non-erythrocytic 1	6569	Q15796_C70	SMAD2 Mothers against decapentaplegic homolog 2	8175
Q8NCA5_C293	FAM98A Protein FAM98A	6570	Q9H7D7_C656	WDR26 WD repeat-containing protein 26	8176
Q96G03_C573	PGM2 Phosphoglucomutase-2	6571	094804_C947	STK10 Serine/threonine-protein kinase 10	8177
075832_C107	PSMD10 26S proteasome non-ATPase regulatory subunit 10	6572	A6NHR9_C59	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	8178
095372_C213	LYPLA2 Acyl-protein thioesterase 2	6573	Q13501_C26	SQSTM1 Sequestosome-1	8179
Q5JVS0_C22	HABP4 Intracellular hyaluronan-binding protein 4	6574	Q13501_C27	SQSTM1 Sequestosome-1	8180
Q9BPZ7_C149	MAPKAP1 Target of rapamycin complex 2 subunit MAPKAP1	6575	P04899_C352	GNAI2 Guanine nucleotide-binding protein G(i) subunit alpha-2	8181
Q81ME71_C655	ABCF1 ATP-binding cassette subfamily F member 1	6576	P40222_C523	TXLNA Alpha-taxilin	8182
P48059_C100	LIMS1 LIM and senescent cell antigen-like-containing domain 1	6577	Q6UUV9_C131	CRTC1 CREB-regulated transcription coactivator 1	8183
Q13263_C83	TRIM28 Transcription intermediary factor 1-beta	6578	075643_C428	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicas	8184
Q13263_C88	TRIM28 Transcription intermediary factor 1-beta	6579	P29590_C338	PML Protein PML	8185
Q13263_C91	TRIM28 Transcription intermediary factor 1-beta	6580	Q32MZ4_C14	LRRFPT1 Leucine-rich repeat flightless-interacting protein	8186
Q9Y4H4_C116	GPSM3 G-protein-signaling modulator 3	6581	P07814_C1487	EPRS Bifunctional glutamate/proline-tRNA ligase	8187
000139_C537	KIF2A Kinesin-like protein KIF2A	6582	Q08999_C368	RBL2 Retinoblastoma-like protein 2	8188
A6NHR9_C897	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	6583	Q6IA86_C475	ELP2 Elongator complex protein 2	8189
Q12824_C350	SMARCB1 SWI/SNF-related matrix-associated actin-dependent	6584	A6NHR9_C61	SMCHD1 Structural maintenance of chromosomes	8190

				flexible hinge domain containing 1	
Q96EP5_C85	DAZAP1 DAZ-associated protein 1	6585	P35611_C525	ADD1 Alpha-adducin	8191
Q96ME7_C413	ZNF512 Zinc finger protein 512	6586	P52701_C88	MSH6 DNA mismatch repair protein Msh6	8192
Q13813_C1622	SPTAN1 Spectrin alpha chain, non-erythrocytic 1	6587	Q14137_C108	BOPI Ribosome biogenesis protein BOP 1	8193
Q8WWQ0_C28	PHIP PH-interacting protein	6588	Q12802_C1232	AKAP13 A-kinase anchor protein 13	8194
P22736_C303	NR4A1 Nuclear receptor subfamily 4 group A member 1	6589	Q92800_C423	EZH1 Histone-lysine N-methyltransferase EZH1	8195
Q9P2N6_C459	KANSL3 KAT8 regulatory NSL complex subunit 3	6590	Q8N9N8_C89	EIF1 AD Probable RNA-binding protein EIF1 AD	8196
Q93084_C447	ATP2A3 Sarcoplasmic/endoplasmic reticulum calcium ATPase	6591	Q13813_C2233	SPTAN1 Spectrin alpha chain, non-erythrocytic 1	8197
Q92945_C436	KHSRP Far upstream element-binding protein 2	6592	Q96EK4_C48	THAP1 THAP domain-containing protein 11	8198
075643_C1278	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicase	6593	095267_C713	RASGRP1 RAS guanyl-releasing protein 1	8199
P14866_C260	HNRNPL Heterogeneous nuclear ribonucleoprotein L	6594	P62851_C59	RPS25 40S ribosomal protein S25	8200
H7BZ11_C83	Uncharacterized protein	6595	060551_C104	NMT2 Glycylpeptide N-tetradecanoyltransferase 2	8201
H7BZ11_C88	Uncharacterized protein	6596	Q9Y228_C135	TRAF3IP3 TRAF3-interacting JNK-activating modulator	8202
Q969Q0_C72	RPL36AL 60S ribosomal protein L36a-like	6597	I3L115_C189	Uncharacterized protein	8203
Q969Q0_C77	RPL36AL 60S ribosomal protein L36a-like	6598	P08047_C68	SP1 Transcription factor Spl	8204
P14866_C261	HNRNPL Heterogeneous nuclear ribonucleoprotein L	6599	E7ETI0_C21	ARPC4-TTL3 Protein ARPC4-TTL3	8205
P15927_C219	RPA2 Replication protein A 32 kDa subunit	6600	P59998_C21	ARPC4 Actin-related protein 2/3 complex subunit 4	8206
Q92598_C290	HSPH1 Heat shock protein 105 kDa	6601	Q7KZ85_C336	SUPT6H Transcription elongation factor SPT6	8207
P22307_C71	SCP2 Non-specific lipid-transfer protein	6602	Q9HB58_C461	SP110 Sp110 nuclear body protein	8208
P26358_C896	DNMT1 DNA (cytosine-5)-methyltransferase 1	6603	B0IIT2_C793	MYOIG Unconventional myosin-Ig	8209
Q06830_C173	PRDX1 Peroxiredoxin-1	6604	Q99497_C106	PARK7 Protein DJ-1	8210
P42765_C287	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	6605	Q9HB19_C191	PLEKHA2 Pleckstrin homology domain-containing family A member 2	8211
075592_C2163	MYCBP2 Probable E3 ubiquitin-protein ligase MYCBP2	6606	B0IIT2_C788	MYOIG Unconventional myosin-Ig	8212
Q9Y4W2_C504	LAS1L Ribosomal biogenesis protein LAS1L	6607	Q9NWY4_C17	C4orf27 UPF0609 protein C4orf27	8213
A6NHR9_C1856	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	6608	Q9H4L4_C243	SEN3 Sentrin-specific protease 3	8214
075351_C240	VPS4B Vacuolar protein sorting-associated protein 4B	6609	A0AVT1_C347	UBA6 Ubiquitin-like modifier-activating enzyme 6	8215

P52333_C 811	JAK3 Tyrosine-protein kinase JAK3	6610	P23497_C 238	SP100 Nuclear autoantigen Sp-100	8216
P52564_C 216	MAP2K6 Dual specificity mitogen- activated protein kinase	6611	Q9NU22_ C4041	MDN1 Midasin	8217
P31146_C 40	CORO1A Coronin-1A	6612	Q92835_ C506	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5- phosphatase D	8218
P55072_C 522	VCP Transitional endoplasmic reticulum ATPase	6613	Q66GS9_ C316	CEP135 Centrosomal protein of 135 kDa	8219
P21333_C 2293	FLNA Filamin-A	6614	P48739_C 13	PITPNB Phosphatidylinositol transfer protein beta isoform	8220
Q15233_C 208	NONO Non-POU domain-containing octamer-binding protein	6615	P35914_C 323	HMGCL Hydroxymethylglutaryl-CoA lyase, mitochondrial	8221
P00492_C 23	HPRT1 Hypoxanthine-guanine phosphoribosyltransferase	6616	Q5JSL3_ C1190	DOCK11 Dedicator of cytokinesis protein 11	8222
O94804_C 873	STK10 Serine/threonine-protein kinase 10	6617	Q96JY6_ C160	PDLIM2 PDZ and LIM domain protein 2	8223
P36578_C 96	RPL4 60S ribosomal protein L4	6618	Q7Z5K2_ C94	WAPAL Wings apart-like protein homolog	8224
P28838_C 462	LAP3 Cytosol aminopeptidase	6619	Q00653_ C57	NFKB2 Nuclear factor NF- kappa-B p100 subunit	8225
P52272_C 676	HNRNPM Heterogeneous nuclear ribonucleoprotein M	6620	Q8TC07_ C686	TBC1D15 TBC1 domain family member 15	8226
Q08AF3_ C489	SLFN5 Schlafen family member 5	6621	Q8N1F7_ C422	NUP93 Nuclear pore complex protein Nup93	8227
Q9Y383_ C59	LUC7L2 Putative RNA-binding protein Luc7-like 2	6622	P57678_C 210	GEMIN4 Gem-associated protein 4	8228
Q9NZ09_ C45	UBAP1 Ubiquitin-associated protein 1	6623	Q7Z5R6_ C401	APBB1IP Amyloid beta A4 precursor protein-binding family B	8229
Q14152_C 404	EIF3A Eukaryotic translation initiation factor 3 subunit	6624	Q9NX24_ C18	NHP2 H/ACA ribonucleoprotein complex subunit 2	8230
Q99496_C 72	RNF2 E3 ubiquitin-protein ligase RING2	6625	P55265_C 622	ADAR Double-stranded RNA- specific adenosine deaminase	8231
P30086_C 133	PEBP1 Phosphatidylethanolamine- binding protein 1	6626	Q8WVV9_ C464	HNRPLL Heterogeneous nuclear ribonucleoprotein L- like	8232
Q93009_C 90	USP7 Ubiquitin carboxyl-terminal hydrolase 7	6627	Q99832_ C364	CCT7 T-complex protein 1 subunit eta	8233
P83731_C 36	RPL24 60S ribosomal protein L24	6628	P63244_C 286	GNB2L1 Guanine nucleotide- binding protein subunit beta-2- like 1	8234
P83731_C 6	RPL24 60S ribosomal protein L24	6629	Q13427_ C310	PPIG Peptidyl-prolyl cis-trans isomerase G	8235
Q92499_C 110	DDX1 ATP-dependent RNA helicase DDX1	6630	P48147_C 25	PREP Prolyl endopeptidase	8236
A6NHR9_ C492	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	6631	Q9UJZ1_ C167	STOML2 Stomatatin-like protein 2	8237
P34932_C 290	HSPA4 Heat shock 70 kDa protein 4	6632	O75369_ C26	FLNB Filamin-B	8238
Q9H4B7_ C12	TUBB1 Tubulin beta-1 chain	6633	P21333_C 53	FLNA Filamin-A	8239

Q6PJG6_C326	BRAT1 BRCA1-associated ATM activator 1	6634	Q92974_C335	ARHGEF2 Rho guanine nucleotide exchange factor 2	8240
Q9NZ08_C486	ERAP1 Endoplasmic reticulum aminopeptidase 1	6635	Q92835_C1050	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1	8241
Q5VZF2_C19	MBNL2 Muscleblind-like protein 2	6636	Q4G0F5_C334	VPS26B Vacuolar protein sorting-associated protein 26B	8242
Q9NR56_C19	MBNL1 Muscleblind-like protein 1	6637	P17844_C234	DDX5 Probable ATP-dependent RNA helicase DDX5	8243
P55263_C353	ADK Adenosine kinase	6638	Q9BSD7_C101	NTPCR Cancer-related nucleoside-triphosphatase	8244
Q8WUM4_C40	PDCD61P Programmed cell death 6-interacting protein	6639	Q92619_C1020	HMHA1 Minor histocompatibility protein HA-1	8245
P50579_C121	METAP2 Methionine aminopeptidase 2	6640	Q14790_C360	CASP8 Caspase-8	8246
P21333_C1165	FLNA Filamin-A	6641	015067_C1285	PFAS Phosphoribosylformylglycine midine synthase	8247
Q2M2I8_C288	AAK1 AP2-associated protein kinase 1	6642	015067_C1287	PFAS Phosphoribosylformylglycine midine synthase	8248
Q8N0W3_C484	FUK L-fucose kinase	6643	060880_C124	SH2D1A SH2 domain-containing protein 1A	8249
P18621_C144	RPL17 60S ribosomal protein L17	6644	Q92888_C537	ARHGEF1 Rho guanine nucleotide exchange factor I	8250
J3QL51_C144	RPL17-C180RF32 Protein RPL17-C180RF32	6645	014879_C343	IFIT3 Interferon-induced protein with tetratricopeptide	8251
Q12906_C203	ILF3 Interleukin enhancer-binding factor 3	6646	Q93052_C364	LPP Lipoma-preferred partner	8252
Q8N163_C754	KIAA1967 DBIRD complex subunit KIAA1967	6647	P22695_C192	UQCRC2 Cytochrome b-c1 complex subunit 2, mitochondrial	8253
Q6PIR4_C213	DUS1L tRNA-dihydrouridine(16/17) synthase	6648	PI0398_C597	ARAF Serine/threonine-protein kinase A-Raf	8254
Q9Y490_C2196	TLN1 Talin-1	6649	P78347_C215	GTF2I General transcription factor II-I	8255
Q92947_C176	GCDH Glutaryl-CoA dehydrogenase, mitochondrial	6650	P08575_C1259	PTPRC Receptor-type tyrosine-protein phosphatase C	8256
P21333_C1453	FLNA Filamin-A	6651	Q9UHB9_C562	SRP68 Signal recognition particle 68 kDa protein	8257
P49411_C147	TUFM Elongation factor Tu, mitochondrial	6652	P40121_C290	CAPG Macrophage-capping protein	8258
Q9BV38_C384	WDRI 8 WD repeat-containing protein 18	6653	P36578_C250	RPL4 60S ribosomal protein L4	8259
Q93008_C1566	USP9X Probable ubiquitin carboxyl-terminal hydrolase FAF	6654	A9UHW6_C49	MIF4GD MIF4G domain-containing protein	8260
000507_C1568	USP9Y Probable ubiquitin carboxyl-terminal hydrolase FAF	6655	Q9Y3B4_C83	SF3B14 Pre-rRNA branch site protein p 14	8261
Q9BXL7_C1115	CARD1 1 Caspase recruitment domain-containing protein 11	6656	Q93008_C1212	USP9X Probable ubiquitin carboxyl-terminal hydrolase FAF	8262
Q9P2J5_C573	LARS Leucine-tRNA ligase, cytoplasmic	6657	P11171_C179	EPB41 Protein 4.1	8263

000541_C 391	PES1 Pescadillo homolog	6658	Q9BZS1_C C169	FOXP3 Forkhead box protein P3	8264
Q9Y228_C C388	TRAF3IP3 TRAF3-interacting JNK-activating modulator	6659	Q13469_C C256	NFATC2 Nuclear factor of activated T-cells, cytoplasmic 2	8265
095747_C 191	OXSRI Serine/threonine-protein kinase OSR1	6660	Q9BWW8_C C25	APOL6 Apolipoprotein L6	8266
Q9UEW8_C C237	STK39 STE20/SPS1-related proline-alanine-rich protein kinase	6661	Q15366_C C217	PCBP2 Poly(rC)-binding protein 2	8267
Q8IVH4_C C184	MMAA Methylmalonic aciduria type A protein, mitochondrial	6662	P13796_C I01	LCPI Plastin-2	8268
P49189_C 484	ALDH9A1 4-trimethylaminobutyraldehyde dehydrogenase	6663	Q16851_C C123	UGP2 UTP-glucose-1-phosphate uridylyltransferase	8269
P08238_C 521	HSP90AB1 Heat shock protein HSP 90-beta	6664	P53602_C I08	MVD Diphosphomevalonate decarboxylase	8270
Q8TDP1_C C34	RNASEH2C Ribonuclease H2 subunit C	6665	Q9NR30_C C378	DDX21 Nucleolar RNA helicase 2	8271
P08575_C 760	PTPRC Receptor-type tyrosine-protein phosphatase C	6666	P13727_C I201	PRG2 Bone marrow proteoglycan	8272
I3L3Q1_C 558	Uncharacterized protein	6667	014867_C C646	BACH1 Transcription regulator protein BACH1	8273
Q6ZSZ5_C C600	ARHGEF18 Rho guanine nucleotide exchange factor 18	6668	043772_C C283	SLC25A20 Mitochondrial carnitine/acylcarnitine carrier protein	8274
Q9Y490_C C1661	TLN1 Talin-1	6669	Q9Y3F4_C C305	STRAP Serine-threonine kinase receptor-associated protein	8275
Q9Y490_C C1671	TLN1 Talin-1	6670	Q12802_C C1677	AKAP13 A-kinase anchor protein 13	8276
P53384_C 235	NUBP1 Cytosolic Fe-S cluster assembly factor NUBP1	6671	Q9BSU1_C C222	C16orf70 UPF0183 protein C16orf70	8277
P49589_C 204	CARS Cysteine-tRNA ligase, cytoplasmic	6672	P78362_C C320	SRPK2 SRSF protein kinase 2	8278
P78527_C 2469	PRKDC DNA-dependent protein kinase catalytic subunit	6673	Q9NZJ7_C C385	MTCH1 Mitochondrial carrier homolog 1	8279
Q9P2R3_C C460	ANKFY1 Ankyrin repeat and FYVE domain-containing protein	6674	P51692_C C688	STAT5B Signal transducer and activator of transcription 5	8280
P33316_C 222	DUT Deoxyuridine 5-triphosphate nucleotidohydrolase, mitochondrial	6675	Q04637_C C662	EIF4G1 Eukaryotic translation initiation factor 4 gamma 1	8281
E9PMF8_C C694	PTPRC Receptor-type tyrosine-protein phosphatase C	6676	Q08AF3_C C369	SLFN5 Schlafen family member 5	8282
P49773_C 84	HINT1 Histidine triad nucleotide-binding protein 1	6677	Q9NZB2_C C919	FAM120A Constitutive coactivator of PPAR-gamma-like protein 1	8283
Q9BRZ2_C C514	TRIM56 E3 ubiquitin-protein ligase TRIM56	6678	060684_C C238	KPNA6 Importin subunit alpha-7	8284
P35754_C 83	GLRX Glutaredoxin-1	6679	015131_C C238	KPNA5 Importin subunit alpha-6	8285
Q9Y490_C C1353	TLN1 Talin-1	6680	P52294_C C240	KPNA1 Importin subunit alpha-1	8286
P61981_C 97	YWHAG 14-3-3 protein gamma	6681	Q8ND71_C C214	GIMAP8 GTPase MAP family member 8	8287
Q15020_C 341	SART3 Squamous cell carcinoma antigen recognized by T-cells 3	6682	P35658_C C728	NUP214 Nuclear pore complex protein Nup214	8288

060711_C 199	LPXN Leupaxin	6683	Q32MZ4_C 644	LRRFIPI Leucine-rich repeat flightless-interacting protein	8289
Q9ULT8_C 2415	HECTDI E3 ubiquitin-protein ligase HECTDI	6684	Q8TCU6_C C1116	PREX1 Phosphatidylinositol 3,4,5-trisphosphate-dependent	8290
Q99757_C 90	TXN2 Thioredoxin, mitochondrial	6685	Q96I24_C 460	FUBP3 Far upstream element- binding protein 3	8291
Q99757_C 93	TXN2 Thioredoxin, mitochondrial	6686	Q6KC79_C CI066	NIPBL Nipped-B-like protein	8292
Q13363_C 134	CTBP1 C-terminal-binding protein 1	6687	Q03519_C C353	TAP2 Antigen peptide transporter 2	8293
095571_C 34	ETHEL Protein ETHEL, mitochondrial	6688	Q7Z3K3_C C547	POGZ Pogo transposable element with ZNF domain	8294
P31040_C 311	SDHA Succinate dehydrogenase	6689	Q7L8W6_C C88	ATPBD4 ATP-binding domain-containing protein 4	8295
P29466_C 285	CASP1 Caspase-1	6690	Q9Y2Z0_C C62	SUGT1 Suppressor of G2 allele of SKP1 homolog	8296
Q9Y4F9_C C35	FAM65B Protein FAM65B	6691	P34932_C 376	HSPA4 Heat shock 70 kDa protein 4	8297
P35754_C 79	GLRX Glutaredoxin-1	6692	Q92598_C C376	HSPH1 Heat shock protein 105 kDa	8298
Q15149_C 950	PLEC Plectin	6693	P17844_C 221	DDX5 Probable ATP- dependent RNA helicase DDX5	8299
Q13642_C 71	FHL1 Four and a half LIM domains protein 1	6694	Q92841_C C298	DDX17 Probable ATP- dependent RNA helicase DDX17	8300
Q00610_C 753	CLTC Clathrin heavy chain 1	6695	Q5JSL3_C C1204	DOCK11 Dedicator of cytokinesis protein 11	8301
Q15365_C 293	PCBP1 Poly(rC)-binding protein 1	6696	P09564_C 230	CD7 T-cell antigen CD7	8302
P39023_C 253	RPL3 60S ribosomal protein L3	6697	P27635_C 105	RPLIO 60S ribosomal protein L10	8303
Q96QR8_C C238	PURB Transcriptional activator protein Pur-beta	6698	Q9UKA8_C C173	RCAN3 Calcipressin-3	8304
P29590_C 60	PML Protein PML	6699	P00492_C 106	HPRT1 Hypoxanthine-guanine phosphoribosyltransferase	8305
P07814_C 1497	EPRS Bifunctional glutamate/proline-- tRNA ligase	6700	P26038_C 117	MSN Moeshi	8306
Q9BYW2_C C667	SETD2 Histone-lysine N- methyltransferase SETD2	6701	P12955_C 482	PEPD Xaa-Pro dipeptidase	8307
Q13469_C 569	NFATC2 Nuclear factor of activated T- cells, cytoplasmic 2	6702	Q9NR33_C C84	POLE4 DNA polymerase epsilon subunit 4	8308
P31040_C 305	SDHA Succinate dehydrogenase	6703	Q9H8W4_C C219	PLEKHF2 Pleckstrin homology domain-containing family F member	8309
P40939_C 550	HADHA Trifunctional enzyme subunit alpha, mitochondrial	6704	Q8WYP5_C C1131	AHCTF1 Protein ELYS	8310
P68104_C 411	EEF1A1 Elongation factor 1-alpha 1	6705	Q9Y6K5_C C350	OAS3 2-5-oligoadenylate synthase 3	8311
015365_C 158	PCBP1 Poly(rC)-binding protein 1	6706	P41250_C 616	GARS Glycine-tRNA ligase	8312
P26599_C 250	PTBP1 Polypyrimidine tract-binding protein 1	6707	Q8NF50_C C143	DOCK8 Dedicator of cytokinesis protein 8	8313
P26599_C 251	PTBP1 Polypyrimidine tract-binding protein 1	6708	H3BQZ7_C C57	Uncharacterized protein	8314

P10768_C 176	ESD S-formylglutathione hydrolase	6709	Q1KMD3 _C57	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein	8315
P10768_C 181	ESD S-formylglutathione hydrolase	6710	Q5JTH9 _C102	RRP12 RRP12-like protein	8316
P30084_C 62	ECHS1 Enoyl-CoA hydratase, mitochondrial	6711	Q9C0C9 _C910	UBE2O Ubiquitin-conjugating enzyme E2 O	8317
Q15149_C 3336	PLEC Plectin	6712	Q9C0C9 _C913	UBE2O Ubiquitin-conjugating enzyme E2 O	8318
P51610_C 149	HCFC1 Host cell factor 1	6713	Q8NF50 _C197	DOCK8 Dedicator of cytokinesis protein 8	8319
Q9BUJ2_C 291	HNRNPUL1 Heterogeneous nuclear ribonucleoprotein U-like protein	6714	O95466 _C45	FMNL1 Formin-like protein 1	8320
P11413_C 385	G6PD Glucose-6-phosphate 1-dehydrogenase	6715	Q53GL7 _C50	PARP10 Polymerase	8321
P00488_C 410	F13A1 Coagulation factor XIII A chain	6716	Q9P2R3 _C675	ANKFY1 Ankyrin repeat and FYVE domain-containing protein	8322
Q9H8H3_C 79	METTL7A Methyltransferase-like protein 7A	6717	O75607 _C105	NPM3 Nucleoplasmin-3	8323
Q9NZ08_C 498	ERAP1 Endoplasmic reticulum aminopeptidase 1	6718	Q9NXA8 _C303	SIRT5 NAD-dependent protein deacetylase sirtuin-5, mitochondrial	8324
O00303_C 256	EIF3F Eukaryotic translation initiation factor 3 subunit	6719	Q00013 _C454	MPP1 55 kDa erythrocyte membrane protein	8325
O75643_C 1127	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicase	6720	O60701 _C276	UGDH UDP-glucose 6-dehydrogenase	8326
Q5T4S7_C 1274	UBR4 E3 ubiquitin-protein ligase UBR4	6721	Q15149 _C730	PLEC Plectin	8327
Q14676_C 2049	MDC1 Mediator of DNA damage checkpoint protein 1	6722	Q9Y4P8 _C393	WIPI2 WD repeat domain phosphoinositide-interacting protein	8328
Q9Y2X3_C 205	NOP58 Nucleolar protein 58	6723	P27816_C 126	MAP4 Microtubule-associated protein 4	8329
P31930_C 453	UQCRC1 Cytochrome b-c1 complex subunit 1, mitochondrial	6724	O95487 _C87	SEC24B Protein transport protein Sec24B	8330
Q15019_C 111	SEPT2 Septin-2	6725	Q3SXM5 _C265	HSDL1 Inactive hydroxysteroid dehydrogenase-like protein	8331
Q15149_C 992	PLEC Plectin	6726	H3BQZ7 _C293	Uncharacterized protein	8332
Q29RF7_C 1079	PDS5A Sister chromatid cohesion protein PDS5 homolog A	6727	Q1KMD3 _C293	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein 2	8333
Q6P2E9_C 976	EDC4 Enhancer of mRNA-decapping protein 4	6728	P16871_C 349	IL7R Interleukin-7 receptor subunit alpha	8334
O00329_C 474	PIK3CD Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit delta isoform	6729	Q9HB90 _C377	RRAGC Ras-related GTP-binding protein C	8335
P56192_C 12	MARS Methionine--tRNA ligase, cytoplasmic	6730	Q14919 _C54	DRAP1 Drl-associated corepressor	8336
P28838_C 335	LAP3 Cytosol aminopeptidase	6731	Q86YS7 _C867	KIAA0528 Uncharacterized protein KIAA0528	8337
P30876_C 1093	POLR2B DNA-directed RNA polymerase II subunit RPB2	6732	P49915_C 456	GMPS GMP synthase	8338

P27635_C 195	RPL10 60S ribosomal protein L10	6733	Q13428_ C1298	TCOF1 Treacle protein	8339
Q9Y490_ C1392	TLN1 Talin-1	6734	Q9H9A6_ C264	LRRC40 Leucine-rich repeat-containing protein 40	8340
P55884_C 384	EIF3B Eukaryotic translation initiation factor 3 subunit	6735	Q12802_ C1548	AKAP13 A-kinase anchor protein 13	8341
Q9UGI8_ C46	TES Testin	6736	Q06330_ C313	RBPJ Recombining binding protein suppressor of hairless	8342
P61978_C 184	HNRNPK Heterogeneous nuclear ribonucleoprotein K	6737	Q969E8_ C17	TSR2 Pre-rRNA-processing protein TSR2 homolog	8343
P31943_C 122	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	6738	Q9ULT8_ C254	HECTD1 E3 ubiquitin-protein ligase HECTD1	8344
Q63HN8_ C4348	RNF213 E3 ubiquitin-protein ligase RNF213	6739	P51858_C 12	HDGF Hepatoma-derived growth factor	8345
Q9Y490_ C956	TLN1 Talin-1	6740	Q99543_ C394	DNAJC2 DnaJ homolog subfamily C member 2	8346
P08133_C 96	ANXA6 Annexin A6	6741	PI2268_C 331	IMPDH2 Inosine-5-monophosphate dehydrogenase 2	8347
P13667_C 206	PDIA4 Protein disulfide-isomerase A4	6742	P42166_C 341	TMPO Lamina-associated polypeptide 2, isoform alpha	8348
Q7Z434_ C33	MAVS Mitochondrial antiviral-signaling protein	6743	Q92888_ C911	ARHGEF1 Rho guanine nucleotide exchange factor 1	8349
Q9UKX7_ C416	NUP50 Nuclear pore complex protein Nup50	6744	Q9BZ29_ C628	DOCK9 Dedicator of cytokinesis protein 9	8350
Q2M2I8_ C319	AAK1 AP2-associated protein kinase 1	6745	095336_ C78	PGLS 6-phosphogluconolactonase	8351
Q13547_C 100	HDAC1 Histone deacetylase 1	6746	Q9UEW8_ C525	STK39 STE20/SPSI-related proline-alanine-rich protein kinase	8352
Q13547_C 110	HDAC1 Histone deacetylase 1	6747	Q63HN8_ C614	RNF213 E3 ubiquitin-protein ligase RNF213	8353
P13667_C 209	PDIA4 Protein disulfide-isomerase A4	6748	P49023_C 108	PXN Paxillin	8354
P55795_C 122	HNRNPH2 Heterogeneous nuclear ribonucleoprotein H2	6749	Q16666_ C679	IFI16 Gamma-interferon-inducible protein 16	8355
095544_C 79	NADK NAD kinase	6750	Q9Y5Y2_ C196	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	8356
P62140_C 154	PPP1CB Serine/threonine-protein phosphatase PPI-beta catalytic subunit	6751	Q9Y5Y2_ C202	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	8357
P62136_C 155	PPP1CA Serine/threonine-protein phosphatase PPI-alpha catalytic subunit	6752	Q9GZR7_ C49	DDX24 ATP-dependent RNA helicase DDX24	8358
P36873_C 155	PPP1CC Serine/threonine-protein phosphatase PPI-gamma catalytic subunit	6753	Q96F63_ C78	CCDC97 Coiled-coil domain-containing protein 97	8359
P53597_C 172	SUCLG1 Succinyl-CoA ligase	6754	Q9Y5Y2_ C199	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	8360
095071_C 730	UBR5 E3 ubiquitin-protein ligase UBR5	6755	Q96F07_ C1112	CYFIP2 Cytoplasmic FMR1-interacting protein 2	8361
P22314_C 632	UBA1 Ubiquitin-like modifier-activating enzyme 1	6756	Q9UPU5_ C153	USP24 Ubiquitin carboxyl-terminal hydrolase 24	8362
Q9UBT2_ C173	UBA2 SUMO-activating enzyme subunit 2	6757	P02545_C 570	LMNA Prelamin-A/C	8363

P55072_C 572	VCP Transitional endoplasmic reticulum ATPase	6758	Q7L576_C C1088	CYFIP1 Cytoplasmic FMR1-interacting protein 1	8364
000329_C 90	PIK3CD Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit delta isoform	6759	095671_C C333	ASMTL N-acetylserotonin O-methyltransferase-like protein	8365
Q9UGI8_C C238	TES Testin	6760	Q7Z6B0_C C424	CCDC91 Coiled-coil domain-containing protein 91	8366
Q14204_C 2142	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	6761	P49321_C 708	NASP Nuclear autoantigenic sperm protein	8367
Q9Y692_C C113	GMEB1 Glucocorticoid modulatory element-binding protein	6762	P61978_C 132	HNRNPK Heterogeneous nuclear ribonucleoprotein K	8368
Q9UKD1_C C110	GMEB2 Glucocorticoid modulatory element-binding protein	6763	P42224_C 255	STAT1 Signal transducer and activator of transcription 1	8369
P43686_C 210	PSMC4 26S protease regulatory subunit 6B	6764	Q01518_C C427	CAPI Adenylyl cyclase-associated protein 1	8370
095232_C 58	LUC7L3 Luc7-like protein 3	6765	094874_C C32	UFL1 E3 UFM1-protein ligase 1	8371
P27695_C 99	APEX1 DNA-(apurinic or apyrimidinic site) lyase	6766	P42224_C 247	STAT1 Signal transducer and activator of transcription 1	8372
P23743_C 432	DGKA Diacylglycerol kinase alpha	6767	Q96BY6_C C2164	DOCK10 Dedicator of cytokinesis protein 10	8373
Q08J23_C 93	NSUN2 tRNA (cytosine(34)-C(5))-methyltransferase	6768	043586_C C305	PSTPIPI Proline-serine-threonine phosphatase-interacting protein 1	8374
Q92616_C 1482	GCN IL 1 Translational activator GCN1	6769	P50851_C 1704	LRBA Lipopolysaccharide-responsive and beige-like anchor protein	8375
Q9Y4B6_C C1227	VPRBP Protein VPRBP	6770	Q96QR8_C C17	PURB Transcriptional activator protein Pur-beta	8376
Q9Y6D5_C C1450	ARFGEF2 Brefeldin A-inhibited guanine nucleotide-exchange	6771	Q9H3H3_C C222	C11orf68 UPF0696 protein C11orf68	8377
Q6F5E8_C C698	RLTPR Leucine-rich repeat-containing protein 16C	6772	Q14997_C C1840	PSME4 Proteasome activator complex subunit 4	8378
P21964_C 119	COMT Catechol O-methyltransferase	6773	Q9BUP3_C C172	HTA TIP2 Oxidoreductase HTATEP2	8379
Q15365_C 163	PCBP1 Poly(rC)-binding protein 1	6774	Q5VSL9_C C769	FAM40A Protein FAM40A	8380
014617_C 208	AP3D1 AP-3 complex subunit delta-1	6775	Q9NW68_C C49	BSDC1 BSD domain-containing protein 1	8381
P53597_C 181	SUCLG1 Succinyl-CoA ligase	6776	Q96F07_C C1265	CYFIP2 Cytoplasmic FMR1-interacting protein 2	8382
P53582_C 14	METAPI Methionine aminopeptidase 1	6777	P60468_C 39	SEC61B Protein transport protein Sec61 subunit beta	8383
Q00839_C 497	HNRNPU Heterogeneous nuclear ribonucleoprotein U	6778	Q15061_C C380	WDR43 WD repeat-containing protein 43	8384
Q9Y6W5_C C27	WASF2 Wiskott-Aldrich syndrome protein family member 2	6779	Q04759_C C322	PRKCQ Protein kinase C theta type	8385
Q99439_C 164	CNN2 Calponin-2	6780	Q13615_C C826	MTMR3 Myotubularin-related protein 3	8386
Q9NVG8_C C145	TBC1D13 TBC1 domain family member 13	6781	Q13630_C C116	TSTA3 GDP-L-fucose synthase	8387
PI0768_C 56	ESD S-fonnylglutathione hydrolase	6782	Q9Y6R4_C C1604	MAP3K4 Mitogen-activated protein kinase kinase kinase 4	8388
P31146_C 345	CORO1A Coronin-1A	6783	P49711_C 155	CTCF Transcriptional repressor CTCF	8389

075521_C 380	ECI2 Enoyl-CoA delta isomerase 2, mitochondrial	6784	Q9UPS6_C1405	SETD1B Histone-lysine N-methyltransferase SETD1B	8390
PI3796_C 336	LCP1 Plastin-2	6785	Q8WVT3_C160	TRAPPC12 Trafficking protein particle complex subunit 12	8391
Q15149_C 4574	PLEC Plectin	6786	P55060_C842	CSEIL Exportin-2	8392
P98171_C 569	ARHGAP4 Rho GTPase-activating protein 4	6787	Q9BSJ8_C611	ESYT1 Extended synaptotagmin-1	8393
P48059_C 272	LIMS1 LIM and senescent cell antigen-like-containing domain 1	6788	P52948_C1027	NUP98 Nuclear pore complex protein Nup98-Nup96	8394
Q86WV6_C 257	TMEM173 Transmembrane protein 173	6789	P50991_C120	CCT4 T-complex protein 1 subunit delta	8395
P23743_C 707	DGKA Diacylglycerol kinase alpha	6790	Q13107_C702	USP4 Ubiquitin carboxyl-terminal hydrolase 4	8396
Q14204_C 3573	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	6791	P22681_C508	CBL E3 ubiquitin-protein ligase CBL	8397
P22061_C 95	PCMT1 Protein-L-isoaspartate(D-aspartate) O-methyltransferase	6792	Q08117_C26	AES Amino-terminal enhancer of split	8398
Q86W42_C 35	THOC6 THO complex subunit 6 homolog	6793	P19784_C336	CSNK2A2 Casein kinase II subunit alpha	8399
P55072_C 535	VCP Transitional endoplasmic reticulum ATPase	6794	Q16576_C97	RBBP7 Histone-binding protein RBBP7	8400
Q07666_C 264	KHDRBS1 KH domain-containing, RNA-binding, signal transduction associated 1	6795	Q8NBF2_C716	NHLRC2 NHL repeat-containing protein 2	8401
000139_C 334	KIF2A Kinesin-like protein KIF2A	6796	Q00403_C223	GTF2B Transcription initiation factor IIB	8402
P30481_C 188	HLA-B HLA class I histocompatibility antigen, B-44 alpha	6797	P46527_C148	CDKN1B Cyclin-dependent kinase inhibitor 1B	8403
P30483_C 188	HLA-B HLA class I histocompatibility antigen, B-45 alpha	6798	P17844_C191	DDX5 Probable ATP-dependent RNA helicase DDX5	8404
Q8WV92_C 233	MITDI MIT domain-containing protein 1	6799	P22061_C102	PCMT1 Protein-L-isoaspartate(D-aspartate) O-methyltransferase	8405
P49207_C 83	RPL34 60S ribosomal protein L34	6800	P35611_C430	ADD1 Alpha-adducin	8406
P24752_C 119	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	6801	P52888_C682	THOP1 Thimet oligopeptidase	8407
P24752_C 413	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	6802	Q01081_C67	U2AF1 Splicing factor U2AF 35 kDa subunit	8408
Q14141_C 42	SEPT6 Septin-6	6803	Q96BY9_C320	TMEM66 Store-operated calcium entry-associated regulatory	8409
095319_C 174	CELF2 CUGBP Elav-like family member 2	6804	Q14152_C78	EIF3A Eukaryotic translation initiation factor 3 subunit	8410
015144_C 120	ARPC2 Actin-related protein 2/3 complex subunit 2	6805	P13489_C409	RNH1 Ribonuclease inhibitor	8411
Q9NTK5_C 55	OLA1 Olg-like ATPase 1	6806	Q07960_C91	ARHGAP1 Rho GTPase-activating protein 1	8412
Q9Y490_C 1953	TLN1 Talin-1	6807	Q9UGP4_C305	LIMD1 LIM domain-containing protein 1	8413
P42331_C 258	ARHGAP25 Rho GTPase-activating protein 25	6808	P27816_C535	MAP4 Microtubule-associated protein 4	8414

O75643_C 1580	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicas	6809	Q8NCE2_C C182	MTMR14 Myotubularin-related protein 14	8415
P27635_C 49	RPL10 60S ribosomal protein L10	6810	O00273_C C154	DFFA DNA fragmentation factor subunit alpha	8416
P04075_C 202	ALDOA Fructose-bisphosphate aldolase A	6811	Q92973_C C153	TNPO1 Transportin-1	8417
Q92616_C 2255	GCN1L1 Translational activator GCN1	6812	P51608_C 413	MECP2 Methyl-CpG-binding protein 2	8418
Q15149_C 3299	PLEC Plectin	6813	Q63HN8_C C3008	RNF213 E3 ubiquitin-protein ligase RNF213	8419
O94776_C 209	MTA2 Metastasis-associated protein MTA2	6814	O15294_C C620	OGT UDP-N-acetylglucosamine--peptide N-acetylglucosaminyl transferase	8420
O95466_C 69	FMNL1 Formin-like protein 1	6815	P42166_C 561	TMPO Lamina-associated polypeptide 2, isoform alpha	8421
P09972_C 202	ALDOC Fructose-bisphosphate aldolase C	6816	Q6F5E8_C C746	RLTPR Leucine-rich repeat-containing protein 16C	8422
Q16186_C 80	ADRM1 Proteasomal ubiquitin receptor ADRM1	6817	P55265_C 392	ADAR Double-stranded RNA-specific adenosine deaminase	8423
Q9Y224_C C19	C14orf166 UPF0568 protein C14orf166	6818	Q8NB37_C C154	PDDC1 Parkinson disease 7 domain-containing protein 1	8424
P23743_C 253	DGKA Diacylglycerol kinase alpha	6819	Q6JBY9_C C155	RCSD1 CapZ-interacting protein	8425
Q13464_C 29	ROCK1 Rho-associated protein kinase 1	6820	Q9UJU2_C C321	LEF1 Lymphoid enhancer-binding factor 1	8426
O14617_C 1133	AP3D1 AP-3 complex subunit delta-1	6821	O00186_C C501	STXBP3 Syntaxin-binding protein 3	8427
P05062_C 202	ALDOB Fructose-bisphosphate aldolase B	6822	Q96BY6_C C1310	DOCK10 Deducator of cytokinesis protein 10	8428
O95154_C 186	AKR7A3 Aflatoxin B1 aldehyde reductase member 3	6823	O00186_C C498	STXBP3 Syntaxin-binding protein 3	8429
Q8NHP1_C C186	AKR7L Aflatoxin B1 aldehyde reductase member 4	6824	P63104_C 25	YWHAZ 14-3-3 protein zeta/delta	8430
O43488_C 214	AKR7A2 Aflatoxin B1 aldehyde reductase member 2	6825	Q8WU79_C C196	SMAP2 Stromal membrane-associated protein 2	8431
P23246_C 431	SFPQ Splicing factor, proline- and glutamine-rich	6826	Q00765_C C18	REEP5 Receptor expression-enhancing protein 5	8432
O00268_C 867	TAF4 Transcription initiation factor TFIID subunit 4	6827	P51608_C 429	MECP2 Methyl-CpG-binding protein 2	8433
P61158_C 12	ACTR3 Actin-related protein 3	6828	O60841_C C749	EIF5B Eukaryotic translation initiation factor 5B	8434
P21333_C 2601	FLNA Filamin-A	6829	P42331_C 524	ARHGAP25 Rho GTPase-activating protein 25	8435
O00567_C 384	NOP56 Nucleolar protein 56	6830	P35579_C 988	MYH9 Myosin-9	8436
P46776_C 70	RPL27A 60S ribosomal protein L27a	6831	Q14151_C C672	SAFB2 Scaffold attachment factor B2	8437
P68366_C 54	TUBA4A Tubulin alpha-4A chain	6832	Q99490_C C811	AGAP2 Arf-GAP with GTPase, ANK repeat and PH domain-containing protein 2	8438
P68366_C 295	TUBA4A Tubulin alpha-4A chain	6833	O60307_C C762	MAST3 Microtubule-associated serine/threonine-protein ki	8439
Q71U36_C C295	TUBA1A Tubulin alpha-1A chain	6834	P27707_C 9	DCK Deoxycytidine kinase	8440

P62829_C 125	RPL23 60S ribosomal protein L23	6835	Q99704_ C308	DOK1 Docking protein 1	8441
095881_C 66	TXNDC12 Thioredoxin domain- containing protein 12	6836	075940_ C214	SMNDC1 Survival of motor neuron-related-splicing factor 3	8442
P50552_C 64	VASP Vasodilator-stimulated phosphoprotein	6837	015269_ C438	SPTLC1 Serine palmitoyltransferase 1	8443
Q9UJU6_ C127	DBNL Drebrin-like protein	6838	Q5EBM0_ C119	CMPK2 UMP-CMP kinase 2, mitochondrial	8444
Q9UNH7_ C264	SNX6 Sorting nexin-6	6839	Q96F86_ C137	EDC3 Enhancer of mRNA- decapping protein 3	8445
Q8WVJ2_ C99	NUDCD2 NudC domdn-containing protein 2	6840	Q86YV0_ C1005	RASAL3 RAS protein activator like-3	8446
Q9Y490_ C1486	TLN1 Talin-1	6841	P30044_C 204	PRDX5 Peroxiredoxin-5, mitochondrial	8447
Q8WYJ6_ C231	SEPT1 Septin-1	6842	P78527_C 1904	PRKDC DNA-dependent protein kinase catalytic subunit	8448
Q15149_C 317	PLEC Plectin	6843	Q9BXP2_ C911	SLC12A9 Solute carrier family 12 member 9	8449
Q15027_C 79	ACAP1 Arf-GAP with coiled-coil, ANK repeat and PH domain 1	6844	Q9Y6G9_ C51	DYNC1L1 Cytoplasmic dynein 1 light intermediate chain 1	8450
Q9BXJ9_ C322	NAA15 N-alpha-acetyltransferase 15, NatA auxiliary subunit	6845	Q12962_ C174	TAF10 Transcription initiation factor TFIID subunit 10	8451
Q86YV0_ C447	RASAL3 RAS protein activator like-3	6846	Q8IV53_ C412	DENND1C DENN domain- containing protein 1C	8452
Q63HN8_ C2918	RNF213 E3 ubiquitin-protein ligase RNF213	6847	Q8NFW8_ C364	CMAS N-acymeuraminatate cytidyltransferase	8453
P61158_C 8	ACTR3 Actin-related protein 3	6848	Q7Z4S6_ C299	KIF21A Kinesin-like protein KIF21A	8454
Q8WWQ0_ C1144	PHIP PH-interacting protein	6849	Q9Y383_ C348	LUC7L2 Putative RNA- binding protein Luc7-like 2	8455
Q9Y490_ C1478	TLN1 Talin-1	6850	Q12768_ C21	KIAA0196 WASH complex subunit strumpellin	8456
Q10567_C 95	AP1B1 AP-1 complex subunit beta- 1	6851	Q9ULX6_ C211	AKAP8L A-kinase anchor protein 8-like	8457
Q13748_C 295	TUBA3D Tubulin alpha-3C/D chain	6852	Q2NKJ3_ C584	CTC1 CST complex subunit CTC1	8458
Q8N1G4_ C224	LRRC47 Leucine-rich repeat- containing protein 47	6853	Q7Z4W1_ C138	DCXR L-xylulose reductase	8459
E9PPU0_ C611	EPPK1 Epiplakin	6854	P78527_C 1507	PRKDC DNA-dependent protein kinase catalytic subunit	8460
Q92878_C 102	RAD50 DNA repair protein RAD50	6855	Q9NQC3_ CHOI	RTN4 Reticulon-4	8461
Q9UKE5_ C202	TNIK TRAF2 and NCK-interacting protein kinase	6856	Q8NCE2_ C429	MTMR14 Myotubularin- related protein 14	8462
Q96FV9_ C445	THOC1 THO complex subunit 1	6857	P41227_C 194	NAA10 N-alpha- acetyltransferase 10	8463
Q92747_C 162	ARPC1A Actin-related protein 2/3 complex subunit 1A	6858	Q08AF3_ C846	SLFN5 Schlafen family member 5	8464
015143_C 162	ARPC1B Actin-related protein 2/3 complex subunit 1B	6859	Q9NXG2_ C31	THUMPDP1 THUMP domain- containing protein 1	8465
PI2236_C 160	SLC25A6 ADP/ATP translocase 3	6860	Q00722_ C945	PLCB2 1-phosphaudylinositol 4,5-bisphosphate phosphodiesterase beta-2	8466

P05141_C 160	SLC25A5 ADP/ATP translocase 2	6861	Q14694_C 94	USP10 Ubiquitin carboxyl-terminal hydrolase 10	8467
Q13315_C 2021	ATM Serine-protein kinase ATM	6862	Q12933_C C287	TRAF2 TNF receptor-associated factor 2	8468
P50990_C 244	CCT8 T-complex protein 1 subunit theta	6863	P14735_C 974	IDE Insulin-degrading enzyme	8469
Q00839_C 607	HNRNPU Heterogeneous nuclear ribonucleoprotein U	6864	P32456_C 405	GBP2 Interferon-induced guanylate-binding protein 2	8470
P10809_C 442	HSPD1 60 kDa heat shock protein, mitochondrial	6865	P32456_C 404	GBP2 Interferon-induced guanylate-binding protein 2	8471
Q676U5_C 145	ATG16L1 Autophagy-related protein 16-1	6866	Q6PJG6_C C539	BRAT1 BRCA1-associated ATM activator 1	8472
Q86UX7_C 235	FERMT3 Fermitin family homolog 3	6867	Q9NPG8_C C337	ZDHHC4 Probable palmitoyltransferase ZDHHC4	8473
P21333_C 1353	FLNA Filamin-A	6868	Q9Y2K7_C C840	KDM2A Lysine-specific demethylase 2A	8474
Q56VL3_C 27	OCIAD2 OCIA domain-containing protein 2	6869	P12081_C 507	HARS Histidine-tRNA ligase, cytoplasmic	8475
Q14204_C 1977	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	6870	Q13469_C C231	NFATC2 Nuclear factor of activated T-cells, cytoplasmic 2	8476
Q9NUV9_C 187	GIMAP4 GTPase IMAP family member 4	6871	Q16611_C C14	BAK1 Bcl-2 homologous antagonist/killer	8477
P52272_C 114	HNRNPM Heterogeneous nuclear ribonucleoprotein M	6872	P35579_C 931	MYH9 Myosin-9	8478
P78527_C 3781	PRKDC DNA-dependent protein kinase catalytic subunit	6873	Q9UFW8_C C92	CGGBP1 CGG triplet repeat-binding protein 1	8479
P39023_C 114	RPL3 60S ribosomal protein L3	6874	P11171_C 49	EPB41 Protein 4.1	8480
Q14202_C 1326	ZMYM3 Zinc finger MYM-type protein 3	6875	Q9UQ35_C C2116	SRRM2 Serine/arginine repetitive matrix protein 2	8481
O43684_C 129	BUB3 Mitotic checkpoint protein BUB3	6876	Q8WXI9_C C308	GATAD2B Transcriptional repressor p66-beta	8482
Q8N2I2_C 302	ZNF619 Zinc finger protein 619	6877	Q96EY8_C C132	MMAB Cob(I)yrinic acid a,c-diamide adenosyltransferase, mitochondrial	8483
Q92900_C 657	UPF1 Regulator of nonsense transcripts 1	6878	Q01433_C C107	AMPD2 AMP deaminase 2	8484
Q00839_C 389	HNRNPU Heterogeneous nuclear ribonucleoprotein U	6879	Q9H0L4_C C150	CSTF2T Cleavage stimulation factor subunit 2 tau variant	8485
Q00839_C 391	HNRNPU Heterogeneous nuclear ribonucleoprotein U	6880	P16188_C 363	HLA-A HLA class I histocompatibility antigen, A-30 alpha	8486
Q9Y3U8_C 48	RPL36 60S ribosomal protein L36	6881	P04439_C 363	HLA-A HLA class I histocompatibility antigen, A-3 alpha	8487
Q7L2J0_C 177	MEPCE 7SK snRNA methylphosphate capping enzyme	6882	P30443_C 363	HLA-A HLA class I histocompatibility antigen, A-1 alpha	8488
Q01518_C 93	CAP1 Adenylyl cyclase-associated protein 1	6883	O75663_C C87	TIPRL TIP41-like protein	8489
P55769_C 30	NHP2L1 NHP2-like protein 1	6884	P19838_C 61	NFKB1 Nuclear factor NF-kappa-B p105 subunit	8490
P46776_C 144	RPL27A 60S ribosomal protein L27a	6885	P07858_C 319	CTSB Cathepsin B	8491

Q9H3P7_C129	ACBD3 Golgi resident protein GCP60	6886	O60502_C596	MGEA5 Bifunctional protein NCOAT	8492
Q9NQR4_C153	NIT2 Omega-amidase NIT2	6887	Q9HB58_C283	SP110 Sp110 nuclear body protein	8493
O60216_C392	RAD21 Double-strand-break repair protein rad21 homolog	6888	P21333_C2543	FLNA Filamin-A	8494
P13639_C67	EEF2 Elongation factor 2	6889	Q9BTE6_C209	AARSD1 Alanyl-tRNA editing protein Aarsd1	8495
Q8WWP7_C76	GIMAP1 GTPase IMAP family member 1	6890	Q04864_C524	REL Proto-oncogene c-Rel	8496
Q9NTI5_C1069	PDS5B Sister chromatid cohesion protein PDS5 homolog B	6891	O75400_C39	PRPF40A Pre-mRNA-processing factor 40 homolog A	8497
P41091_C105	EIF2S3 Eukaryotic translation initiation factor 2 subunit	6892	P04150_C367	NR3C1 Glucocorticoid receptor	8498
Q9Y2I8_C417	WDR37 WD repeat-containing protein 37	6893	P33241_C283	LSP1 Lymphocyte-specific protein 1	8499
P52566_C76	ARHGDI2 Rho GDP-dissociation inhibitor 2	6894	O60934_C487	NBN Nibrin	8500
Q9BSJ8_C522	ESYT1 Extended synaptotagmin-1	6895	Q86W50_C448	METTL16 Methyltransferase-like protein 16	8501
Q8N163_C238	KIAA1967 DBIRD complex subunit KIAA1967	6896	Q9UQ35_C872	SRRM2 Serine/arginine repetitive matrix protein 2	8502
Q92835_C672	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase	6897	Q8NDH3_C81	NPEPL1 Probable aminopeptidase NPEPL1	8503
Q8NB90_C672	SPATA5 Spermatogenesis-associated protein 5	6898	O43815_C765	STRN Striatin	8504
Q92878_C157	RAD50 DNA repair protein RAD50	6899	O15145_C162	ARPC3 Actin-related protein 2/3 complex subunit 3	8505
Q15370_C89	TCEB2 Transcription elongation factor B polypeptide 2	6900	O15355_C164	PPM1G Protein phosphatase 1G	8506
Q9UNF1_C516	MAGED2 Melanoma-associated antigen D2	6901	H3BQZ7_C308	Uncharacterized protein	8507
Q08AF3_C48	SLFN5 Schlafen family member 5	6902	Q1KMD3_C308	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein	8508
Q01082_C1900	SPTBN1 Spectrin beta chain, non-erythrocytic 1	6903	Q9NQ88_C114	TIGAR Fructose-2,6-bisphosphatase TIGAR	8509
Q8IUI8_C154	CRLF3 Cytokine receptor-like factor 3	6904	P23497_C309	SP100 Nuclear autoantigen Sp-100	8510
P57737_C505	CORO7 Coronin-7	6905	A2A288_C367	ZC3H12D Probable ribonuclease ZC3H12D	8511
O95336_C237	PGLS 6-phosphogluconolactonase	6906	Q9C0B6_C491	FAM5B Protein FAM5B	8512
O15372_C327	EIF3H Eukaryotic translation initiation factor 3 subunit	6907	Q9UJW0_C258	DCTN4 Dynactin subunit 4	8513
Q63HN8_C3609	RNF213 E3 ubiquitin-protein ligase RNF213	6908	P05771_C217	PRKCB Protein kinase C beta type	8514
P00367_C327	GLUD1 Glutamate dehydrogenase 1, mitochondrial	6909	Q96RS6_C376	NUDCD1 NudC domain-containing protein 1	8515
Q15185_C76	PTGES3 Prostaglandin E synthase 3	6910	Q8TD19_C878	NEK9 Serine/threonine-protein kinase Nek9	8516
Q86UX7_C439	FERMT3 Fermitin family homolog 3	6911	O95786_C680	DDX58 Probable ATP-dependent RNA helicase DDX58	8517

A6NHR9_C458	SMCHDI Structural maintenance of chromosomes flexible hinge domain-containing protein 1	6912	094763_C44	URI1 Unconventional prefoldin RPB5 interactor 1	8518
P49448_C327	GLUD2 Glutamate dehydrogenase 2, mitochondrial	6913	Q6PCB5_C280	RSBN1L Round spermatid basic protein 1-like protein	8519
Q15052_C530	ARHGEF6 Rho guanine nucleotide exchange factor 6	6914	Q09666_C1833	AHNAK Neuroblast differentiation-associated protein AHNA	8520
H3BQZ7_C538	Uncharacterized protein	6915	095861_C42	BPNT1 3(2),5-bisphosphate nucleotidase 1	8521
Q1KMD3_C538	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein 2	6916	Q96B23_C57	C18orf25 Uncharacterized protein C18orf25	8522
P11413_C13	G6PD Glucose-6-phosphate 1-dehydrogenase	6917	Q9UER7_C699	DAXX Death domain-associated protein 6	8523
P57737_C34	COR07 Coronin-7	6918	Q7Z616_C954	ARHGAP30 Rho GTPase-activating protein 30	8524
P55735_C187	SEC13 Protein SEC13 homolog	6919	Q9P107_C335	GMIP GEM-interacting protein	8525
P68366_C315	TUBA4A Tubulin alpha-4A chain	6920	Q06323_C22	PSME1 Proteasome activator complex subunit 1	8526
P68366_C316	TUBA4A Tubulin alpha-4A chain	6921	Q9P107_C336	GMIP GEM-interacting protein	8527
Q71U36_C315	TUBA1A Tubulin alpha-1A chain	6922	P35579_C569	MYH9 Myosin-9	8528
Q71U36_C316	TUBA1A Tubulin alpha-1A chain	6923	P13489_C75	RNH1 Ribonuclease inhibitor	8529
P31146_C195	CORO1A Coronin-1A	6924	Q9NY27_C22	PPP4R2 Serine/threonine-protein phosphatase 4 regulatory	8530
P68371_C354	TUBB4B Tubulin beta-4B chain	6925	Q8NFH5_C255	NUP35 Nucleoporin NUP53	8531
P07437_C354	TUBB Tubulin beta chain	6926	P13489_C85	RNH1 Ribonuclease inhibitor	8532
P29350_C102	PTPN6 Tyrosine-protein phosphatase non-receptor type 6	6927	Q00610_C870	CLTC Clathrin heavy chain 1	8533
P21333_C1260	FLNA Filamin-A	6928	095071_C2267	UBR5 E3 ubiquitin-protein ligase UBR5	8534
P08670_C328	VIM Vimentin	6929	Q6NZY4_C393	ZCCHC8 Zinc finger CCHC domain-containing protein 8	8535
P42167_C363	TMPO Lamina-associated polypeptide 2, isoforms beta/gamma	6930	A6QL63_C783	BTBD11 Ankyrin repeat and BTB/POZ domain-containing protein	8536
Q9H0C8_C325	ILKAP Integrin-linked kinase-associated serine/threonine	6931	Q09666_C1900	AHNAK Neuroblast differentiation-associated protein AHNA	8537
Q66K74_C342	MAP1S Microtubule-associated protein 1S	6932	Q09161_C44	NCBP1 Nuclear cap-binding protein subunit 1	8538
Q7KZF4_C560	SND1 Staphylococcal nuclease domain-containing protein	6933	Q5JSP0_C43	FGD3 FYVE, RhoGEF and PH domain-containing protein 3	8539
Q9P1F3_C39	ABRA1 Costars family protein ABRA1	6934	Q14839_C1594	CHD4 Chromodomain-helicase-DNA-binding protein 4	8540
P36507_C211	MAP2K2 Dual specificity mitogen-activated protein kinase	6935	Q16566_C202	CAMK4 Calcium/calmodulin-dependent protein kinase type	8541

				1	
Q02750_C 207	MAP2K1 Dual specificity mitogen-activated protein kinase	6936	Q8WTW3 C513	COG1 Conserved oligomeric Golgi complex subunit 1	8542
Q8NF50_C 685	DOCK8 Dedicator of cytokinesis protein 8	6937	Q09666_C 2162	AHNAK Neuroblast differentiation-associated protein AHNA	8543
Q9BVA1_C 354	TUBB2B Tubulin beta-2B chain	6938	Q9HA64_C 24	FN3KRP Ketosamine-3-kinase	8544
P36578_C 125	RPL4 60S ribosomal protein L4	6939	Q96E39_C 338	RBMXL1 RNA binding motif protein, X-linked-like-1	8545
Q8TD19_C 890	NEK9 Serine/threonine-protein kinase Nek9	6940	P35610_C 92	SOAT1 Sterol O-acyltransferase 1	8546
A6NHR9_C 1286	SMCHD1 Structural maintenance of chromosomes flexible hinge domain-containing protein 1	6941	Q96T76_C 549	MMS19 MMS19 nucleotide excision repair protein homolog	8547
Q9BSD7_C 110	NTPCR Cancer-related nucleoside-triphosphatase	6942	Q9H4A3_C 547	WNK1 Serine/threonine-protein kinase WNK1	8548
Q14573_C 1638	ITPR3 Inositol 1,4,5-trisphosphate receptor type 3	6943	Q7Z2T5_C 320	TRMT1L TRMT1-like protein	8549
Q12874_C 274	SF3A3 Splicing factor 3A subunit 3	6944	Q99996_C 3868	AKAP9 A-kinase anchor protein 9	8550
Q13045_C 337	FLII Protein flightless-1 homolog	6945	Q96RU3_C 70	FNBP1 Formin-binding protein 1	8551
Q8IY67_C 255	RAVER1 Ribonucleoprotein PTB-binding 1	6946	Q9H9A6_C 54	LRRC40 Leucine-rich repeat-containing protein 40	8552
P13639_C 728	EEF2 Elongation factor 2	6947	075569_C 106	PRKRA Interferon-inducible double stranded RNA-dependent	8553
P53990_C 125	IST1 IST1 homolog	6948	P04150_C 302	NR3C1 Glucocorticoid receptor	8554
P13796_C 618	LCP1 Plastin-2	6949	Q9NUQ9_C 10	FAM49B Protein FAM49B	8555
Q9BWM7_C 193	SFXN3 Sideroflexin-3	6950	P20592_C 707	MX2 Interferon-induced GTP-binding protein Mx2	8556
Q9H9B4_C 190	SFXN1 Sideroflexin-1	6951	Q8N5K1_C 92	CISD2 CDGSH iron-sulfur domain-containing protein 2	8557
P31146_C 192	CORO1A Coronin-1A	6952	014497_C 336	ARID1A AT-rich interactive domain-containing protein 1A	8558
Q15024_C 85	EXOSC7 Exosome complex component RRP42	6953	075694_C 874	NUP155 Nuclear pore complex protein Nup155	8559
Q8N4C8_C 202	MINK1 Misshapen-like kinase 1	6954	Q5W0V3_C 298	FAM160B1 Protein FAM160B1	8560
095819_C 202	MAP4K4 Mitogen-activated protein kinase kinase kinase kinase	6955	Q9NSD9_C 195	FARSB Phenylalanine-tRNA ligase beta subunit	8561
P13798_C 30	APEH Acylamino-acid-releasing enzyme	6956	P45984_C 177	MAPK9 Mitogen-activated protein kinase 9	8562
P35579_C 172	MYH9 Myosin-9	6957	Q92835_C 956	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase	8563
P30626_C 194	SRI Sorcin	6958	Q96EV2_C 726	RBM33 RNA-binding protein 33	8564
015371_C 19	EIF3D Eukaryotic translation initiation factor 3 subunit	6959	P55198_C 571	MLLT6 Protein AF-17	8565
O00567_C	NOP56 Nucleolar protein 56	6960	075475_C	PSIP1 PC4 and SFRS1-	8566

211			C204	interacting protein	
Q9UGI8_C196	TES Testin	6961	P51812_C229	RPS6KA3 Ribosomal protein S6 kinase alpha-3	8567
P67936_C247	TPM4 Tropomyosin alpha-4 chain	6962	Q15418_C223	RPS6KA1 Ribosomal protein S6 kinase alpha-1	8568
P45954_C175	ACADSB Short/branched chain specific acyl-CoA dehydrogenase	6963	O94886_C791	TMEM63A Transmembrane protein 63A	8569
Q14566_C301	MCM6 DNA replication licensing factor MCM6	6964	Q14005_C975	IL16 Pro-interleukin-16	8570
P50990_C149	CCT8 T-complex protein I subunit theta	6965	P13639_C41	EEF2 Elongation factor 2	8571
Q08945_C200	SSRP1 FACT complex subunit SSRP1	6966	Q63HN8_C310	RNF213 E3 ubiquitin-protein ligase RNF213	8572
P45985_C246	MAP2K4 Dual specificity mitogen-activated protein kinase	6967	Q96QD9_C242	FYTTD1 UAP56-interacting factor	8573
P21333_C2582	FLNA Filamin-A	6968	P07814_C744	EPRS Bifunctional glutamate/proline--tRNA ligase	8574
P29590_C213	PML Protein PML	6969	Q9UKT9_C434	IKZF3 Zinc finger protein Aiolos	8575
P13489_C30	RNH1 Ribonuclease inhibitor	6970	Q8TC07_C197	TBC1D15 TBC1 domain family member 15	8576
Q13315_C2770	ATM Serine-protein kinase ATM	6971	Q96RU3_C511	FNBP1 Formin-binding protein 1	8577
Q9NR56_C34	MBNL1 Muscleblind-like protein 1	6972	Q9NUP9_C47	LIN7C Protein lin-7 homolog C	8578
Q08AF3_C114	SLFN5 Schlafen family member 5	6973	Q9ULP9_C89	TBC1D24 TBC1 domain family member 24	8579
Q53EL6_C150	PDCD4 Programmed cell death protein 4	6974	H3BQ06_C89	Uncharacterized protein	8580
Q9NPJ6_C162	MED4 Mediator of RNA polymerase II transcription subunit	6975	P28702_C340	RXRβ Retinoic acid receptor RXR-beta	8581
P25398_C92	RPS12 40S ribosomal protein S12	6976	Q9UL15_C327	BAG5 BAG family molecular chaperone regulator 5	8582
P57737_C303	CORO7 Coronin-7	6977	O95817_C179	BAG3 BAG family molecular chaperone regulator 3	8583
Q96RL1_C283	UIMC1 BRCA1-A complex subunit RAP80	6978	Q86UT6_C331	NLRX1 NLR family member X1	8584
P24928_C1245	POLR2A DNA-directed RNA polymerase II subunit RPB1	6979	Q96PE3_C854	INPP4A Type I inositol 3,4-bisphosphate 4-phosphatase	8585
P17858_C89	PFKL 6-phosphofructokinase, liver type	6980	P57764_C268	GSDMD Gasdermin-D	8586
P50995_C226	ANXA11 Annexin A11	6981	Q99873_C109	PRMT1 Protein arginine N-methyltransferase 1	8587
Q7Z460_C1428	CLASP1 CLIP-associating protein 1	6982	P49589_C27	CARS Cysteine--tRNA ligase, cytoplasmic	8588
O75122_C1184	CLASP2 CLIP-associating protein 2	6983	P53384_C31	NUBP1 Cytosolic Fe-S cluster assembly factor NUBP1	8589
Q14008_C1344	CKAP5 Cytoskeleton-associated protein 5	6984	O95644_C228	NFATC1 Nuclear factor of activated T-cells, cytoplasmic 1	8590
Q14008_C1360	CKAP5 Cytoskeleton-associated protein 5	6985	Q9UPN7_C795	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	8591

P16455_C 145	MGMT Methylated-DNA-protein-cysteine methyltransferase	6986	Q93008_C673	USP9X Probable ubiquitin carboxyl-terminal hydrolase FAF	8592
014976_C 190	GAK Cyclin-G-associated kinase	6987	000507_C674	USP9Y Probable ubiquitin carboxyl-terminal hydrolase FAF	8593
Q14103_C 226	HNRNPD Heterogeneous nuclear ribonucleoprotein D0	6988	Q9UHI6_C577	DDX20 Probable ATP-dependent RNA helicase DDX20	8594
P11586_C 918	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	6989	Q09666_C108	AHNAK Neuroblast differentiation-associated protein AHNA	8595
Q14008_C 1350	CKAP5 Cytoskeleton-associated protein 5	6990	043290_C674	SART1 U4/U6.U5 tri-snRNP-associated protein 1	8596
P42704_C 484	LRPPRC Leucine-rich PPR motif-containing protein, mitochondrial	6991	Q2NL82_C126	TSR1 Pre-rRNA-processing protein TSR1 homolog	8597
P50990_C 148	CCT8 T-complex protein 1 sub-unit theta	6992	Q9UPN3_C4825	MACF1 Microtubule-actin cross-linking factor 1, isoforms	8598
P33992_C 197	MCM5 DNA replication licensing factor MCM5	6993	Q13588_C161	GRAP GRB2-related adapter protein	8599
043143_C 190	DHX15 Putative pre-mRNA-splicing factor ATP-dependent RN	6994	Q9UG22_C227	GIMAP2 GTPase IMAP family member 2	8600
P07814_C 381	EPRS Bifunctional glutamate/proline-tRNA ligase	6995	I3L420_C73	LSM14A Protein LSM14 homolog A	8601
P24928_C 13	POLR2A DNA-directed RNA polymerase II subunit RPB1	6996	Q8ND56_C78	LSM14A Protein LSM14 homolog A	8602
P24928_C 1287	POLR2A DNA-directed RNA polymerase II subunit RPB 1	6997	Q96CM8_C64	ACSF2 Acyl-CoA synthetase family member 2, mitochondrial	8603
P42858_C 664	HTT Huntingtin	6998	Q6Y7W6_C938	GIGYF2 PERQ amino acid-rich with GYF domain-containing protein	8604
QI3155_C 23	AIMP2 Aminoacyl tRNA synthase complex-interacting multif	6999	Q9HB58_C327	SP1 10 Spl 10 nuclear body protein	8605
Q14203_C 1252	DCTN1 Dynactin subunit 1	7000	Q9UGP4_C374	LIMD1 LIM domain-containing protein 1	8606
P68366_C 347	TUBA4A Tubulin alpha-4A chain	7001	P49458_C48	SRP9 Signal recognition particle 9 kDa protein	8607
Q00839_C 648	HNRNPU Heterogeneous nuclear ribonucleoprotein U	7002	043566_C496	RGS 14 Regulator of G-protein signaling 14	8608
Q92616_C 2558	GCNLI Translational activator GCNI	7003	P21333_C717	FLNA Filamin-A	8609
Q86SX6_C C67	GLRX5 Glutaredoxin-related protein 5, mitochondrial	7004	Q9NZB2_C279	FAM120A Constitutive coactivator of PPAR-gamma-like protein 1	8610
P24752_C 196	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	7005	Q96EB1_C218	ELP4 Elongator complex protein 4	8611
075150_C 950	RNF40 E3 ubiquitin-protein ligase BRE1B	7006	043149_C2312	ZZEF1 Zinc finger ZZ-type and EF-hand domain-containing	8612
P62979_C 149	RPS27A Ubiquitin-40S ribosomal protein S27a	7007	Q0VD83_C844	APOBR Apolipoprotein B receptor	8613
Q9Y3A3_C C134	MOB4 MOB-like protein phocein	7008	Q00537_C127	CDK17 Cyclin-dependent kinase 17	8614

Q8IUI8_C 95	CRLF3 Cytokine receptor-like factor 3	7009	Q9UJY4_C C429	GGA2 ADP-ribosylation factor-binding protein GGA2	8615
Q96SK2_C C295	TMEM209 Transmembrane protein 209	7010	Q03519_C C641	TAP2 Antigen peptide transporter 2	8616
P21964_C 238	COMT Catechol O-methyltransferase	7011	Q9P2X3_C C195	IMPACT Protein IMPACT	8617
P62753_C 100	RPS6 40S ribosomal protein S6	7012	P42166_C 684	TMPO Lamina-associated polypeptide 2, isoform alpha	8618
Q9Y3Z3_C C522	SAMHD1 SAM domain and HD domain-containing protein 1	7013	Q5GLZ8_C C392	HERC4 Probable E3 ubiquitin-protein ligase HERC4	8619
Q12802_C 2142	AKAP13 A-kinase anchor protein 13	7014	Q9H832_C CIOO	UBE2Z Ubiquitin-conjugating enzyme E2 Z	8620
Q14697_C 502	GANAB Neutral alpha-glucosidase AB	7015	P36969_C 93	GPX4 Phospholipid hydroperoxide glutathione peroxidase, mitochondrial	8621
P62826_C 112	RAN GTP-binding nuclear protein Ran	7016	Q9NVG8_C C36	TBC1D13 TBC1 domain family member 13	8622
015379_C 94	HDAC3 Histone deacetylase 3	7017	075348_C C69	ATP6V1G1 V-type proton ATPase subunit G 1	8623
P13010_C 296	XRCC5 X-ray repair cross-complementing protein 5	7018	Q99575_C C705	POP1 Ribonucleases P/MRP protein subunit POP1	8624
Q9Y5Y2_C C54	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	7019	075369_C C2501	FLNB Filamin-B	8625
Q9BRJ7_C C171	NUDT16L1 Protein syndesmos	7020	P50851_C 2675	LRBA Lipopolysaccharide-responsive and beige-like anchor protein	8626
P35579_C 91	MYH9 Myosin-9	7021	Q99575_C C706	POP1 Ribonucleases P/MRP protein subunit POP1	8627
P46940_C 494	IQGAP1 Ras GTPase-activating-like protein IQGAP1	7022	Q99704_C C115	DOK1 Docking protein 1	8628
Q6F5E8_C C823	RLTPR Leucine-rich repeat-containing protein 16C	7023	Q05086_C C108	UBE3A Ubiquitin-protein ligase E3A	8629
Q8IX12_C C465	CCAR1 Cell division cycle and apoptosis regulator protein 1	7024	Q15052_C C553	ARHGEF6 Rho guanine nucleotide exchange factor 6	8630
Q6F5E8_C C582	RLTPR Leucine-rich repeat-containing protein 16C	7025	Q9C0B7_C C286	TMC07 Transmembrane and coiled-coil domain-containing protein	8631
Q13148_C 198	TARDBP TAR DNA-binding protein 43	7026	Q9Y2X7_C C576	GIT1 ARF GTPase-activating protein GIT1	8632
Q9Y6N5_C C337	SQRDL Sulfidiquinone oxidoreductase, mitochondrial	7027	Q66PJ3_C C349	ARL6IP4 ADP-ribosylation factor-like protein 6-interacting protein 4	8633
Q02880_C 204	TOP2B DNA topoisomerase 2-beta	7028	Q99497_C C46	PARK7 Protein DJ-1	8634
P62826_C 120	RAN GTP-binding nuclear protein Ran	7029	Q9UIS9_C C525	MBD1 Methyl-CpG-binding domain protein 1	8635
Q8NBN7_C C30	RDH13 Retinol dehydrogenase 13	7030	Q8IWX8_C C69	CHERP Calcium homeostasis endoplasmic reticulum protein	8636
P62979_C 145	RPS27A Ubiquitin-40S ribosomal protein S27a	7031	Q00577_C C292	PURA Transcriptional activator protein Pur-alpha	8637
P41250_C 471	GARS Glycine-tRNA ligase	7032	P62249_C 25	RPS16 40S ribosomal protein S16	8638
P46940_C 781	IQGAP1 Ras GTPase-activating-like protein IQGAP1	7033	Q9UJX3_C C131	ANAPC7 Anaphase-promoting complex subunit 7	8639

P42765_C 92	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	7034	Q5VTL8_ C113	PRPF38B Pre-niENA-splicing factor 38B	8640
Q8WWP7 C186	GIMAP1 GTPase IMAP family member 1	7035	P47756_C 206	CAPZB F-actin-capping protein subunit beta	8641
P49207_C 49	RPL34 60S ribosomal protein L34	7036	Q562E7_ C198	WDR81 WD repeat-containing protein 81	8642
Q8IUI8_C 313	CRLF3 Cytokine receptor-like factor 3	7037	Q8IV50_ C106	LYSMD2 LysM and putative peptidoglycan-binding domain-containing 2	8643
P17655_C 301	CAPN2 Calpain-2 catalytic subunit	7038	Q96F15_ CI71	GIMAP5 GTPase IMAP family member 5	8644
Q13526_C 113	PIN1 Peptidyl-prolyl cis-trans isomerase NIMA -interacti	7039	Q9P253_ C22	VPS 18 Vacuolar protein sorting-associated protein 18 homolog	8645
060313_C 375	OPA1 Dynamin-like 120 kDa protein, mitochondrial	7040	Q562E7_ C187	WDR81 WD repeat-containing protein 81	8646
P68371_C 303	TUBB4B Tubulin beta-4B chain	7041	Q6KC79_ C419	NIPBL Nipped-B-like protein	8647
P07437_C 303	TUBB Tubulin beta chain	7042	Q9BSJ8_ C635	ESYT1 Extended synaptotagmin-1	8648
Q9UPN7_ C37	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	7043	Q14980_ C160	NUMA1 Nuclear mitotic apparatus protein 1	8649
Q96SW2_ C188	CRBN Protein cereblon	7044	000571_ C128	DDX3X ATP-dependent RNA helicase DDX3X	8650
014980_C 1070	XPO1 Exportin-1	7045	Q96FZ5_ C12	CMTM7 CKLF-like MARVEL transmembrane domain-containing protein	8651
Q15366_C 109	PCBP2 Poly(rC)-binding protein 2	7046	Q8TCU6_ C52	PREX1 Phosphatidylinositol 3,4,5-trisphosphate- dependent	8652
P30154_C 402	PPP2R1B Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A beta isoform	7047	Q9Y6K9_ C131	IKBKG NF-kappa-B essential modulator	8653
P30153_C 390	PPP2R1A Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform	7048	014497_ C1968	ARID1 A AT-rich interactive domain-containing protein 1A	8654
P07195_C 294	LDHB L-lactate dehydrogenase B chain	7049	Q9NYF8_ C688	BCLAF1 Bcl-2-associated transcription factor 1	8655
P31943_C 22	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	7050	Q96SK2_ C301	TMEM209 Transmembrane protein 209	8656
P53582_C 40	METAP1 Methionine aminopeptidase 1	7051	Q15424_ C519	SAFB Scaffold attachment factor B1	8657
P61221_C 88	ABCE1 ATP-binding cassette sub- family E member 1	7052	P52564_C 38	MAP2K6 Dual specificity mitogen-activated protein kinase	8658
P49207_C 46	RPL34 60S ribosomal protein L34	7053	P08575_C 398	PTPRC Receptor-type tyrosine-protein phosphatase C	8659
P13639_C 651	EEF2 Elongation factor 2	7054	Q9NUW8 C135	TDP1 Tyrosyl-DNA phosphodiesterase 1	8660
Q9BVA1_ C303	TUBB2B Tubulin beta-2B chain	7055	E9PMF8_ C332	PTPRC Receptor-type tyrosine-protein phosphatase C	8661
Q01082_C 604	SPTBN1 Spectrin beta chain, non- erythrocytic 1	7056	Q9Y4W2 C140	LAS IL Ribosomal biogenesis protein LAS IL	8662
Q9Y490_ CI045	TLN1 Talin-1	7057	P04843_C 477	RPN1 Dolichyl- diphosphooligosaccharide— protein glycosyltransferase	8663

				subunit 1	
Q15366_C 158	PCBP2 Poly(rC)-binding protein 2	7058	Q9UFC0_C249	LRWD1 Leucine-rich repeat and WD repeat-containing protein	8664
095573_C 450	ACSL3 Long-chain-fatty-acid-CoA ligase 3	7059	Q9NUW8_C48	TDPI Tyrosyl-DNA phosphodiesterase 1	8665
Q9BT78_C 378	COPS4 COP9 signalosome complex subunit 4	7060	Q15052_C564	ARHGEF6 Rho guanine nucleotide exchange factor 6	8666
Q53EL6_C 288	PDCD4 Programmed cell death protein 4	7061	Q02543_C22	RPL18A 60S ribosomal protein L18a	8667
Q92841_C 319	DDX17 Probable ATP-dependent RNA helicase DDX17	7062	A0FGR8_C181	ESYT2 Extended synaptotagmin-2	8668
P49411_C 127	TUFM Elongation factor Tu, mitochondrial	7063	Q9BTA9_C553	WAC WW domain-containing adapter protein with coiled-coil	8669
Q96P65_C 201	QRFPYR Pyroglutamylated RFamide peptide receptor	7064	Q14980_C961	NUMA1 Nuclear mitotic apparatus protein 1	8670
P46734_C 227	MAP2K3 Dual specificity mitogen-activated protein kinase	7065	Q9BUH6_C180	C9orf142 Uncharacterized protein C9orf142	8671
P48643_C 253	CCT5 T-complex protein 1 subunit epsilon	7066	P43250_C138	GRK6 G protein-coupled receptor kinase 6	8672
Q96GX9_C 147	APIP Probable methylthioribulose-1-phosphate dehydratase	7067	Q15185_C58	PTGES3 Prostaglandin E synthase 3	8673
000567_C 112	NOP56 Nucleolar protein 56	7068	Q8N4N3_C523	KLHL36 Kelch-like protein 36	8674
Q92835_C 819	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase	7069	Q15669_C165	RHOH Rho-related GTP-binding protein RhoH	8675
P21333_C 623	FLNA Filamin-A	7070	Q9NZZT_C443	OGFR Opioid growth factor receptor	8676
Q13509_C 303	TUBB3 Tubulin beta-3 chain	7071	Q13542_C35	EIF4EBP2 Eukaryotic translation initiation factor 4E-binding protein 2	8677
060759_C 210	CYTIP Cytohesin-interacting protein	7072	Q15669_C108	RHOH Rho-related GTP-binding protein RhoH	8678
Q96P65_C 200	QRFPYR Pyroglutamylated RFamide peptide receptor	7073	Q92835_C138	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase	8679
Q9BUF5_C 303	TUBB6 Tubulin beta-6 chain	7074	Q6PKG0_C864	LARPI La-related protein 1	8680
075369_C 455	FLNB Filamin-B	7075	Q9Y679_C391	AUP1 Ancient ubiquitous protein 1	8681
Q9UEY8_C 245	ADD3 Gamma-adducin	7076	P36542_C103	ATP5C1 ATP synthase subunit gamma, mitochondrial	8682
P06239_C 465	LCK Tyrosine-protein kinase Lck	7077	Q01664_C29	TFAP4 Transcription factor AP-4	8683
P60953_C 157	CDC42 Cell division control protein 42 homolog	7078	P38606_C138	ATP6V1A V-type proton ATPase catalytic subunit A	8684
P11586_C 863	MTHFD1 C-1-tetrahydrofolate synthase, cytoplasmic	7079	Q9Y520_C223	PRRC2C Protein PRRC2C	8685
Q71U36_C 347	TUBA1 A Tubulin alpha-1A chain	7080	Q7Z2Z2_C474	EFTUD1 Elongation factor Tu GTP-binding domain-containing	8686
P20073_C 363	ANXA7 Annexin A7	7081	015294_C758	OGT UDP-N-acetylglucosamine-peptide N-acetylglucosaminyl transferase	8687

Q8WYJ6_C293	SEPT1 Septin-1	7082	Q96S59_C638	RANBP9 Ran-binding protein 9	8688
P04406_C152	GAPDH Glyceraldehyde-3-phosphate dehydrogenase	7083	000541_C272	PES1 Pescadillo homolog	8689
P49748_C237	ACADVL Very long-chain specific acyl-CoA dehydrogenase, mitochondrial	7084	Q15020_C670	SART3 Squamous cell carcinoma antigen recognized by T-cells 3	8690
P53618_C635	COPB1 Coatomer subunit beta	7085	Q8NF91_C8703	SYNE1 Nesprin-1	8691
Q14669_C1538	TRIP12 E3 ubiquitin-protein ligase TRIP12	7086	Q14966_C1279	ZNF638 Zinc finger protein 638	8692
Q8WWP7_C98	GIMAP1 GTPase IMAP family member 1	7087	Q96C19_C172	EFHD2 EF-hand domain-containing protein D2	8693
P49840_C262	GSK3A Glycogen synthase kinase-3 alpha	7088	075688_C172	PPM1B Protein phosphatase 1B	8694
Q9UKV3_C1223	ACINI Apoptotic chromatin condensation inducer in the nucleus	7089	Q05519_C455	SRSF11 Serine/arginine-rich splicing factor 11	8695
Q8N5W9_C86	FAM101B Protein FAM101B	7090	P42331_C448	ARHGAP25 Rho GTPase-activating protein 25	8696
P68371_C201	TUBB4B Tubulin beta-4B chain	7091	P57075_C371	UBASH3A Ubiquitin-associated and SH3 domain-containing protein	8697
P68371_C211	TUBB4B Tubulin beta-4B chain	7092	Q96GX2_C75	ATXN7L3B Putative ataxin-7-like protein 3B	8698
Q9BVA1_C201	TUBB2B Tubulin beta-2B chain	7093	Q14690_C361	PDCD11 Protein RRP5 homolog	8699
Q9BVA1_C211	TUBB2B Tubulin beta-2B chain	7094	Q15149_C4494	PLEC Plectin	8700
P07437_C201	TUBB Tubulin beta chain	7095	Q9NP31_C34	SH2D2A SH2 domain-containing protein 2A	8701
P07437_C211	TUBB Tubulin beta chain	7096	P30519_C282	HMOX2 Heme oxygenase 2	8702
Q8IV04_C305	TBC1D10C Carabin	7097	P98171_C855	ARHGAP4 Rho GTPase-activating protein 4	8703
060664_C341	PLIN3 Perilipin-3	7098	I3L420_C80	LSM14A Protein LSM14 homolog A	8704
P53384_C277	NUBPL Cytosolic Fe-S cluster assembly factor NUBPL	7099	Q8ND56_C85	LSM14A Protein LSM14 homolog A	8705
Q99439_C240	CNN2 Calponin-2	7100	P21580_C590	TNFAIP3 Tumor necrosis factor alpha-induced protein 3	8706
P49841_C199	GSK3B Glycogen synthase kinase-3 beta	7101	014618_C244	CCS Copper chaperone for superoxide dismutase	8707
P04406_C156	GAPDH Glyceraldehyde-3-phosphate dehydrogenase	7102	Q06124_C573	PTPN11 Tyrosine-protein phosphatase non-receptor type 11	8708
095758_C55	PTBP3 Polypyrimidine tract-binding protein 3	7103	P08240_C253	SRPR Signal recognition particle receptor subunit alpha	8709
Q9NY65_C347	TUBA8 Tubulin alpha-8 chain	7104	014618_C246	CCS Copper chaperone for superoxide dismutase	8710
Q13748_C347	TUBA3D Tubulin alpha-3C/D chain	7105	Q9H2M9_C67	RAB3GAP2 Rab3 GTPase-activating protein non-catalytic subunit	8711
Q86WN1_C449	FCHSD1 FCH and double SH3 domains protein 1	7106	Q06124_C567	PTPN11 Tyrosine-protein phosphatase non-receptor type 11	8712

Q92619_C 413	HMHA1 Minor histocompatibility protein HA-1	7107	O43865_C 272	AHCYL1 Putative adenosylhomocysteinase 2	8713
Q93009_C 223	USP7 Ubiquitin carboxyl-terminal hydrolase 7	7108	Q96HN2_C 353	AHCYL2 Putative adenosylhomocysteinase 3	8714
Q9BUF5_C 201	TUBB6 Tubulin beta-6 chain	7109	P41226_C 599	UBA7 Ubiquitin-like modifier-activating enzyme 7	8715
Q9BUF5_C 211	TUBB6 Tubulin beta-6 chain	7110	Q06203_C 100	PPAT Amidophosphoribosyltransferase	8716
Q70J99_C 136	UNC13D Protein unc-13 homolog D	7111	Q96F07_C 98	CYFIP2 Cytoplasmic FMR1-interacting protein 2	8717
O95486_C 704	SEC24A Protein transport protein Sec24A	7112	O60610_C 1227	DIAPH1 Protein diaphanous homolog 1	8718
P27987_C 693	ITPKB Inositol-trisphosphate 3-kinase B	7113	Q9Y266_C 188	NUDC Nuclear migration protein nudC	8719
P84103_C 6	SRSF3 Serine/arginine-rich splicing factor 3	7114	Q7L576_C 98	CYFIP1 Cytoplasmic FMR1-interacting protein 1	8720
P24752_C 126	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	7115	Q9H5N1_C 422	RABEP2 Rab GTPase-binding effector protein 2	8721
O00299_C 223	CLIC1 Chloride intracellular channel protein 1	7116	Q9H5N1_C 423	RABEP2 Rab GTPase-binding effector protein 2	8722
P68366_C 376	TUBA4A Tubulin alpha-4A chain	7117	Q13501_C 289	SQSTM1 Sequestosome-1	8723
Q71U36_C 376	TUBA1A Tubulin alpha-1A chain	7118	Q02446_C 55	SP4 Transcription factor Sp4	8724
Q15365_C 109	PCBP1 Poly(rC)-binding protein 1	7119	O43175_C 369	PHGDH D-3-phosphoglycerate dehydrogenase	8725
P62280_C 60	RPS11 40S ribosomal protein S11	7120	Q93008_C 1237	USP9X Probable ubiquitin carboxyl-terminal hydrolase FAF	8726
P62829_C 28	RPL23 60S ribosomal protein L23	7121	O00507_C 1238	USP9Y Probable ubiquitin carboxyl-terminal hydrolase FAF	8727
P05388_C 119	RPLP0 60S acidic ribosomal protein P0	7122	Q8TD19_C 11	NEK9 Serine/threonine-protein kinase Nek9	8728
P62937_C 161	PPIA Peptidyl-prolyl cis-trans isomerase A	7123	Q6ZRI6_C 367	C15orf39 Uncharacterized protein C15orf39	8729
P28062_C 120	PSMB8 Proteasome subunit beta type-8	7124	P40763_C 718	STAT3 Signal transducer and activator of transcription 3	8730
P28062_C 124	PSMB8 Proteasome subunit beta type-8	7125	Q15723_C 470	ELF2 ETS-related transcription factor Elf-2	8731
Q9Y228_C 256	TRAF3IP3 TRAF3-interacting JNK-activating modulator	7126	Q8IWZ3_C 615	ANKHD1 Ankyrin repeat and KH domain-containing protein 1	8732
Q9BY49_C 191	PECR Peroxisomal trans-2-enoyl-CoA reductase	7127	O60664_C 60	PLIN3 Perilipin-3	8733
P30154_C 306	PPP2R1B Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A beta isoform	7128	Q09666_C 5502	AHNAK Neuroblast differentiation-associated protein AHNA	8734
P30153_C 294	PPP2R1A Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform	7129	Q8IV63_C 191	VRK3 Inactive serine/threonine-protein kinase VRK3	8735
P52564_C 196	MAP2K6 Dual specificity mitogen-activated protein kinase	7130	E7EQZ4_C 146	SMN1 Survival motor neuron protein	8736

P46734_C 207	MAP2K3 Dual specificity mitogen-activated protein kinase	7131	Q16637_C C146	SMN2 Survival motor neuron protein	8737
Q9NYL9_C C150	TMOD3 Tropomodulin-3	7132	Q8I WV7_C C1603	UBR1 E3 ubiquitin-protein ligase UBR1	8738
O75175_C 600	CNOT3 CCR4-NOT transcription complex subunit 3	7133	O14981_C C936	BTAF1 TATA-binding protein-associated factor 172	8739
Q9H0D6_C C736	XRN2 5-3 exoribonuclease 2	7134	Q07352_C C34	ZFP36L1 Zinc finger protein 36, C3H1 type-like 1	8740
Q8IV53_C C52	DENND1C DENN domain-containing protein 1C	7135	P25205_C 119	MCM3 DNA replication licensing factor MCM3	8741
P26358_C 1478	DNMT1 DNA (cytosine-5)-methyltransferase 1	7136	P35579_C 1437	MYH9 Myosin-9	8742
Q7RTV0_C C40	PHF5A PHD finger-like domain-containing protein 5A	7137	Q8NF50_C C2091	DOCK8 Dedicator of cytokinesis protein 8	8743
P51570_C 182	GALK1 Galactokinase	7138	P42224_C 492	STAT1 Signal transducer and activator of transcription 1	8744
Q9Y490_C C1939	TLN1 Talin-1	7139	O96008_C C74	TOMM40 Mitochondrial import receptor subunit TOM40 homolog	8745
P49848_C 460	TAF6 Transcription initiation factor TFIID subunit 6	7140	O96008_C C76	TOMM40 Mitochondrial import receptor subunit TOM40 homolog	8746
Q9NY65_C C376	TUBA8 Tubulin alpha-8 chain	7141	P46063_C 606	RECQL ATP-dependent DNA helicase Q1	8747
Q13748_C 376	TUBA3D Tubulin alpha-3C/D chain	7142	Q9NVE7_C C537	PANK4 Pantothenate kinase 4	8748
Q9Y512_C C457	SAMM50 Sorting and assembly machinery component 50 homolog	7143	O15371_C C195	EIF3D Eukaryotic translation initiation factor 3 subunit	8749
P40939_C 470	HADHA Trifunctional enzyme subunit alpha, mitochondrial	7144	P45880_C 47	VDAC2 Voltage-dependent anion-selective channel protein	8750
Q6VY07_C C732	PACS1 Phosphofurin acidic cluster sorting protein 1	7145	Q8IZ07_C C540	ANKRD13A Ankyrin repeat domain-containing protein 13A	8751
Q9NWX8_C C222	BABAM1 BRISC and BRCA1-A complex member 1	7146	P49795_C 73	RGS19 Regulator of G-protein signaling 19	8752
Q7KZF4_C C152	SND1 Staphylococcal nuclease domain-containing protein	7147	P49795_C 76	RGS19 Regulator of G-protein signaling 19	8753
P12814_C 480	ACTN1 Alpha-actinin-1	7148	Q69YN2_C C288	CWF19L1 CWF19-like protein 1	8754
P07900_C 597	HSP90AA1 Heat shock protein HSP 90-alpha	7149	Q53ET0_C C515	CRTC2 CREB-regulated transcription coactivator 2	8755
P07900_C 598	HSP90AA1 Heat shock protein HSP 90-alpha	7150	P78371_C 412	CCT2 T-complex protein 1 subunit beta	8756
H0Y2S0_C C31	Uncharacterized protein	7151	Q99961_C C277	SH3GL1 Endophilin-A2	8757
Q6UB35_C C906	MTHFD1L Monofunctional C1-tetrahydrofolate synthase, mitochondrial	7152	P33241_C 36	LSP1 Lymphocyte-specific protein 1	8758
Q71UM5_C C77	RPS27L 40S ribosomal protein S27-like	7153	Q8NFI3_C C113	ENGASE Cytosolic endo-beta-N-acetylglucosaminidase	8759
P42677_C 77	RPS27 40S ribosomal protein S27	7154	Q9BXJ9_C C238	NAA15 N-alpha-acetyltransferase 15, NatA auxiliary subunit	8760
Q08211_C 1029	DHX9 ATP-dependent RNA helicase A	7155	Q92570_C C301	NR4A3 Nuclear receptor subfamily 4 group A member	8761

				3	
015533_C 115	TAPBP Tapasin	7156	I3L097_C 251	Uncharacterized protein	8762
P29590_C 389	PML Protein PML	7157	Q9H6R4_C C1034	NOL6 Nucleolar protein 6	8763
P62937_C 62	PPIA Peptidyl-prolyl cis-trans isomerase A	7158	094992_C C79	HEXIMI Protein HEXIMI	8764
Q14204_C 1999	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	7159	Q8N0X7_C C504	SPG20 Spartin	8765
Q13561_C 240	DCTN2 Dynactin subunit 2	7160	094992_C C84	HEXIMI Protein HEXIMI	8766
Q13561_C 256	DCTN2 Dynactin subunit 2	7161	Q96HE7_C C166	EROIL EROl-like protein alpha	8767
H3BQZ7_C C602	Uncharacterized protein	7162	Q9GZU8_C C187	FAM 192A Protein FAM192A	8768
Q1KMD3_C C602	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein 2	7163	Q9UKA4_C C1232	AKAP11 A-kinase anchor protein 11	8769
P61247_C 96	RPS3A 40S ribosomal protein S3a	7164	P42224_C 155	STAT1 Signal transducer and activator of transcription 1	8770
P68871_C 94	HBB Hemoglobin subunit beta	7165	P42166_C 280	TMPO Lamina-associated polypeptide 2, isoform alpha	8771
Q9UHD8_C C375	SEPT9 Septin-9	7166	I3L1I5_C 129	Uncharacterized protein	8772
Q8NFW8_C C394	CMAS N-acymeuraminatate cytidyltransferase	7167	015052_C C25	ARHGEF6 Rho guanine nucleotide exchange factor 6	8773
P51878_C 315	CASP5 Caspase-5	7168	095267_C C615	RASGRP1 RAS guanyl- releasing protein 1	8774
P49662_C 258	CASP4 Caspase-4	7169	Q9P258_C C428	RCC2 Protein RCC2	8775
075083_C 170	WDRI WD repeat-containing protein I	7170	Q7L1Q6_C C35	BZW1 Basic leucine zipper and W2 domain-containing protein	8776
P55884_C 515	EEF3B Eukaryotic translation initiation factor 3 subunit	7171	Q63HN8_C C1510	RNF213 E3 ubiquitin-protein ligase RNF213	8777
Q9UKX7_C C181	NUP50 Nuclear pore complex protein Nup50	7172	Q9Y2X3_C C439	NOP58 Nucleolar protein 58	8778
Q13185_C 69	CBX3 Chromobox protein homolog 3	7173	P53384_C 25	NUBP1 Cytosolic Fe-S cluster assembly factor NUBP1	8779
000299_C 59	CLIC1 Chloride intracellular channel protein 1	7174	015054_C C1205	KDM6B Lysine-specific demethylase 6B	8780
Q06587_C 69	RING1 E3 ubiquitin-protein ligase RING1	7175	Q96BY6_C C321	DOCK10 Dedicator of cytokinesis protein 10	8781
Q14204_C 3033	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	7176	Q96BY6_C C319	DOCK10 Dedicator of cytokinesis protein 10	8782
Q13045_C 241	FLII Protein flightless-1 homolog	7177	P01892_C 363	HLA-A HLA class I histocompatibility antigen, A- 2 alpha	8783
P48643_C 181	CCT5 T-complex protein 1 subunit epsilon	7178	P01891_C 363	HLA-A HLA class I histocompatibility antigen, A- 68 alpha	8784
Q04726_C 528	TLE3 Transducin-like enhancer protein 3	7179	P49327_C 1448	FASN Fatty acid synthase	8785
Q15149_C 3493	PLEC Plectin	7180	Q8ND24_C C655	RNF214 RING finger protein 214	8786

000299_C 24	CLIC1 Chloride intracellular channel protein 1	7181	Q9P2E3_C1822	ZNFX1 NFXI-type zinc finger-containing protein 1	8787
P35579_C 694	MYH9 Myosin-9	7182	Q9Y5K6_C540	CD2AP CD2-associated protein	8788
Q9Y490_C 732	TLN1 Talin-1	7183	Q13459_C1279	MYO9B Unconventional myosin-IXb	8789
Q8WWP7_C 66	GIMAP1 GTPase IMAP family member 1	7184	015355_C241	PPM1G Protein phosphatase 1G	8790
P49721_C 91	PSMB2 Proteasome subunit beta type-2	7185	Q8IV53_C174	DENND1C DENN domain-containing protein 1C	8791
P52272_C 653	HNRNPM Heterogeneous nuclear ribonucleoprotein M	7186	Q6JBY9_C181	RCSL1 CapZ-interacting protein	8792
Q9UK45_C 85	LSM7 U6 snRNA-associated Sm-like protein LSM7	7187	Q8IU85_C354	CAMK1D Calcium/calmodulin-dependent protein kinase type 1	8793
P21333_C 2199	FLNA Filamin-A	7188	095644_C209	NFATC1 Nuclear factor of activated T-cells, cytoplasmic 1	8794
P22087_C 268	FBL rRNA 2-O-methyltransferase fibrillarin	7189	Q92576_C885	PHF3 PHD finger protein 3	8795
Q99714_C 214	HSD17B10 3-hydroxyacyl-CoA dehydrogenase type-2	7190	Q5T440_C170	IBA57 Putative transferase CAF17, mitochondrial	8796
Q96F86_C 413	EDC3 Enhancer of mRNA-decapping protein 3	7191	P30519_C265	HMOX2 Heme oxygenase 2	8797
P53621_C 975	COPA Coatamer subunit alpha	7192	Q86UP2_C105	KTN1 Kinectin	8798
Q96S55_C 272	WRNIP1 ATPase WRNIP1	7193	015042_C624	U2SURP U2 snRNP-associated SURP motif-containing protein	8799
P15498_C 652	VAV1 Proto-oncogene vav	7194	Q9NVZ3_C133	NECAP2 Adaptin ear-binding coat-associated protein 2	8800
P53621_C 453	COPA Coatamer subunit alpha	7195	P26651_C253	ZFP36 Tristetraprolin	8801
Q96RU3_C 248	FNBPI Fonnin-binding protein 1	7196	Q5TFE4_C119	NT5DC1 5-nucleotidase domain-containing protein 1	8802
Q13148_C 39	TARDBP TAR DNA-binding protein 43	7197	Q9BRP1_C278	PDCD2L Programmed cell death protein 2-like	8803
Q9NYL9_C 132	TMOD3 Tropomodulin-3	7198	Q9H410_C287	DSN1 Kinetochore-associated protein DSN1 homolog	8804
Q5VWZ2_C 12	LYPLAL1 Lysophospholipase-like protein 1	7199	P27986_C146	PIK3R1 Phosphatidylinositol 3-kinase regulatory subunit alpha	8805
Q7Z5K2_C 170	WAPAL Wings apart-like protein homolog	7200	P10144_C142	GZMB GranzymeB	8806
Q13148_C 244	TARDBP TAR DNA-binding protein 43	7201	Q9UKF6_C498	CPSF3 Cleavage and polyadenylation specificity factor subunit	8807
Q13200_C 779	PSMD2 26S proteasome non-ATPase regulatory subunit 2	7202	P55265_C1224	ADAR Double-stranded RNA-specific adenosine deaminase	8808
099460_C 806	PSMD1 26S proteasome non-ATPase regulatory subunit 1	7203	Q9NXV6_C516	CDKN2AIP CDKN2A-interacting protein	8809
P29466_C 397	CASP1 Caspase-1	7204	Q7Z401_C1289	DENND4A C-myc promoter-binding protein	8810
P63279_C	UBE2I SUMO-conjugating enzyme	7205	Q9NVT9	ARMCl Armadillo repeat	8811

138	UBC9		C69	containing protein 1	
Q92608_C1408	DOCK2 Dedicator of cytokinesis protein 2	7206	Q9GZR7_C832	DDX24 ATP-dependent RNA helicase DDX24	8812
Q9H6A0_C104	DENND2D DENN domain-containing protein 2D	7207	Q2TAA2_C137	IAH1 Isoamyl acetate-hydrolyzing esterase 1 homolog	8813
Q96F86_C410	EDC3 Enhancer of mRNA-decapping protein 3	7208	Q2TAA2_C150	IAH1 Isoamyl acetate-hydrolyzing esterase 1 homolog	8814
Q12824_C147	SMARCB1 SWI/SNF-related matrix-associated actin-dependent	7209	Q2TAA2_C145	IAH1 Isoamyl acetate-hydrolyzing esterase 1 homolog	8815
075427_C134	LRCH4 Leucine-rich repeat and calponin homology domain-containing protein 4	7210	Q13315_C384	ATM Serine-protein kinase ATM	8816
Q08211_C438	DHX9 ATP-dependent RNA helicase A	7211	Q9BXJ9_C721	NAA15 N-alpha-acetyltransferase 15, NatA auxiliary subunit	8817
P11387_C630	TOPI DNA topoisomerase 1	7212	Q8TD19_C623	NEK9 Serine/threonine-protein kinase Nek9	8818
A6NHR9_C985	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	7213	P50749_C251	RASSF2 Ras association domain-containing protein 2	8819
P62195_C112	PSMC5 26S protease regulatory subunit 8	7214	Q92831_C690	KAT2B Histone acetyltransferase KAT2B	8820
043772_C58	SLC25A20 Mitochondrial carnitine/acylcarnitine carrier protein	7215	Q92830_C695	KAT2A Histone acetyltransferase KAT2A	8821
Q71U36_C20	TUBA1A Tubulin alpha-1A chain	7216	P11216_C437	PYGB Glycogen phosphorylase, brain form	8822
Q15149_C3008	PLEC Plectin	7217	P30044_C100	PRDX5 Peroxiredoxin-5, mitochondrial	8823
075427_C224	LRCH4 Leucine-rich repeat and calponin homology domain-containing protein 4	7218	Q9Y3T9_C585	NOC2L Nucleolar complex protein 2 homolog	8824
Q8N201_C1633	INTS1 Integrator complex subunit 1	7219	Q9NVG8_C387	TBC1D13 TBC1 domain family member 13	8825
Q71U36_C2S	TUBA1A Tubulin alpha-1A chain	7220	014933_C102	UBE2L6 Ubiquitin/ISG15-conjugating enzyme E2 L6	8826
P07195_C164	LDHB L-lactate dehydrogenase B chain	7221	Q9UNE7_C199	STUB1 E3 ubiquitin-protein ligase CHIP	8827
P00338_C163	LDHA L-lactate dehydrogenase A chain	7222	Q9UKA4_C1257	AKAP11 A-kinase anchor protein 11	8828
P21333_C1912	FLNA Filamin-A	7223	Q8TCU6_C37	PREX1 Phosphatidylinositol 3,4,5-trisphosphate-dependent	8829
P21333_C1920	FLNA Filamin-A	7224	P54274_C118	TERF1 Telomeric repeat-binding factor 1	8830
P00558_C379	PGK1 Phosphoglycerate kinase 1	7225	P11161_C469	EGR2 E3 SUMO-protein ligase EGR2	8831
P19447_C342	ERCC3 TFIIH basal transcription factor complex helicase	7226	P11161_C454	EGR2 E3 SUMO-protein ligase EGR2	8832
PI0809_C447	HSPD1 60 kDa heat shock protein, mitochondrial	7227	Q8TAQ2_C145	SMARCC2 SWI/SNF complex subunit SMARCC2	8833
P54198_C882	HIRA Protein HIRA	7228	Q13232_C158	NME3 Nucleoside diphosphate kinase 3	8834

P15153_C 157	RAC2 Ras-related C3 botulinum toxin substrate 2	7229	Q9NXV6 C178	CDKN2AIP CDKN2A-interacting protein	8835
P53618_C 623	COPB1 Coatomer subunit beta	7230	P01106_C 25	MYC Myc proto-oncogene protein	8836
P07864_C 163	LDHC L-lactate dehydrogenase C chain	7231	Q6L8Q7_C C108	PDE12 2,5-phosphodiesterase 12	8837
Q6ZMR3_C C163	LDHAL6A L-lactate dehydrogenase A-like6A	7232	Q6L8Q7_C CI19	PDE12 2,5-phosphodiesterase 12	8838
P12268_C 140	IMPDH2 Inosine-5-monophosphate dehydrogenase 2	7233	P45880_C 210	VDAC2 Voltage-dependent anion-selective channel protein	8839
Q69YN4_C C353	KIAA1429 Protein virilizer homolog	7234	B0V043_C C41	VARS Valyl-tRNA synthetase	8840
P00558_C 380	PGK1 Phosphoglycerate kinase 1	7235	P45880_C 227	VDAC2 Voltage-dependent anion-selective channel protein	8841
P15121_C 299	AKR1B1 Aldose reductase	7236	Q9BU23_C C696	LMF2 Lipase maturation factor 2	8842
Q92888_C 892	ARHGEF1 Rho guanine nucleotide exchange factor 1	7237	Q8NDX1_C C435	PSD4 PH and SEC7 domain-containing protein 4	8843
Q9BVQ7_C C309	SPATA5L1 Spermatogenesis-associated protein 5-like protein	7238	Q9Y4B6_C C784	VPRBP Protein VPRBP	8844
Q15149_C 3110	PLEC Plectin	7239	Q8IY21_C CI051	DDX60 Probable ATP-dependent RNA helicase DDX60	8845
PI7655_C 82	CAPN2 Calpain-2 catalytic subunit	7240	094829_C C217	IP013 Importin-13	8846
P50416_C 304	CPT1A Carnitine O-palmitoyltransferase 1, liver isoform	7241	Q92835_C C1088	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase	8847
Q92947_C 289	GCDH Glutaryl-CoA dehydrogenase, mitochondrial	7242	P01106_C 70	MYC Myc proto-oncogene protein	8848
P60763_C 157	RAC3 Ras-related C3 botulinum toxin substrate 3	7243	Q99829_C C53	CPNE1 Copine-1	8849
P63000_C 157	RAC1 Ras-related C3 botulinum toxin substrate 1	7244	Q9Y2S2_C C125	CRYL1 Lambda-crystallin homolog	8850
Q14141_C 269	SEPT6 Septin-6	7245	Q14289_C C562	PTK2B Protein-tyrosine kinase 2-beta	8851
Q6IBS0_C C141	TWF2 Twinfilin-2	7246	P41240_C 290	CSK Tyrosine-protein kinase CSK	8852
P46736_C 273	BRCC3 Lys-63-specific deubiquitinase BRCC36	7247	Q01826_C C529	SATB1 DNA-binding protein SATB1	8853
014641_C 354	DVL2 Segment polarity protein dishevelled homolog DVL-2	7248	Q9UPW6_C C518	SATB2 DNA-binding protein SATB2	8854
Q13423_C 936	NNT NAD(P) transhydrogenase, mitochondrial	7249	Q9GZT9_C C127	EGLN1 Egl nine homolog 1	8855
Q15027_C 320	ACAP1 Arf-GAP with coiled-coil, ANK repeat and PH domain 1	7250	Q99590_C C553	SCAF1 1 Protein SCAF1 1	8856
P22059_C 224	OSBP Oxysterol-binding protein 1	7251	Q13077_C C37	TRAF1 TNF receptor-associated factor 1	8857
Q08945_C 139	SSRPI FACT complex subunit SSRPI	7252	Q13077_C C38	TRAF1 TNF receptor-associated factor 1	8858
P00558_C 367	PGK1 Phosphoglycerate kinase 1	7253	095352_C C524	ATG7 Ubiquitin-like modifier-activating enzyme ATG7	8859
P68366_C 305	TUBA4A Tubulin alpha-4A chain	7254	Q63HN8_C C62	RNF213 E3 ubiquitin-protein ligase RNF213	8860

Q71U36_C305	TUBA1A Tubulin alpha-1A chain	7255	Q63HN8_C78	RNF213 E3 ubiquitin-protein ligase RNF213	8861
P21333_C574	FLNA Filamin-A	7256	E9PPU0_C1888	EPPK1 Epiplakin	8862
Q86XP3_C281	DDX42 ATP-dependent RNA helicase DDX42	7257	Q63HN8_C4258	RNF213 E3 ubiquitin-protein ligase RNF213	8863
Q9UL46_C91	PSME2 Proteasome activator complex subunit 2	7258	Q9UKX7_C151	NUP50 Nuclear pore complex protein Nup50	8864
Q92598_C34	HSPH1 Heat shock protein 105 kDa	7259	P45880_C76	VDAC2 Voltage-dependent anion-selective channel protein	8865
Q16186_C88	ADRM1 Proteasomal ubiquitin receptor ADRM1	7260	Q6NYC8_C397	PPP1R18 Phostensin	8866
P21333_C478	FLNA Filamin-A	7261	Q6NYC8_C396	PPP1R18 Phostensin	8867
P21333_C483	FLNA Filamin-A	7262	Q9ULV4_C420	CORO1C Coronin-1C	8868
P40926_C212	MDH2 Malate dehydrogenase, mitochondrial	7263	Q96I15_C22	SCLY Selenocysteine lyase	8869
P47756_C36	CAPZB F-actin-capping protein subunit beta	7264	Q8WXH0_C553	SYNE2 Nesprin-2	8870
P12270_C1068	TPR Nucleoprotein TPR	7265	Q9Y277_C36	VDAC3 Voltage-dependent anion-selective channel protein	8871
O43707_C499	ACTN4 Alpha-actinin-4	7266	P31153_C104	MAT2A S-adenosylmethionine synthase isoform type-2	8872
Q5VSL9_C798	FAM40A Protein FAM40A	7267	Q14005_C1004	IL16 Pro-interleukin-16	8873
P19367_C834	HK1 Hexokinase-1	7268	Q16548_C19	BCL2A1 Bcl-2-related protein A1	8874
Q8N9T8_C673	KRI1 Protein KRI1 homolog	7269	P18583_C92	SON Protein SON	8875
P68371_C239	TUBB4B Tubulin beta-4B chain	7270	P31153_C56	MAT2A S-adenosylmethionine synthase isoform type-2	8876
Q9BVA1_C239	TUBB2B Tubulin beta-2B chain	7271	Q04759_C14	PRKCQ Protein kinase C theta type	8877
P07437_C239	TUBB Tubulin beta chain	7272	Q7Z4W1_C244	DCXR L-xylulose reductase	8878
P35579_C896	MYH9 Myosin-9	7273	Q9Y6C9_C296	MTCH2 Mitochondrial carrier homolog 2	8879
Q9Y2H1_C235	STK38L Serine/threonine-protein kinase 38-like	7274	Q86YS7_C993	KIAA0528 Uncharacterized protein KIAA0528	8880
Q15208_C234	STK38 Serine/threonine-protein kinase 38	7275	Q13045_C46	FLII Protein flightless-1 homolog	8881
Q9UNM6_C357	PSMD13 26S proteasome non-ATPase regulatory subunit 13	7276	Q9ULA0_C68	ZNF346 Zinc finger protein 346	8882
Q8N8A2_C921	ANKRD44 Serine/threonine-protein phosphatase 6 regulatory	7277	Q5T4S7_C2554	UBR4 E3 ubiquitin-protein ligase UBR4	8883
Q14669_C1959	TRIP12 E3 ubiquitin-protein ligase TRIP12	7278	Q8N0Z8_C292	PUSL1 tRNA pseudouridine synthase-like 1	8884
Q8IV53_C21	DENND1C DENN domain-containing protein 1C	7279	P46109_C249	CRKL Crk-like protein	8885
Q86X10_C327	RALGAPB Rai GTPase-activating protein subunit beta	7280	Q96CW5_C194	TUBGCP3 Gamma-tubulin complex component 3	8886

P0CB43_C368	FAM203B Protein FAM203B	7281	P54136_C32	RARS Arginine-tRNA ligase, cytoplasmic	8887
Q9Y490_C1434	TLN1 Talin-1	7282	Q15005_C17	SPCS2 Signal peptidase complex subunit 2	8888
000499_C47	BEN1 Myc box-dependent-interacting protein 1	7283	Q15306_C194	IRF4 Interferon regulatory factor 4	8889
015067_C66	PFAS Phosphoribosylfomnylglycinanndine synthase	7284	Q96GW9_C425	MARS2 Methionine-tRNA ligase, mitochondrial	8890
Q01082_C112	SPTBN1 Spectrin beta chain, non-erythrocytic 1	7285	Q02556_C306	IRF8 Interferon regulatory factor 8	8891
Q92793_C1219	CREBBP CREB-binding protein	7286	Q9Y4W2_C456	LASIL Ribosomal biogenesis protein LAS IL	8892
Q09472_C1183	EP300 Histone acetyltransferase p300	7287	Q8TB24_C942	RIN3 Ras and Rab interactor 3	8893
Q16181_C126	SEPT7 Septin-7	7288	Q96Q11_C373	TRNT1 CCA tRNA nucleotidyltransferase 1, mitochondrial	8894
Q14289_C972	PTK2B Protein-tyrosine kinase 2-beta	7289	000170_C122	AIP AH receptor-interacting protein	8895
Q9H3P2_C131	WHSC2 Negative elongation factor A	7290	Q7Z2W4_C645	ZC3HAV1 Zinc finger CCCH-type antiviral protein 1	8896
Q9H3P2_C141	WHSC2 Negative elongation factor A	7291	095081_C39	AGFG2 Arf-GAP domain and FG repeat-containing protein 2	8897
Q92570_C397	NR4A3 Nuclear receptor subfamily 4 group A member 3	7292	P11216_C326	PYGB Glycogen phosphorylase, brain form	8898
Q14204_C633	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	7293	Q16548_C55	BCL2A1 Bcl-2-related protein A1	8899
P15880_C229	RPS2 40S ribosomal protein S2	7294	Q7Z6Z7_C3372	HUWE1 E3 ubiquitin-protein ligase HUWE 1	8900
Q12906_C278	ILF3 Interleukin enhancer-binding factor 3	7295	A6NDG6_C297	PGP Phosphoglycolate phosphatase	8901
Q12906_C295	ELF3 Interleukin enhemcer-brnding factor 3	7296	095336_C32	PGLS 6-phosphogluconolactonase	8902
P27348_C237	YWHAQ 14-3-3 protein theta	7297	014933_C98	UBE2L6 Ubiquitin/ISG15-conjugating enzyme E2 L6	8903
Q9UHD8_C531	SEPT9 Septin-9	7298	P49588_C773	AARS Alanine-tRNA ligase, cytoplasmic	8904
P16152_C227	CBR1 Carbonyl reductase	7299	Q9Y277_C65	VDAC3 Voltage-dependent anion-selective channel protein	8905
P05455_C245	SSB Lupus La protein	7300	Q6IA69_C428	NADSYN1 Glutamine-dependent NAD(+) synthetase	8906
P50995_C294	ANXA1 1 Annexin All	7301	Q9Y2W6_C109	TDRKH Tudor and KH domain-containing protein	8907
P42765_C382	ACAA2 3-ketoacyl-CoA thiolase, mitochondrial	7302	Q9NRW3_C130	APOBEC3C Probable DNA dC- dU-editing enzyme APOBEC-3C	8908
Q06323_C101	PSME1 Proteasome activator complex subunit 1	7303	P00813_C75	ADA Adenosine deaminase	8909
Q06323_C106	PSME1 Proteasome activator complex subunit 1	7304	014920_C464	IKBKB Inhibitor of nuclear factor kappa-B kinase subunit	8910
P68036_C86	UBE2L3 Ubiquitin-conjugating enzyme E2 L3	7305	Q9NWZ3_C13	IRAK4 Interleukin- 1 receptor-associated kinase 4	8911
Q9P0J1_C151	PDP1	7306	Q13422_C394	IKZF1 DNA-binding protein Qcaros	8912

Q92973_C 285	TNPO1 Transportin-1	7307	Q04759_C 17	PRKCQ Protein kinase C theta type	8913
Q86UX7_C 128	FERMT3 Fermitin family homolog 3	7308	Q14005_C 1011	IL16 Pro-interleukin-16	8914
Q9Y5T5_C 205	USP16 Ubiquitin carboxyl-terminal hydrolase 16	7309	Q75694_C 1344	NUP155 Nuclear pore complex protein Nup155	8915
Q15149_C 4071	PLEC Plectin	7310	Q9BU76_C 58	MMTAG2 Multiple myeloma tumor-associated protein 2	8916
Q9NP80_C 714	PNPLA8 Calcium-independent phospholipase A2-gamma	7311	Q6FI81_C 251	CIAPIN1 Anamorsin	8917
P13796_C 140	LCP1 Plastin-2	7312	P54136_C 34	RARS Arginine-tRNA ligase, cytoplasmic	8918
O14647_C 365	CHD2 Chromodomain-helicase-DNA- binding protein 2	7313	Q3ZCM7_C 303	TUBB8 Tubulin beta-8 chain	8919
Q92973_C 297	TNPO1 Transportin-1	7314	Q3ZCM7_C 354	TUBB8 Tubulin beta-8 chain	8920
P13489_C 95	RNH1 Ribonuclease inhibitor	7315	Q13163_C 300	MAP2K5 Dual specificity mitogen-activated protein kinase	8921
P13489_C 96	RNH1 Ribonuclease inhibitor	7316	Q81ZL8_C 237	PELP1 Proline-, glutamic acid- and leucine-rich protein	8922
Q9HC35_C 820	EML4 Echinoderm microtubule- associated protein-like 4	7317	A0AVT1_C 546	UBA6 Ubiquitin-like modifier-activating enzyme 6	8923
P08107_C 603	HSPA1B Heat shock 70 kDa protein 1A/1B	7318	Q7L2J0_C 522	MEPCE 7SK snRNA methylphosphate capping enzyme	8924
P30510_C 345	HLA-C HLA class I histocompatibility antigen, Cw-14 alph	7319	Q14657_C 23	LAGE3 L antigen family member 3	8925
Q29865_C 345	HLA-C HLA class I histocompatibility antigen, Cw-18 alph	7320	B011T2_C 979	MYO1G Unconventional myosin-Ig	8926
P30504_C 345	HLA-C HLA class I histocompatibility antigen, Cw-4 alpha	7321	P36969_C 134	GPX4 Phospholipid hydroperoxide glutathione peroxidase, mitochondrial	8927
Q00653_C 432	NFKB2 Nuclear factor NF-kappa-B p100 subunit	7322	Q14149_C 15	MORC3 MORC family CW- type zinc finger protein 3	8928
Q96GX9_C 16	APIP Probable methylthioribulose-1- phosphate dehydratase	7323	P82932_C 105	MRPS6 28S ribosomal protein S6, mitochondrial	8929
P16152_C 226	CBR1 Carbonyl reductase	7324	Q16666_C 637	IFI16 Gamma-interferon- inducible protein 16	8930
P13797_C 143	PLS3 Plastin-3	7325	Q10567_C 866	AP1B1 AP-1 complex subunit beta-1	8931
Q9TNN7_C 345	HLA-C HLA class I histocompatibility antigen, Cw-5 alpha	7326	Q709C8_C 2159	VPS13C Vacuolar protein sorting-associated protein 13C	8932
Q29963_C 345	HLA-C HLA class I histocompatibility antigen, Cw-6 alpha	7327	Q7Z6Z7_C 3375	HUWE1 E3 ubiquitin-protein ligase HUWE1	8933
Q29960_C 345	HLA-C HLA class I histocompatibility antigen, Cw-16 alpha	7328	Q7Z6Z7_C 3385	HUWE1 E3 ubiquitin-protein ligase HUWE1	8934
Q07000_C 345	HLA-C HLA class I histocompatibility antigen, Cw-15 alpha	7329	Q9ULA0_C 327	DNPEP Aspartyl aminopeptidase	8935
P14678_C 19	SNRNPB Small nuclear ribonucleoprotein-associated protein	7330	P29590_C 479	PML Protein PML	8936
P63162_C 19	SNRPN Small nuclear ribonucleoprotein-associated protein	7331	Q9NRG0_C 55	CHRAC1 Chromatin accessibility complex protein 1	8937
O14950_C 109	MYL12B Myosin regulatory light chain 12B	7332	Q14005_C 1016	IL16 Pro-interleukin-16	8938

P14618_C 358	PKM Pyruvate kinase isozymes M1/M2	7333	Q8NCF5_C232	NFATC2IP NFATC2-interacting protein	8939
014733_C 131	MAP2K7 Dual specificity mitogen-activated protein kinase	7334	Q96QT6_C233	PHF12 PHD finger protein 12	8940
P62701_C 41	RPS4X 40S ribosomal protein S4, X isoform	7335	Q29RF7_C532	PDS5A Sister chromatid cohesion protein PDS5 homolog A	8941
P60709_C 257	ACTB Actin, cytoplasmic 1	7336	QI6254_C88	E2F4 Transcription factor E2F4	8942
P60709_C 272	ACTB Actin, cytoplasmic 1	7337	Q53GL7_C434	PARP10Poly	8943
Q8N7H5_C36	PAF1 RNA polymerase II-associated factor 1 homolog	7338	Q93009_C315	USP7 Ubiquitin carboxyl-terminal hydrolase 7	8944
Q9UBB5_C359	MBD2 Methyl-CpG-binding domain protein 2	7339	095931_C102	CBX7 Chromobox protein homolog 7	8945
P21964_C 223	COMT Catechol O-methyltransferase	7340	095931_C107	CBX7 Chromobox protein homolog 7	8946
Q9BVQ7_C509	SPATA5L1 Spermatogenesis-associated protein 5-like protein	7341	Q5VZ89_C850	DENND4C DENN domain-containing protein 4C	8947
P61247_C 201	RPS3A 40S ribosomal protein S3a	7342	Q8NF50_C939	DOCK8 Dedicator of cytokinesis protein 8	8948
Q9Y3D5_C90	MRPS18C 28S ribosomal protein S18c, mitochondrial	7343	Q7Z3B4_C171	NUP54 Nucleoporin p54	8949
P48735_C 308	IDH2 Isocitrate dehydrogenase	7344	Q6FI81_C249	CIAPIN1 Anamorsin	8950
P84243_C 111	H3F3B Histone H3.3	7345	Q92888_C595	ARHGEF1 Rho guanine nucleotide exchange factor 1	8951
P37198_C 475	NUP62 Nuclear pore glycoprotein p62	7346	Q8TDG2_C182	ACTRT1 Actin-related protein T1	8952
P61158_C 307	ACTR3 Actin-related protein 3	7347	060216_C78	RAD21 Double-strand-break repair protein rad21 homolog	8953
P35754_C 23	GLRX Glutaredoxin-1	7348	Q9UPN6_C102	SCAF8 Protein SCAF8	8954
Q9Y5B9_C574	SUPT16H FACT complex subunit SPT16	7349	Q9NVC6_C649	MED17 Mediator of RNA polymerase II transcription subunit 17	8955
P22102_C 237	GART Trifunctional purine biosynthetic protein adenosine	7350	P35579_C816	MYH9 Myosin-9	8956
Q01780_C 612	EXOSC10 Exosome component 10	7351	Q9P0J1_C149	PDP1	8957
Q7Z5K2_C293	WAPAL Wings apart-like protein homolog	7352	095602_C613	POLR1A DNA-directed RNA polymerase I subunit RPAI	8958
P39687_C 87	ANP32A Acidic leucine-rich nuclear phosphoprotein 32 family member A	7353	Q8IZL8_C536	PELP1 Proline-, glutamic acid- and leucine-rich protein	8959
P49588_C 947	AARS Alanine- tRNA ligase, cytoplasmic	7354	P42331_C154	ARHGAP25 Rho GTPase-activating protein 25	8960
Q9GZR2_C382	REX04 RNA exonuclease 4	7355	P78527_C3837	PRKDC DNA-dependent protein kinase catalytic subunit	8961
H3BQZ7_C408	Uncharacterized protein	7356	P61978_C185	HNRNPK Heterogeneous nuclear ribonucleoprotein K	8962
Q1KMD3_C408	HNRNPU2 Heterogeneous nuclear ribonucleoprotein U-like protein 2	7357	P51610_C352	HCFC1 Host cell factor 1	8963
Q00325_C 237	SLC25A3 Phosphate carrier protein, mitochondrial	7358	J3QR44_C422	CDK11B Cyclin-dependent kinase 11B	8964

Q8TEM1_C767	NUP210 Nuclear pore membrane glycoprotein 210	7359	P21127_C432	CDK11B Cyclin-dependent kinase 11B	8965
P62753_C12	RPS6 40S ribosomal protein S6	7360	Q01082_C183	SPTBN1 Spectrin beta chain, non-erythrocytic 1	8966
O95487_C562	SEC24B Protein transport protein Sec24B	7361	P05771_C502	PRKCB Protein kinase C beta type	8967
P17844_C200	DDX5 Probable ATP-dependent RNA helicase DDX5	7362	Q9NYQ6_C1840	CELSR1 Cadherin EGF LAG seven-pass G-type receptor 1	8968
Q92841_C277	DDX17 Probable ATP-dependent RNA helicase DDX17	7363	Q8NBU5_C137	ATAD1 ATPase family AAA domain-containing protein 1	8969
O75533_C1035	SF3B1 Splicing factor 3B subunit 1	7364	Q9BXL7_C539	CARD11 Caspase recruitment domain-containing protein 11	8970
P62280_C131	RPS11 40S ribosomal protein S11	7365	Q6PCE3_C303	PGM2L1 Glucose 1,6-bisphosphate synthase	8971
Q9Y3L3_C102	SH3BP1 SH3 domain-binding protein 1	7366	Q9BTE3_C287	MCMBP Mini-chromosome maintenance complex-binding protein	8972
Q13148_C50	TARDBP TAR DNA-binding protein 43	7367	Q9NTM9_C248	CUTC Copper homeostasis protein cutC homolog	8973
P14649_C89	MYL6B Myosin light chain 6B	7368	Q9Y4P1_C74	ATG4B Cysteine protease ATG4B	8974
P60660_C32	MYL6 Myosin light polypeptide 6	7369	P21580_C657	TNFAIP3 Tumor necrosis factor alpha-induced protein 3	8975
P62910_C91	RPL32 60S ribosomal protein L32	7370	O43149_C2546	ZZEF1 Zinc finger ZZ-type and EF-hand domain-containing 1	8976
P21333_C1157	FLNA Filamin-A	7371	Q8NHV1_C195	GIMAP7 GTPase IMAP family member 7	8977
Q9BWD1_C88	ACAT2 Acetyl-CoA acetyltransferase, cytosolic	7372	Q14644_C206	RASA3 Ras GTPase-activating protein 3	8978
Q9BWD1_C92	ACAT2 Acetyl-CoA acetyltransferase, cytosolic	7373	Q99567_C608	NUP88 Nuclear pore complex protein Nup88	8979
Q8WWP7_C181	GIMAP1 GTPase IMAP family member 1	7374	P08311_C142	CTSG Cathepsin G	8980
P05386_C61	RPLP1 60S acidic ribosomal protein P1	7375	O60256_C31	PRPSAP2 Phosphoribosyl pyrophosphate synthase-associated protein 2	8981
P07900_C374	HSP90AA1 Heat shock protein HSP 90-alpha	7376	O95785_C1429	WIZ Protein Wiz	8982
O75694_C974	NUP155 Nuclear pore complex protein Nup155	7377	O00148_C74	DDX39A ATP-dependent RNA helicase DDX39A	8983
Q9NZ32_C388	ACTR10 Actin-related protein 10	7378	O00148_C86	DDX39A ATP-dependent RNA helicase DDX39A	8984
P14618_C326	PKM Pyruvate kinase isozymes M1/M2	7379	Q9H4E7_C266	DEF6 Differentially expressed in FDCP 6 homolog	8985
Q9BZL6_C217	PRKD2 Serine/threonine-protein kinase D2	7380	P31949_C91	S100A11 Protein S100-A11	8986
Q9Y490_C709	TLN1 Talin-1	7381	P18206_C85	VCL Vinculin	8987
Q9Y490_C719	TLN1 Talin-1	7382	P12931_C280	SRC Proto-oncogene tyrosine-protein kinase Src	8988
A6NHR9_C505	SMCHD1 Structural maintenance of chromosomes flexible hinge domain-containing protein 1	7383	Q9UK61_C830	FAM208A Protein FAM208A	8989

P18669_C 153	PGAM1 Phosphoglycerate rautase 1	7384	P19838_C 925	NFKB1 Nuclear factor NF-kappa-B p105 subunit	8990
Q99973_C 149	TEP1 Telomerase protein component 1	7385	Q15418_C C432	RPS6KA1 Ribosomal protein S6 kinase alpha-1	8991
P31150_C 202	GDI1 Rab GDP dissociation inhibitor alpha	7386	P17987_C 397	TCPI T-complex protein 1 subunit alpha	8992
Q96S15_C C474	WDR24 WD repeat-containing protein 24	7387	P30566_C 483	ADSL Adenylosuccinate lyase	8993
A0FGR8_C C611	ESYT2 Extended synaptotagmin-2	7388	Q96FV9_C C49	THOC1 THO complex subunit 1	8994
P49792_C 348	RANBP2 E3 SUMO-protein ligase RanBP2	7389	Q9H9Y6_C C1061	POLR1B DNA-directed RNA polymerase I subunit RPA2	8995
Q9Y6C9_C C79	MTCH2 Mitochondrial carrier homolog 2	7390	Q9UN37_C C403	VPS4A Vacuolar protein sorting-associated protein 4A	8996
Q9Y3L3_C C388	SH3BP1 SHS domain-binding protein 1	7391	Q49A26_C C303	GLYR1 Putative oxidoreductase GLYR1	8997
P47755_C 111	CAPZA2 F-actin-capping protein subunit alpha-2	7392	P49591_C 300	SARS Serine- tRNA ligase, cytoplasmic	8998
Q86W42_C C314	THOC6 THO complex subunit 6 homolog	7393	P78371_C 289	CCT2 T-complex protein 1 subunit beta	8999
P38646_C 317	HSPA9 Stress-70 protein, mitochondrial	7394	P55786_C 265	NPEPPS Puromycin-sensitive aminopeptidase	9000
Q9UID3_C C190	VPS5 1 Vacuolar protein sorting-associated protein 5 1 homolog	7395	Q9Y314_C C185	NOSIP Nitric oxide synthase-interacting protein	9001
Q9Y2Q3_C C176	GSTK1 Glutathione S-transferase kappa 1	7396	P30466_C 188	HLA-B HLA class I histocompatibility antigen, B-18 alpha	9002
Q86XR8_C C285	CEP57 Centrosomal protein of 57 kDa	7397	P30462_C 188	HLA-B HLA class I histocompatibility antigen, B-14 alpha	9003
P21281_C 162	ATP6V1B2 V-type proton ATPase subunit B, brain isoform	7398	Q14980_C C80	NUMA1 Nuclear mitotic apparatus protein 1	9004
Q86UV5_C C39	USP48 Ubiquitin carboxyl-terminal hydrolase 48	7399	P36954_C 52	POLR2I DNA-directed RNA polymerase II subunit RPB9	9005
P35579_C 671	MYH9 Myosin-9	7400	095639_C C41	CPSF4 Cleavage and polyadenylation specificity factor subunit	9006
P10809_C 237	HSPD1 60 kDa heat shock protein, mitochondrial	7401	P14618_C 49	PKM Pyruvate kinase isozymes M1/M2	9007
P35611_C 68	ADD1 Alpha-adducin	7402	Q7L4I2_C C382	RSRC2 Arginine/serine-rich coiled-coil protein 2	9008
Q9H4M9_C C138	EHD1 EH domain-containing protein 1	7403	A6NHR9_C C1899	SMCHD1 Structural maintenance of chromosomes flexible hinge domain containing 1	9009
060828_C 60	PQBP1 Polyglutamine-binding protein 1	7404	Q86U90_C C99	YRDC YrdC domain-containing protein, mitochondrial	9010
Q9P289_C C392	MST4 Serine/threonine-protein kinase MST4	7405	Q86U90_C C95	YRDC YrdC domain-containing protein, mitochondrial	9011
P28838_C 376	LAP3 Cytosol aminopeptidase	7406	Q14839_C C1827	CHD4 Chromodomain-helicase-DNA-binding protein 4	9012
P55265_C	ADAR Double-stranded RNA-specific	7407	Q92499_	DDX1 ATP-dependentRNA	9013

851	adenosine deaminase		C111	helicase DDX1	
Q8WXH0_C39	SYNE2 Nesprin-2	7408	P49411_C222	TUFM Elongation factor Tu, mitochondrial	9014
P50991_C252	CCT4 T-complex protein 1 subunit delta	7409	P49411_C290	TUFM Elongation factor Tu, mitochondrial	9015
Q8NDH3_C189	NPEPL1 Probable aminopeptidase NPEPL1	7410	Q9Y5U2_C99	TSSC4 Protein TSSC4	9016
P49023_C290	PXN PaxiUin	7411	P49189_C267	ALDH9A1 4-trimethylaminobutyraldehyde dehydrogenase	9017
Q9Y508_C8	RNF114 RING finger protein 114	7412	075376_C1274	NCOR1 Nuclear receptor corepressor 1	9018
P13667_C555	PDIA4 Protein disulfide-isomerase A4	7413	P23743_C645	DGKA Diacylglycerol kinase alpha	9019
P30101_C406	PDIA3 Protein disulfide-isomerase A3	7414	P26368_C429	U2AF2 Splicing factor U2AF 65 kDa subunit	9020
P15153_C6	RAC2 Ras-related C3 botulinum toxin substrate 2	7415	Q01432_C47	AMPD3 AMP deaminase 3	9021
Q29RF7_C583	PDS5A Sister chromatid cohesion protein PDS5 homolog A	7416	Q9HBH5_C97	RDH14 Retinol dehydrogenase 14	9022
Q00839_C408	HNRNPU Heterogeneous nuclear ribonucleoprotein U	7417	Q13576_C276	IQGAP2 Ras GTPase-activating-like protein IQGAP2	9023
P13667_C558	PDIA4 Protein disulfide-isomerase A4	7418	Q9H5V9_C11	CXorf56 UPF0428 protein CXorf56	9024
P30101_C409	PDIA3 Protein disulfide-isomerase A3	7419	Q9NYK5_C335	MRPL39 39S ribosomal protein L39, mitochondrial	9025
Q9Y4H4_C160	GPSM3 G-protein-signaling modulator 3	7420	Q96JM7_C233	L3MBTL3 Lethal(3)malignant brain tumor-like protein 3	9026
P60763_C6	RAC3 Ras-related C3 botulinum toxin substrate 3	7421	P20591_C42	MX1 Interferon-induced GTP-binding protein Mx1	9027
P63000_C6	RAC1 Ras-related C3 botulinum toxin substrate 1	7422	Q9NVS2_C186	MRPS18A 28S ribosomal protein S18a, mitochondrial	9028
095232_C40	LUC7L3 Luc7-like protein 3	7423	015042_C65	U2SURP U2 snRNP-associated SURP motif-containing protein	9029
P60953_C6	CDC42 Cell division control protein 42 homolog	7424	Q5H9U9_C1031	DDX60L Probable ATP-dependent RNA helicase DDX60-like	9030
P61158_C34	ACTR3 Actin-related protein 3	7425	Q9Y4A5_C3535	TRRAP Transformation/transcription domain-associated protein	9031
Q9P2A4_C137	ABI3 ABI gene family member 3	7426	060313_C801	OPA1 Dynamin-like 120 kDa protein, mitochondrial	9032
P16333_C266	NCK1 Cytoplasmic protein NCK1	7427	060759_C246	CYTIP Cytohesin-interacting protein	9033
P49591_C438	SARS Serine-tRNA ligase, cytoplasmic	7428	P51531_C1296	SMARCA2 Probable global transcription activator SNF2L2	9034
Q9BQC3_C251	DPH2 Diphthamide biosynthesis protein 2	7429	P51532_C1359	SMARCA4 Transcription activator BRG1	9035
Q99439_C61	CNN2 Calponin-2	7430	Q6QNY0_C168	BLOC1S3 Biogenesis of lysosome-related organelles complex	9036
Q07020_C134	RPL18 60S ribosomal protein L18	7431	P16615_C447	ATP2A2 Sarcoplasmic/endoplasmic	9037

				reticulum calcium ATPase	
P57772_C 442	EEFSEC Selenocysteine-specific elongation factor	7432	Q6PTJ9_C 654	WDR59 WD repeat-containing protein 59	9038
Q92797_C 848	SYMPK Symplekin	7433	Q99683_C C928	MAP3K5 Mitogen-activated protein kinase kinase kinase 5	9039
Q8WUM4 C250	PDCD6IP Programmed cell death 6-interacting protein	7434	Q99714_C C58	HSD17B10 3-hydroxyacyl-CoA dehydrogenase type-2	9040
P04075_C 73	ALDOA Fructose-bisphosphate aldolase A	7435	A6NC98_C C1222	CCDC88B Coiled-coil domain-containing protein 88B	9041
P31146_C 51	CORO1A Coronin-1A	7436	P78527_C 4045	PRKDC DNA-dependent protein kinase catalytic subunit	9042
P31146_C 24	CORO1A Coronin-1A	7437	Q9C0B1_C C171	FTO Alpha-ketoglutarate-dependent dioxygenase FTO	9043
Q9NXE8_C C107	CWC25 Pre-mRNA-splicing factor CWC25 homolog	7438	Q9Y490_C C2161	TLN1 Talin-1	9044
Q01813_C 360	PFKP 6-phosphofructokinase type C	7439	P78527_C 3403	PRKDC DNA-dependent protein kinase catalytic subunit	9045
Q92878_C 1302	RAD50 DNA repair protein RAD50	7440	Q9H668_C C8	OBFC1 CST complex subunit STN1	9046
P62241_C 174	RPS8 40S ribosomal protein S8	7441	Q96FS4_C C811	SIPA1 Signal-induced proliferation-associated protein 1	9047
Q9BQC3_C C250	DPH2 Diphthamide biosynthesis protein 2	7442	Q8NI27_C C1064	THOC2 THO complex subunit 2	9048
Q14166_C 612	TTL12 Tubulin--tyrosine ligase-like protein 12	7443	O15213_C C515	WDR46 WD repeat-containing protein 46	9049
P62241_C 72	RPS8 40S ribosomal protein S8	7444	P48147_C 255	PREP Prolyl endopeptidase	9050
P28062_C 160	PSMB8 Proteasome subunit beta type-8	7445	B5ME19_C C753	EIF3CL Eukaryotic translation initiation factor 3 subunit	9051
P51649_C 340	ALDH5A1 Succinate-semialdehyde dehydrogenase, mitochondrial	7446	Q15118_C C71	PKD1	9052
Q8WYJ6_C C99	SEPT1 Septin-1	7447	P12081_C 509	HARS Histidine--tRNA ligase, cytoplasmic	9053
Q8WYJ6_C C102	SEPT1 Septin-1	7448	O60684_C C253	KPNA6 Importin subunit alpha-7	9054
Q15027_C 64	ACAP1 Arf-GAP with coiled-coil, ANK repeat and PH domain 1	7449	Q9BVP2_C C234	GNL3 Guanine nucleotide-binding protein-like 3	9055
Q15366_C 54	PCBP2 Poly(rC)-binding protein 2	7450	P09326_C 148	CD48 CD48 antigen	9056
Q15365_C 54	PCBP1 Poly(rC)-binding protein 1	7451	O75663_C C14	TIPRL TIP41-like protein	9057
P35236_C 204	PTPN7 Tyrosine-protein phosphatase non-receptor type 7	7452	Q9Y4W2_C C306	LAS1L Ribosomal biogenesis protein LAS1L	9058
P47756_C 147	CAPZB F-actin-capping protein subunit beta	7453	Q92889_C C560	ERCC4 DNA repair endonuclease XPF	9059
A6NHR9_C C444	SMCHD1 Structural maintenance of chromosomes flexible hinge domain-containing protein 1	7454	Q9Y4F9_C C519	FAM65B Protein FAM65B	9060
Q5TDH0_C C361	DDI2 Protein DDI1 homolog 2	7455	Q8N8A6_C C402	DDX51 ATP-dependent RNA helicase DDX51	9061
P62266_C 90	RPS23 40S ribosomal protein S23	7456	Q92900_C C188	UPF1 Regulator of nonsense transcripts 1	9062

P29590_C 204	PML Protein PML	7457	Q27J81_C 971	ENF2 Inverted formin-2	9063
P42226_C 228	STAT6 Signal transducer and activator of transcription 6	7458	000422_C 26	SAP 18 Histone deacetylase complex subunit SAP 18	9064
Q9H1E5_C C326	TMX4 Thioredoxin-related transmembrane protein 4	7459	Q9BRU9_C C207	UTP23 rRNA-processing protein UTP23 homolog	9065
P62241_C 71	RPS8 40S ribosomal protein S8	7460	Q9NV88_C C578	INTS9 Integrator complex subunit 9	9066
Q9UBW5_C C205	BN2 Bridging integrator 2	7461	P57740_C 78	NUP 107 Nuclear pore complex protein Nup107	9067
P41214_C 489	EIF2D Eukaryotic translation initiation factor 2D	7462	Q15005_C C26	SPCS2 Signal peptidase complex subunit 2	9068
Q96I99_C 255	SUCLG2 Succinyl-CoA ligase	7463	075643_C C238	SNRNP200 U5 small nuclear ribonucleoprotein 200 kDa helicase	9069
P63208_C 160	SKP1 S-phase kinase-associated protein 1	7464	Q92608_C C41	DOCK2 Dedicator of cytokinesis protein 2	9070
P61163_C 34	ACTR1 A Alpha-centractin	7465	P62913_C 72	RPL1 1 60S ribosomal protein L1	9071
P42025_C 34	ACTR1B Beta-centractin	7466	Q96F54_C C755	SIPA1 Signal-induced proliferation-associated protein 1	9072
015381_C 626	NVL Nuclear valosin-containing protein-like	7467	Q92974_C C306	ARHGEF2 Rho guanine nucleotide exchange factor 2	9073
Q9NTX5_C C133	ECHDC1 Ethylmalonyl-CoA decarboxylase	7468	Q8TDB6_C C175	DTX3L E3 ubiquitin-protein ligase DTX3L	9074
043390_C 292	HNRNPR Heterogeneous nuclear ribonucleoprotein R	7469	Q68EM7_C C305	ARHGAP17 Rho GTPase-activating protein 17	9075
060506_C 289	SYNCRIP Heterogeneous nuclear ribonucleoprotein Q	7470	075131_C C54	CPNE3 Copine-3	9076
Q2M2I8_C C156	AAK1 AP2-associated protein kinase 1	7471	Q9P107_C C895	GMIP GEM-interacting protein	9077
P62917_C 115	RPL8 60S ribosomal protein L8	7472	Q81YQ7_C C324	THNSL1 Threonine synthase-like 1	9078
060610_C 314	DIAPH1 Protein diaphanous homolog 1	7473	Q05086_C C83	UBE3A Ubiquitin-protein ligase E3A	9079
P12081_C 455	HARS Histidine-tRNA ligase, cytoplasmic	7474	Q8IWZ3_C C181	ANKHD1 Ankyrin repeat and KH domain-containing protein 1	9080
P62917_C 114	RPL8 60S ribosomal protein L8	7475	Q14671_C C1179	PUM1 Pumilio homolog 1	9081
P23528_C 147	CFL1 Cofilin-1	7476	Q9BVL2_C C252	NUPL1 Nucleoporin p58/p45	9082
P49189_C 288	ALDH9A1 4-trimethylaminobutyraldehyde dehydrogenase	7477	Q8NF50_C C186	DOCK8 Dedicator of cytokinesis protein 8	9083
P49189_C 289	ALDH9A1 4-trimethylaminobutyraldehyde dehydrogenase	7478	Q9HB21_C C389	PLEKHA1 Pleckstrin homology domain-containing family A member 1	9084
Q8N0W3_C C582	FUK L-fucose kinase	7479	Q96HC4_C C213	PDLIM5 PDZ and LIM domain protein 5	9085
Q14137_C 404	BOPI Ribosome biogenesis protein BOPI	7480	Q9UPU5_C C1362	USP24 Ubiquitin carboxyl-terminal hydrolase 24	9086
Q9Y4K1_C C1404	AIM1 Absent in melanoma 1 protein	7481	Q9Y5T5_C C618	USP16 Ubiquitin carboxyl-terminal hydrolase 16	9087

PI9367_C 813	HK1 Hexokinase-1	7482	Q9Y570_ C381	PPME1 Protein phosphatase methyltransferase 1	9088
P60174_C 79	TPI1 Triosephosphate isomerase	7483	Q9NYK5 C133	MRPL39 39S ribosomal protein L39, mitochondrial	9089
Q9H307_ C249	PNN Pinin	7484	Q96T51_ C703	RUFY1 RUN and FYVE domain-containing protein 1	9090
Q9UKA8_ C239	RCAN3 Calcipressin-3	7485	Q16643_ C613	DBN1 Drebrin	9091
000160_C 101	MYOIF Unconventional myosin-If	7486	Q9Y5B0_ C429	CTDPI RNA polymerase II subunit A C-terminal domain phosphatase	9092
P07355_C 133	ANXA2 Annex in A2	7487	Q8N806_ C260	UBR7 Putative E3 ubiquitin- protein ligase UBR7	9093
P07814_C 1148	EPRS Bifunctional glutamate/proline- tRNA ligase	7488	Q96K76_ C856	USP47 Ubiquitin carboxyl- terminal hydrolase 47	9094
P52907_C 157	CAPZA1 F-actin-capping protein subunit alpha-1	7489	Q9UDY8 _C71	MALT1 Mucosa-associated lymphoid tissue lymphoma translocation protein 1	9095
P62837_C 111	UBE2D2 Ubiquitin-conjugating enzyme E2 D2	7490	Q8IY81_ C577	FTSJ3 pre-rRNA processing protein FTSJ3	9096
P61077_C 111	UBE2D3 Ubiquitin-conjugating enzyme E2 D3	7491	P21333_C 796	FLNA Filamin-A	9097
Q8NE71_ C365	ABCF1 ATP-binding cassette sub- family F member 1	7492	P11413_C 446	G6PD Glucose-6-phosphate 1- dehydrogenase	9098
Q8NBU5_ C359	ATAD1 ATPase family AAA domain- containing protein 1	7493	P42575_C 320	CASP2 Caspase-2	9099
P55265_C 630	ADAR Double-stranded RNA-specific adenosine deaminase	7494	Q04760_ C61	GLO1 Lactoylglutathione lyase	9100
Q9Y3Z3_ C51	SAMHD1 SAM domain and HD domain-containing protein 1	7495	000562_ C259	PITPNM1 Membrane- associated phosphatidylinositol transfer	9101
P29728_C 668	OAS2 2-5-oligoadenylate synthase 2	7496	P49848_C 141	TAF6 Transcription initiation factor TFIID subunit 6	9102
043823_C 85	AKAP8 A-kinase anchor protein 8	7497	P08567_C 160	PLEK Pleckstrin	9103
P51610_C 135	HCFC1 Host cell factor 1	7498	Q7Z7H8_ C180	MRPLIO 39S ribosomal protein L10, mitochondrial	9104
P20592_C 100	MX2 Interferon-induced GTP-binding protein Mx2	7499	095786_ C268	DDX58 Probable ATP- dependent RNA helicase DDX58	9105
Q96N96_ C124	SPATA13 Spermatogenesis-associated protein 13	7500	P17655_C 105	CAPN2 Calpain-2 catalytic subunit	9106
Q01826_C 209	SATB1 DNA-binding protein SATB1	7501	000541_ C361	PES1 Pescadillo homolog	9107
I3L115_C 86	Uncharacterized protein	7502	Q8WW9 _C405	HNRPLL Heterogeneous nuclear ribonucleoprotein L- like	9108
P62837_C 107	UBE2D2 Ubiquitin-conjugating enzyme E2 D2	7503	P45974_C 335	USP5 Ubiquitin carboxyl- terminal hydrolase 5	9109
P61077_C 107	UBE2D3 Ubiquitin-conjugating enzyme E2 D3	7504	P14868_C 203	DARS Aspartate-tRNA ligase, cytoplasmic	9110
P20591_C 52	MX1 Interferon-induced GTP-binding protein Mx1	7505	Q8WWY 3_C247	PRPF31 U4/U6 small nuclear ribonucleoprotein Prp3 1	9111
Q9Y490_ C1023	TLN1 Talin-1	7506	Q9P258_ C280	RCC2 Protein RCC2	9112

Q99973_C 1468	TEPI Telomerase protein component 1	7507	P22087_C 99	FBL rRNA 2-0- methyltransferase fibrillarin	9113
Q8IY67_C C297	RAVER1 Ribonucleoprotein PTB- binding 1	7508	Q8N8A2_C C408	ANKRD44 Serine/threonine- protein phosphatase 6 regulatory	9114
Q8WUM4_C C512	PDCD6IP Programmed cell death 6- interacting protein	7509	Q96EB1_C C361	ELP4 Elongator complex protein 4	9115
Q14141_C 14	SEPT6 Septin-6	7510	P20073_C 413	ANXA7 Annexin A7	9116
015213_C 172	WDR46 WD repeat-containing protein 46	7511	Q6PGP7_C C1162	TTC37 Tetralricopeptide repeat protein 37	9117
B0I1T2_C 143	MYOIG Unconventional myosin-Ig	7512	Q9Y490_C C1978	TLN1 Talin-1	9118
P14868_C 349	DARS Aspartate-tRNA ligase, cytoplasmic	7513	Q14204_C C1888	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	9119
P40227_C 406	CCT6A T-complex protein 1 subunit zeta	7514	Q8N8A2_C C334	ANKRD44 Serine/threonine- protein phosphatase 6 regulatory	9120
Q29RF7_C C327	PDS5A Sister chromatid cohesion protein PDS5 homolog A	7515	Q96EY4_C C162	TMA16 Translation machinery-associated protein 16	9121
Q8NF50_C C170	DOCK8 Dedicator of cytokinesis protein 8	7516	Q9UJX4_C C203	ANAPC5 Anaphase- promoting complex subunit 5	9122
Q14683_C 1115	SMC1A Structural maintenance of chromosomes protein 1A	7517	Q9Y490_C C1509	TLN1 Talin-1	9123
014773_C 522	TPP1 Tripeptidyl-peptidase 1	7518	P07814_C 1480	EPRS Bifunctional glutamate/proline-tRNA ligase	9124
014773_C 526	TPP1 Tripeptidyl-peptidase 1	7519	Q14152_C C198	EIF3A Eukaryotic translation initiation factor 3 subunit	9125
014773_C 537	TPP1 Tripeptidyl-peptidase 1	7520	P52306_C 29	RAP1GDS1 Rap1 GTPase- GDP dissociation stimulator 1	9126
Q9NTI5_C C317	PDS5B Sister chromatid cohesion protein PDS5 homolog B	7521	Q96RL1_C C257	UIMC1 BRCA1-A complex subunit RAP80	9127
Q9NVP1_C C183	DDX18 ATP-dependent RNA helicase DDX18	7522	Q8N4N3_C C254	KLHL36 Kelch-like protein 36	9128
Q9Y490_C C1506	TLN1 Talin-1	7523	Q92616_C C55	GCN1L1 Translational activator GCN1	9129
P13796_C 164	LCPI Plastin-2	7524	Q14966_C C652	ZNF638 Zinc finger protein 638	9130
Q5EBM0_C C287	CMPK2 UMP-CMP kinase 2, mitochondrial	7525	P40763_C 687	STAT3 Signal transducer and activator of transcription 3	9131
Q08AF3_C C875	SLFN5 Schlafen family member 5	7526	P22307_C 94	SCP2 Non-specific lipid- transfer protein	9132
Q9NUV9_C C220	GIMAP4 GTPase IMAP family member 4	7527	P41250_C 466	GARS Glycine-tRNA ligase	9133
P08238_C 589	HSP90AB1 Heat shock protein HSP 90-beta	7528	Q8WXH0_C C5315	SYNE2 Nesprin-2	9134
P08238_C 590	HSP90AB1 Heat shock protein HSP 90-beta	7529	P13639_C 567	EEF2 Elongation factor 2	9135
P60866_C 70	RPS20 40S ribosomal protein S20	7530	Q99973_C C171	TEPI Telomerase protein component 1	9136
Q08J23_C 673	NSUN2 tRNA (cytosine(34)-C(5))- methyltransferase	7531	Q8N4C6_C C1986	NIN Ninein	9137

I Q9H4E7_C253	DEF6 Differentially expressed in FDCP 6 homolog	7532	Q8TBC4_C237	UBA3 NEDD8-activating enzyme E1 catalytic subunit	9138
Q15365_C194	PCBP1 Poly(rC)-binding protein 1	7533	Q5VWQ0_C318	RSBN1 Round spermatid basic protein 1	9139
P30041_C47	PRDX6 Peroxiredoxin-6	7534	Q96FS4_C732	SIPA1 Signal-induced proliferation-associated protein 1	9140
P78371_C395	CCT2 T-complex protein 1 subunit beta	7535	P20700_C198	LMNB1 Lamin-B1	9141
P46782_C155	RPS5 40S ribosomal protein S5	7536	P34949_C289	MPI Mannose-6-phosphate isomerase	9142
Q96GM5_C492	SMARCD1 SWI/SNF-related matrix-associated actin-dependent	7537	Q5T1M5_C828	FKBP15 FK506-binding protein 15	9143
P10599_C73	TXN Thioredoxin	7538	Q13315_C2991	ATM Serine-protein kinase ATM	9144
Q14258_C70	TRIM25 E3 ubiquitin/ISG 15 ligase TRIM25	7539	Q9UIG0_C953	BAZ1B Tyrosine-protein kinase BAZ1B	9145
Q96RN5_C618	MED 15 Mediator of RNA polymerase II transcription subunit	7540	Q9ULX6_C128	AKAP8L A-kinase anchor protein 8-like	9146
P45973_C133	CBX5 Chromobox protein homolog 5	7541	Q92620_C865	DHX38 Pre-mRNA-splicing factor ATP-dependent RNA helicase	9147
Q9UHD8_C248	SEPT9 Septin-9	7542	Q7L5D6_C160	GET4 Golgi to ER traffic protein 4 homolog	9148
P39023_C336	RPL3 60S ribosomal protein L3	7543	P34932_C417	HSPA4 Heat shock 70 kDa protein 4	9149
014980_C164	XPO1 Exportin-1	7544	Q7KZ85_C1435	SUPT6H Transcription elongation factor SPT6	9150
Q08J23_C678	NSUN2 tRNA (cytosine(34)-C(5)-methyltransferase	7545	Q9Y2Z2_C315	MTO1 Protein MTO1 homolog, mitochondrial	9151
Q00839_C562	HNRNPU Heterogeneous nuclear ribonucleoprotein U	7546	P08514_C87	ITGA2B Integrin alpha-IIb	9152
Q9BVA1_C127	TUBB2B Tubulin beta-2B chain	7547	075821_C139	EIF3G Eukaryotic translation initiation factor 3 subunit	9153
Q9BVA1_C129	TUBB2B Tubulin beta-2B chain	7548	Q9Y265_C141	RUVBL1 RuvB-like 1	9154
P10599_C32	TXN Thioredoxin	7549	Q969M7_C50	UBE2F NEDD8-conjugating enzyme UBE2F	9155
Q14289_C677	PTK2B Protein-tyrosine kinase 2-beta	7550	H3BSR4_C50	UBE2F Ubiquitin-conjugating enzyme E2F (Putative)	9156
Q9H4E7_C244	DEF6 Differentially expressed in FDCP 6 homolog	7551	P25098_C120	ADRBK1 Beta-adrenergic receptor kinase 1	9157
P15311_C117	EZREzrin	7552	060831_C28	PRAF2 PRA1 family protein 2	9158
P55060_C387	CSE1L Exportin-2	7553	000429_C367	DNM1L Dynamin-1-like protein	9159
Q13838_C165	DDX39B Spliceosome RNA helicase DDX39B	7554	Q7Z5K2_C160	WAPAL Wings apart-like protein homolog	9160
A6NE09_C163	RPSAP58 Protein RPSAP58	7555	P13807_C699	GYS1 Glycogen	9161
Q9BTZ2_C209	DHRS4 Dehydrogenase/reductase SDR family member 4	7556	Q96CP2_C132	FLYWCH2 FLYWCH family member 2	9162
Q8IY21_C517	DDX60 Probable ATP-dependent RNA helicase DDX60	7557	P26651_C250	ZFP36 Tristetraprolin	9163

P04075_C 339	ALDOA Fructose-bisphosphate aldolase A	7558	Q92974_C C478	ARHGEF2 Rho guanine nucleotide exchange factor 2	9164
P13639_C 466	EEF2 Elongation factor 2	7559	Q9H4B7_C C303	TUBB 1 Tubulin beta-1 chain	9165
Q99832_C 29	CCT7 T-complex protein 1 subunit eta	7560	Q9Y5A7_C C52	NUB1 NEDD8 ultimate buster 1	9166
P12814_C 332	ACTN1 Alpha-actinin-1	7561	Q81ZD4_C C369	DCP 1B mRNA-decapping enzyme 1B	9167
Q92619_C 278	HMHA1 Minor histocompatibility protein HA-1	7562	Q13422_C C223	IKZF 1 DNA-binding protein Ikaros	9168
Q13131_C 185	PRKAA1 5-AMP-activated protein kinase catalytic subunit	7563	Q15181_C C270	PPA1 Inorganic pyrophosphatase	9169
P54646_C 174	PRKAA2 5-AMP-activated protein kinase catalytic subunit	7564	P49916_C 929	LIG3 DNA ligase 3	9170
Q00610_C 926	CLTC Clathrin heavy chain 1	7565	Q9Y6C9_C C49	MTCH2 Mitochondrial carrier homolog 2	9171
Q00610_C 934	CLTC Clathrin heavy chain 1	7566	Q15265_C C639	ATXN7 Ataxin-7	9172
Q99439_C 175	CNN2 Calponin-2	7567	Q9BQ67_C C11	GRWD1 Glutamate-rich WD repeat-containing protein 1	9173
B011T2_C 965	MYOIG Unconventional myosin-Ig	7568	Q7Z6Z7_C C3658	HUWE1 E3 ubiquitin-protein ligase HUWE1	9174
Q02252_C 317	ALDH6A1 Methylmalonate- semialdehyde dehydrogenase	7569	Q9BTE3_C C325	MCMBP Mini-chromosome maintenance complex-binding protein	9175
P12955_C 467	PEPD Xaa-Pro dipeptidase	7570	Q92917_C C137	GPKOW G patch domain and KOW motifs-containing protein	9176
P08238_C 366	HSP90AB1 Heat shock protein HSP 90-beta	7571	Q9BSA9_C C32	TMEM175 Transmembrane protein 175	9177
P13639_C 369	EEF2 Elongation factor 2	7572	Q9H9A5_C C504	CNOT10 CCR4-NOT transcription complex subunit 10	9178
P41240_C 31	CSK Tyrosine-protein kinase CSK	7573	P0CB43_C C51	FAM203B Protein FAM203B	9179
P13639_C 812	EEF2 Elongation factor 2	7574	Q9BWU0_C C125	SLC4A1AP Kanadaplin	9180
P22736_C 551	NR4A1 Nuclear receptor subfamily 4 group A member 1	7575	Q96FW1_C C91	OTUB 1 Ubiquitin thioesterase OTUB 1	9181
Q8WVV9 C84	HNRPLL Heterogeneous nuclear ribonucleoprotein L-like	7576	Q9UEY8_C C73	ADD3 Gamma-adducin	9182
Q43707_C 351	ACTN4 Alpha-actinin-4	7577	Q8N4N3_C C308	KLHL36 Kelch-like protein 36	9183
Q9H4B7_C C340	TUBB1 Tubulin beta-1 chain	7578	Q9H3M7_C C170	TXNIP Thioredoxin- interacting protein	9184
Q15067_C 270	PFAS Phosphoribosylformylglycinamide synthase	7579	Q8N9N7_C C128	LRRC57 Leucine-rich repeat- containing protein 57	9185
Q13045_C 232	FLU Protein flightless-1 homolog	7580	I3L1I5_C 144	Uncharacterized protein	9186
Q13057_C 144	COASY Bifunctional coenzyme A synthase	7581	Q7L2J0_C C54	MEPCE 7SK snRNA methylphosphate capping enzyme	9187
P43243_C 230	MATR3 Matrin-3	7582	Q9Y2H0_C C800	DLGAP4 Disks large- associated protein 4	9188

A5YKK6_C624	CNOT1 CCR4-NOT transcription complex subunit 1	7583	Q9Y314_C8	NOSIP Nitric oxide synthase-interacting protein	9189
Q9Y6D5_C76	ARFGEF2 Brefeldin A-inhibited guanine nucleotide-exchange	7584	Q9Y490_C1927	TLN1 Talin-1	9190
P49915_C489	GMPS GMP synthase	7585	Q8N2G8_C502	GHDC GH3 domain-containing protein	9191
Q96BN8_C347	FAM105B Protein FAM105B	7586	P53992_C78	SEC24C Protein transport protein Sec24C	9192
P43403_C78	ZAP70 Tyrosine-protein kinase ZAP-70	7587	P60891_C91	PRPS1 Ribose-phosphate pyrophosphokinase 1	9193
Q9Y3D0_C158	FAM96B Mitotic spindle-associated MMXD complex subunit MI	7588	P11908_C91	PRPS2 Ribose-phosphate pyrophosphokinase 2	9194
Q03518_C795	TAP1 Antigen peptide transporter 1	7589	P21108_C91	PRPS1L1 Ribose-phosphate pyrophosphokinase 3	9195
Q86WS5_C64	TMPRSS12 Transmembrane protease serine 12	7590	Q9UPN7_C216	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	9196
P50579_C298	METAP2 Methionine aminopeptidase 2	7591	Q63HN8_C3084	RNF213 E3 ubiquitin-protein ligase RNF213	9197
Q14019_C52	COTL1 Coactosin-like protein	7592	P61247_C111	RPS3A 40S ribosomal protein S3a	9198
P34897_C119	SHMT2 Serine hydroxymethyltransferase, mitochondrial	7593	P18583_C2070	SON Protein SON	9199
Q86YV9_C695	HPS6 Hermansky-Pudlak syndrome 6 protein	7594	P28331_C727	NDUFS1 NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial	9200
Q96FX7_C209	TRMT61A tRNA (adenine(58)-N(1))-methyltransferase catalytic	7595	P46063_C478	RECQL ATP-dependent DNA helicase Q1	9201
P23528_C139	CFL1 Cofilin-1	7596	Q7L2J0_C429	MEPCE 7SK snRNA methylphosphate capping enzyme	9202
Q96F15_C238	GIMAP5 GTPase IMAP family member 5	7597	Q9NR45_C287	NANS Sialic acid synthase	9203
P62888_C92	RPL30 60S ribosomal protein L30	7598	Q92945_C379	KHSRP Far upstream element-binding protein 2	9204
Q8N163_C644	KIAA1967 DBIRD complex subunit KIAA1967	7599	O75934_C132	BCAS2 Pre-mRNA-splicing factor SPF27	9205
Q9C0K0_C642	BCL11B B-cell lymphoma/leukemia 11B	7600	P42229_C101	STAT5A Signal transducer and activator of transcription 5	9206
P53618_C888	COPB1 Coatomer subunit beta	7601	Q96SI9_C195	STRBP Spermatid perinuclear RNA-binding protein	9207
P13639_C751	EEF2 Elongation factor 2	7602	P78527_C1629	PRKDC DNA-dependent protein kinase catalytic subunit	9208
P60763_C178	RAC3 Ras-related C3 botulinum toxin substrate 3	7603	P28715_C12	ERCC5 DNA repair protein complementing XP-G cells	9209
P63000_C178	RAC1 Ras-related C3 botulinum toxin substrate 1	7604	O60318_C1839	MCM3AP 80 kDa MCM3-associated protein	9210
P38606_C254	ATP6V1A V-type proton ATPase catalytic subunit A	7605	P43354_C190	NR4A2 Nuclear receptor subfamily 4 group A member 2	9211
Q14683_C987	SMC1A Structural maintenance of chromosomes protein 1A	7606	Q562E7_C215	WDR81 WD repeat-containing protein 81	9212
P23528_C39	CFL1 Cofilin-1	7607	P61247_C139	RPS3A 40S ribosomal protein S3a	9213

P17987_C 147	TCP1 T-complex protein 1 subunit alpha	7608	P19174_C 646	PLCG1 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase	9214
P31946_C 96	YWHAB 14-3-3 protein beta/alpha	7609	Q8IUR7_ C283	ARMC8 Armadillo repeat- containing protein 8	9215
Q63HN8_ C1748	RNF213 E3 ubiquitin-protein ligase RNF213	7610	075828_ C227	CBR3 Carbonyl reductase	9216
P46782_C 172	RPS5 40S ribosomal protein S5	7611	Q9NR30_ C291	DDX21 Nucleolar RNA helicase 2	9217
000483_C 44	NDUFA4 NADH dehydrogenase	7612	Q9HCK8_ C1655	CHD8 Chromodomain- helicase-DNA-binding protein 8	9218
P50570_C 27	DNM2 Dynamin-2	7613	Q5T4S7_ C3864	UBR4 E3 ubiquitin-protein ligase UBR4	9219
075427_C 179	LRCH4 Leucine-rich repeat and calponin homology domain-containing protein 4	7614	Q9H869_ C290	YY1 AP1 YY1-associated protein 1	9220
P22234_C 81	PAICS Multifunctional protein ADE2	7615	Q3T8J9_ C813	GON4L GON-4-like protein	9221
P34932_C 34	HSPA4 Heat shock 70 kDa protein 4	7616	PI1161_C 234	EGR2 E3 SUMO-protein ligase EGR2	9222
H3BQZ7_ C452	Uncharacterized protein	7617	P50579_C 436	METAP2 Methionine aminopeptidase 2	9223
Q1KMD3 C452	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein 2	7618	P42229_C 126	STAT5A Signal transducer and activator of transcription 5	9224
P62837_C 85	UBE2D2 Ubiquitin-conjugating enzyme E2 D2	7619	Q15545_ C72	TAF7 Transcription initiation factor TFIID subunit 7	9225
P61077_C 85	UBE2D3 Ubiquitin-conjugating enzyme E2 D3	7620	Q9UM19 C187	HPCAL4 Hippocalcin-like protein 4	9226
P52565_C 79	ARHGDI1 Rho GDP-dissociation inhibitor 1	7621	Q92989_ C338	CLP1 Polyribonucleotide 5- hydroxyl -kinase Clp1	9227
Q9HCD5_ C137	NCOA5 Nuclear receptor coactivator 5	7622	Q5W42_ C138	CDKAL1 Threonylcarbamoyladenosine tRNA methyltransferase	9228
014733_C 260	MAP2K7 Dual specificity mitogen- activated protein kinase	7623	Q9BVQ7_ C580	SPATA5L1 Spermatogenesis- associated protein 5-like protein	9229
Q14203_C 791	DCTN1 Dynactin subunit 1	7624	P24928_C 451	POLR2A DNA-directed RNA polymerase II subunit RPBI	9230
Q96JM7_ C682	L3MBTL3 Lethal(3)malignant brain tumor-like protein 3	7625	Q14573_ C2668	ITPR3 Inositol 1,4,5- trisphosphate receptor type 3	9231
014773_C 365	TPP1 Tripeptidyl-peptidase 1	7626	Q9NUU7 C392	DDX19A ATP-dependent RNA helicase DDX19A	9232
P61158_C 408	ACTR3 Actin-related protein 3	7627	Q9UMR2 C393	DDX19B ATP-dependent RNA helicase DDX19B	9233
P45974_C 532	USP5 Ubiquitin carboxyl-terminal hydrolase 5	7628	P49368_C 398	CCT3 T-complex protein 1 subunit gamma	9234
P23368_C 120	ME2 NAD-dependent malic enzyme, mitochondrial	7629	P0DJD1_ C348	RGPD2 RANBP2-like and GRIP domain-containing protein 2	9235
P60903_C 62	S100A10 Protein S100-A10	7630	Q8TF42_ C367	UBASH3B Ubiquitin- associated and SH3 domain- containing protein	9236
Q07955_C 148	SRSF1 Serine/arginine-rich splicing factor 1	7631	Q9BWG4 C81	SSBP4 Single-stranded DNA- binding protein 4	9237

P10644_C 18	PRKARI A cAMP-dependent protein kinase type I-alpha regulatory subunit	7632	P50995_C 501	ANXA1 1 Annexin A1 1	9238
P07814_C 692	EPRS Bifunctional glutamate/proline-tRNA ligase	7633	Q9UPP1_C 684	PHF8 Histone lysine demethylase PHF8	9239
015355_C 13	PPM1G Protein phosphatase 1G	7634	Q9UQ35_C 1036	SRRM2 Serine/arginine repetitive matrix protein 2	9240
P08133_C 669	ANXA6 Annexin A6	7635	Q9Y6A5_C 749	TACC3 Transforming acidic coiled-coil-containing protein	9241
P22314_C 1039	UBA1 Ubiquitin-like modifier-activating enzyme 1	7636	P13489_C 248	RNH1 Ribonuclease inhibitor	9242
Q00839_C 594	HNRNPU Heterogeneous nuclear ribonucleoprotein U	7637	Q66K74_C 588	MAP1S Microtubule-associated protein 1S	9243
014980_C 34	XPO1 Exportin-1	7638	Q16881_C 209	TXNRD1 Thioredoxin reductase 1, cytoplasmic	9244
043290_C 645	SART1 U4/U6.U5 tri-snRNP-associated protein 1	7639	H0YBQ0_C 258	TXNRD3 Thioredoxin reductase 3	9245
Q9Y5Y2_C 72	NUBP2 Cytosolic Fe-S cluster assembly factor NUBP2	7640	Q9NNW7_C 86	TXNRD2 Thioredoxin reductase 2, mitochondrial	9246
Q15365_C 201	PCBP1 Poly(rC)-binding protein 1	7641	P78527_C 1499	PRKJDC DNA-dependent protein kinase catalytic subunit	9247
P30086_C 168	PEBP1 Phosphatidylethanolamine-binding protein 1	7642	Q9UGR2_C 956	ZC3H7B Zinc finger CCCH domain-containing protein 7B	9248
P11142_C 17	HSPA8 Heat shock cognate 71 kDa protein	7643	P49903_C 71	SEPHS1 Selenide, water dikinase 1	9249
060496_C 110	DOK2 Docking protein 2	7644	014976_C 87	GAK Cyclin-G-associated kinase	9250
P85037_C 254	FOXK1 Forkhead box protein K1	7645	Q86WB0_C 406	ZC3HC1 Nuclear-interacting partner of ALK	9251
P54577_C 250	YARS Tyrosine-tRNA ligase, cytoplasmic	7646	Q9H9A6_C 23	LRRC40 Leucine-rich repeat-containing protein 40	9252
Q8IX01_C 656	SUGP2 SURP and G-patch domain-containing protein 2	7647	Q3KQU3_C 373	MAP7D1 MAP7 domain-containing protein 1	9253
P22314_C 1040	UBA1 Ubiquitin-like modifier-activating enzyme 1	7648	Q9H4L5_C 24	OSBPL3 Oxysterol-binding protein-related protein 3	9254
Q709C8_C 2177	VPS13C Vacuolar protein sorting-associated protein 13C	7649	P27987_C 561	ITPKB Inositol-trisphosphate 3-kinase B	9255
Q709C8_C 2440	VPS13C Vacuolar protein sorting-associated protein 13C	7650	Q9Y520_C 177	PRRC2C Protein PRRC2C	9256
P61158_C 189	ACTR3 Actin-related protein 3	7651	P53041_C 77	PPP5C Serine/threonine-protein phosphatase 5	9257
P0CW22_C 35	RPS17L 40S ribosomal protein S17-like	7652	Q9Y2H0_C 726	DLGAP4 Disks large-associated protein 4	9258
Q6KC79_C 1795	NIPBL Nipped-B-like protein	7653	P21580_C 54	TNFAIP3 Tumor necrosis factor alpha-induced protein 3	9259
Q15042_C 322	RAB3GAP1 Rab3 GTPase-activating protein catalytic subunit	7654	Q15334_C 505	LLGL1 Lethal(2) giant larvae protein homolog 1	9260
P60709_C 285	ACTB Actin, cytoplasmic 1	7655	015111_C 406	CHUK Inhibitor of nuclear factor kappa-B kinase subunit	9261
P04899_C 112	GNAI2 Guanine nucleotide-binding protein G(i) subunit alpha	7656	Q14149_C 797	MORC3 MORC family CW-type zinc finger protein 3	9262
P23396_C 97	RPS3 40S ribosomal protein S3	7657	000329_C 219	PIK3CD Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit delta isoform	9263
P00558_C 316	PGK1 Phosphoglycerate kinase 1	7658	Q9NPD3_C 97	EXOSC4 Exosome complex component RRP4 1	9264

P39687_C 123	ANP32A Acidic leucine-rich nuclear phosphoprotein 32 family member A	7659	P98171_C 527	ARHGAP4 Rho GTPase-activating protein 4	9265
P27708_C 1889	CAD CAD protein	7660	Q8NFI3_C C454	ENGASE Cytosolic endo-beta-N-acetylglucosaminidase	9266
Q15646_C 188	OASL 2-5-oligoadenylate synthase-like protein	7661	Q13342_C C686	SP140 Nuclear body protein SP140	9267
Q9ULA0_C C413	DNPEP Aspartyl aminopeptidase	7662	Q9H930_C C399	SP140L Nuclear body protein SP140-like protein	9268
Q9HAU5_C C578	UPF2 Regulator of nonsense transcripts 2	7663	Q9C0B0_C C696	UNK RING finger protein unkempt homolog	9269
P50995_C 384	ANXA11 Annexin A11	7664	Q8TB03_C C12	CXorf38 Uncharacterized protein CXorf38	9270
P63220_C 17	RPS21 40S ribosomal protein S21	7665	P21580_C 767	TNFAIP3 Tumor necrosis factor alpha-induced protein 3	9271
Q16822_C 306	PCK2 Phosphoenolpyruvate carboxykinase	7666	O94906_C C698	PRPF6 Pre-mRNA-processing factor 6	9272
P14921_C 31	ETS1 Protein C-ets-1	7667	P43304_C 385	GPD2 Glycerol-3-phosphate dehydrogenase, mitochondrial	9273
Q9BWU1_C C349	CDK19 Cyclin-dependent kinase 19	7668	Q9H4E7_C C267	DEF6 Differentially expressed in FDCP 6 homolog	9274
P60174_C 164	TPI1 Triosephosphate isomerase	7669	Q8NEM7_C C298	FAM48A Protein FAM48A	9275
P55809_C 67	OXCT1 Succinyl-CoA:3-ketoacid coenzyme A transferase 1,	7670	O75367_C C286	H2AFY Core histone macro-H2A.1	9276
P54136_C 369	RARS Arginine--tRNA ligase, cytoplasmic	7671	O00148_C C197	DDX39A ATP-dependent RNA helicase DDX39A	9277
O60784_C 415	TOM1 Target of Myb protein 1	7672	P40926_C 275	MDH2 Malate dehydrogenase, mitochondrial	9278
Q16630_C 159	CPSF6 Cleavage and polyadenylation specificity factor subunit 6	7673	Q6P2E9_C C249	EDC4 Enhancer of mRNA-decapping protein 4	9279
Q13370_C 410	PDE3B cGMP-inhibited 3,5-cyclic phosphodiesterase B	7674	Q9Y6K9_C C54	IKBKG NF-kappa-B essential modulator	9280
P68104_C 234	EEF1A1 Elongation factor 1-alpha 1	7675	Q8TDB6_C C159	DTX3L E3 ubiquitin-protein ligase DTX3L	9281
P62937_C 115	PPIA Peptidyl-prolyl cis-trans isomerase A	7676	Q5SSJ5_C C359	HP1BP3 Heterochromatin protein 1-binding protein 3	9282
O75390_C 211	CS Citrate synthase, mitochondrial	7677	P41252_C 87	IARS Isoleucine--tRNA ligase, cytoplasmic	9283
Q92688_C 123	ANP32B Acidic leucine-rich nuclear phosphoprotein 32 family member A	7678	P28838_C 445	LAP3 Cytosol aminopeptidase	9284
A6NHR9_C C1656	SMCHD1 Structural maintenance of chromosomes flexible hinge domain-containing protein 1	7679	P62979_C 144	RPS27A Ubiquitin-40S ribosomal protein S27a	9285
Q3B7J2_C C377	GFOD2 Glucose-fructose oxidoreductase domain-containing	7680	Q29RF7_C C1084	PDS5A Sister chromatid cohesion protein PDS5 homolog A	9286
O15523_C 296	DDX3Y ATP-dependent RNA helicase DDX3Y	7681	Q9UPN7_C C437	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	9287
O00571_C 298	DDX3X ATP-dependent RNA helicase DDX3X	7682	Q04206_C C38	RELA Transcription factor p65	9288
P61158_C 235	ACTR3 Actin-related protein 3	7683	Q9BTT0_C C87	ANP32E Acidic leucine-rich nuclear phosphoprotein 32 family	9289

Q53EL6_C275	PDCD4 Programmed cell death protein 4	7684	Q6ZMZ3_C251	SYNE3 Nesprin-3	9290
P05388_C27	RPLP0 60S acidic ribosomal protein P0	7685	Q8N201_C969	INTS1 Integrator complex subunit 1	9291
Q96I99_C162	SUCLG2 Succinyl-CoA ligase	7686	Q7Z591_C1078	AKNA AT-hook-containing transcription factor	9292
P08133_C114	ANXA6 Annexin A6	7687	Q9ULT8_C1995	HECTD1 E3 ubiquitin-protein ligase HECTD1	9293
P09104_C389	ENO2 Gamma-enolase	7688	Q8IZL8_C239	PELP1 Proline-, glutamic acid- and leucine-rich protein	9294
P06733_C389	ENO1 Alpha-enolase	7689	Q7Z616_C1021	ARHGAP30 Rho GTPase-activating protein 30	9295
P13929_C389	ENO3 Beta-enolase	7690	Q8NDX1_C988	PSD4 PH and SEC7 domain-containing protein 4	9296
P19838_C261	NFKB1 Nuclear factor NF-kappa-B p105 subunit	7691	Q92598_C658	HSPH1 Heat shock protein 105 kDa	9297
Q96IJ6_C389	GMPPA Mannose-1-phosphate guanyltransferase alpha	7692	Q15020_C537	SART3 Squamous cell carcinoma antigen recognized by T-cells 3	9298
P78527_C3187	PRKDC DNA-dependent protein kinase catalytic subunit	7693	Q9UJC3_C432	HOOK1 Protein Hook homolog 1	9299
P04083_C270	ANXA1 Annexin A1	7694	Q9BQG0_C1031	MYBBP1A Myb-binding protein 1A	9300
Q86WV6_C309	TMEM173 Transmembrane protein 173	7695	O00170_C208	AIP AH receptor-interacting protein	9301
P31949_C13	S100A11 Protein S100-A11	7696	O60244_C729	MED14 Mediator of RNA polymerase II transcription subunit	9302
Q16181_C280	SEPT7 Septin-7	7697	Q9NUB1_C422	ACSS1 Acetyl-coenzyme A synthetase 2-like, mitochondrial	9303
P53621_C1185	COPA Coatomer subunit alpha	7698	O76074_C447	PDE5A cGMP-specific 3,5-cyclic phosphodiesterase	9304
O75179_C210	ANKRD17 Ankyrin repeat domain-containing protein 17	7699	Q96EY5_C231	FAM125A Multivesicular body subunit 12A	9305
P62333_C193	PSMC6 26S protease regulatory subunit 10B	7700	Q9P210_C621	CPSF2 Cleavage and polyadenylation specificity factor subunit	9306
Q9Y5P6_C245	GMPPB Mannose-1-phosphate guanyltransferase beta	7701	Q9NQC7_C129	CYLD Ubiquitin carboxyl-terminal hydrolase CYLD	9307
P31948_C461	STIP1 Stress-induced-phosphoprotein 1	7702	P49903_C31	SEPHS1 Selenide, water dikinase 1	9308
Q96P48_C900	ARAP1 Arf-GAP with Rho-GAP domain, ANK repeat and PH domain 1	7703	P22102_C41	GART Trifunctional purine biosynthetic protein adenosin	9309
Q52LJ0_C216	FAM98B Protein FAM98B	7704	Q13464_C1206	ROCK1 Rho-associated protein kinase 1	9310
P46779_C13	RPL28 60S ribosomal protein L28	7705	Q01813_C112	PFKP 6-phosphofructokinase type C	9311
Q8N5W9_C81	FAM101B Protein FAM101B	7706	P16188_C188	HLA-A HLA class I histocompatibility antigen, A-30 alpha	9312
P50914_C54	RPL14 60S ribosomal protein L14	7707	P18463_C188	HLA-B HLA class I histocompatibility antigen, B-37 alpha	9313
P00338_C	LDHA L-lactate dehydrogenase A	7708	P30499_C	HLA-C HLA class I	9314

293	chain		188	histocompatibility antigen, Cw-1 alpha	
P62993_C 32	GRB2 Growth factor receptor-bound protein 2	7709	P30492_C 188	HLA-B HLA class I histocompatibility antigen, B- 54 alpha	93 15
P85037_C 439	FOKK1 Forkhead box protein K1	7710	Q29940_C 188	HLA-B HLA class I histocompatibility antigen, B- 59 alpha	93 16
Q14103_C 126	HNRNPD Heterogeneous nuclear ribonucleoprotein D0	7711	F8VZB9_C 225	HLA-C HLA class I histocompatibility antigen, Cw-14 alpha	93 17
Q9NVA2_C 41	SEPT1 1 Septin-1 1	7712	P10321_C 188	HLA-C HLA class I histocompatibility antigen, Cw-7 alpha	93 18
P43403_C 346	ZAP70 Tyrosine-protein kinase ZAP- 70	7713	Q96Q15_C 3401	SMG1 Serine/threonine- protein kinase SMG1	93 19
Q562E7_C 130	WDR81 WD repeat-containing protein 81	7714	P27635_C 71	RPL10 60S ribosomal protein L10	9320
060610_C 796	DIAPH1 Protein diaphanous homolog 1	7715	P49756_C 83	RBM25 RNA-binding protein 25	9321
P08133_C 552	ANXA6 Annexin A6	7716	Q8NE71_C 758	ABCF1 ATP-binding cassette sub-family F member 1	9322
Q13418_C 346	ILK Integrin-linked protein kinase	7717	095696_C 441	BRJD1 Bromodomain- containing protein 1	9323
P49915_C 523	GMPS GMP synthase	7718	Q9NXR7_C 34	BRE BRCA1-A complex subunit BRE	9324
Q15459_C 244	SF3A1 Splicing factor 3A subunit 1	7719	000478_C 512	BTN3A3 Butyrophilin subfamily 3 member A3	9325
Q06124_C 259	PTPN11 Tyrosine-protein phosphatase non-receptor type 11	7720	060942_C 419	RNGTT mRNA-capping enzyme	9326
Q02338_C 288	BDH1 D-beta-hydroxybutyrate dehydrogenase, mitochondrial	7721	Q16831_C 17	UPP1 Uridine phosphorylase 1	9327
P46060_C 338	RANGAP1 Ran GTPase-activating protein 1	7722	Q14142_C 20	TRIM14 Tripartite motif- containing protein 14	9328
Q14204_C 4216	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	7723	075367_C 276	H2AFY Core histone macro- H2A.1	9329
P40926_C 285	MDH2 Malate dehydrogenase, mitochondrial	7724	Q15052_C 57	ARHGEF6 Rho guanine nucleotide exchange factor 6	9330
Q9NX63_C 112	CHCHD3 Coiled-coil-helix-coiled-coil- helix domain-containing protein 3	7725	P35626_C 340	ADRBK2 Beta-adrenergic receptor kinase 2	9331
P62280_C 116	RPS1140S ribosomal protein S11	7726	P25098_C 340	ADRBK1 Beta-adrenergic receptor kinase 1	9332
Q9BZV1_C 125	UBXN6 UBX domain-containing protein 6	7727	P15428_C 182	HPGD 15- hydroxyprostaglandin dehydrogenase	9333
000299_C 178	CLIC1 Chloride intracellular channel protein 1	7728	Q96FZ2_C 131	C3orf37 UPF0361 protein C3orf37	9334
075592_C 1131	MYCBP2 Probable E3 ubiquitin- protein ligase MYCBP2	7729	Q9Y2H0_C 736	DLGAP4 Disks large- associated protein 4	9335
P61601_C 185	NCALD Neurocalcin-delta	7730	Q8TCU4_C 2878	ALMS1 Alstrom syndrome protein 1	9336
PI5498_C 794	VAV1 Proto-oncogene vav	7731	095801_C 238	TTC4 Tetratricopeptide repeat protein 4	9337
PI2004_C 81	PCNA Proliferating cell nuclear antigen	7732	095571_C 219	ETHE1 Protein ETHE1, mitochondrial	9338

P6098_1_C 23	DSTN Destrin	7733	Q9H4Z3_ C29	PCIF1 Phosphorylated CTD-interacting factor 1	9339
P14618_C 474	PKM Pyruvate kinase isozymes M1/M2	7734	P55957_C 15	BID BH3 -interacting domain death agonist	9340
Q9Y3F4_ C340	STRAP Serine-threonine kinase receptor-associated protein	7735	P49458_C 39	SRP9 Signal recognition particle 9 kDa protein	9341
075694_C 704	NUP155 Nuclear pore complex protein Nup155	7736	Q9NQ88_ C161	TIGAR Fructose-2,6-bisphosphatase TIGAR	9342
092888_C 594	ARHGEF1 Rho guanine nucleotide exchange factor 1	7737	P22234_C 63	PAICS Multifunctional protein ADE2	9343
000264_C 129	PGRMC1 Membrane-associated progesterone receptor component	7738	P35611_C 253	ADD1 Alpha-adducin	9344
015173_C 159	PGRMC2 Membrane-associated progesterone receptor component	7739	PI9474_C 463	TRIM21 E3 ubiquitin-protein ligase TRIM21	9345
Q15691_C 228	MAPRE1 Microtubule-associated protein RP/EB family member	7740	Q12874_ C103	SF3A3 Splicing factor 3A subunit 3	9346
Q13325_C 137	IFIT5 Interferon-induced protein with tetra-ricopeptide	7741	Q03188_ C612	CENPC1 Centromere protein C1	9347
Q9Y678_ C296	COPG1 Coatamer subunit gamma-1	7742	P42166_C 518	TMPO Lamina-associated polypeptide 2, isoform alpha	9348
Q5XKP0_ C60	QIL1 Protein QIL1	7743	Q9NY12_ C80	GAR1 H/ACA ribonucleoprotein complex subunit 1	9349
043776_C 438	NARS Asparagine-tRNA ligase, cytoplasmic	7744	Q10567_ C241	AP1B1 AP-1 complex subunit beta-1	9350
07553_1_C 85	BANF1 Barrier-to-autointegration factor	7745	Q96F86_ C499	EDC3 Enhancer of mRNA-decapping protein 3	9351
Q00577_C 272	PURA Transcriptional activator protein Pur-alpha	7746	Q86UV5_ C986	USP48 Ubiquitin carboxyl-terminal hydrolase 48	9352
P61758_C 113	VBPI Prefoldin subunit 3	7747	P49368_C 213	CCT3 T-complex protein 1 subunit gamma	9353
P62330_C 155	ARF6 ADP-ribosylation factor 6	7748	P08559_C 91	PDHA1 Pyruvate dehydrogenase E1 component subunit alpha, mitochondrial	9354
P09110_C 381	ACAA1 3-ketoacyl-CoA thiolase, peroxisomal	7749	Q96SZ5_ C18	ADO2 2-aminoethanethiol dioxxygenase	9355
P60842_C 134	EIF4A1 Eukaryotic initiation factor 4A-I	7750	Q92974_ C715	ARHGEF2 Rho guanine nucleotide exchange factor 2	9356
Q8N1G4_ C249	LRRC47 Leucine-rich repeat-containing protein 47	7751	Q92597_ C289	NDRG1 Protein NDRG1	9357
Q9Y5Z7_ C673	HCFC2 Host cell factor 2	7752	Q9BZF2_ C466	OSBPL7 Oxysterol-binding protein-related protein 7	9358
P30485_C 125	HLA-B HLA class I histocompatibility antigen, B-47 alpha	7753	Q9BQ69_ C186	MACROD1 O-acetyl-ADP-ribose deacetylase MACROD1	9359
P51812_C 579	RPS6KA3 Ribosomal protein S6 kinase alpha-3	7754	Q14738_ C17	PPP2R5D Serine/threonine-protein phosphatase 2A 56 kDa regulatory subunit, delta isoform	9360
Q15418_C 575	RPS6KA1 Ribosomal protein S6 kinase alpha-1	7755	P55210_C 186	CASP7 Caspase-7	9361
Q9P2J5_C 554	LARS Leucine-tRNA ligase, cytoplasmic	7756	P31939_C 241	ATIC Bifunctional purine biosynthesis protein PURH	9362
P00558_C 108	PGK1 Phosphoglycerate kinase 1	7757	000329_ C366	PIK3CD Phosphatidylinositol 4,5-bisphosphate 3-kinase catalytic subunit delta isoform	9363

O14966_C 120	RAB7L1 Ras-related protein Rab-7L1	7758	Q9NZT2_ C417	OGFR Opioid growth factor receptor	9364
P13639_C 591	EEF2 Elongation factor 2	7759	Q96I25_C 302	RBM17 Splicing factor 45 CPTK	9365
P07195_C 36	LDHB L-lactate dehydrogenase B chain	7760	Q13158_ C98	FADD Protein FADD	9366
Q96EY7_ C642	PTCD3 Pentatricopeptide repeat- containing protein 3, mitochondrial	7761	P52948_C 1312	NUP98 Nuclear pore complex protein Nup98-Nup96	9367
Q13469_C 355	NFATC2 Nuclear factor of activated T- cells, cytoplasmic 2	7762	Q7Z5K2_ C964	WAPAL Wings apart-like protein homolog	9368
Q96JH7_ C219	VCPIP1 Deubiquitinating protein VCIP135	7763	Q8NI37_ C57	PPTC7 Protein phosphatase PTC7 homolog	9369
Q92619_C 324	HMHA1 Minor histocompatibility protein HA-1	7764	Q9Y6Y8_ C604	SEC23IP SEC23-interacting protein	9370
O00148_C 164	DDX39A ATP-dependent RNA helicase DDX39A	7765	Q969E8_ C114	TSR2 Pre-rRNA-processing protein TSR2 homolog	9371
P16455_C 150	MGMT Methylated-DNA--protein- cysteine methyltransferase	7766	Q9UEW8_ C82	STK39 STE20/SPS1-related proline-alanine-rich protein kinase	9372
P40763_C 259	STAT3 Signal transducer and activator of transcription 3	7767	Q9P032_ C87	NDUFAF4 NADH dehydrogenase	9373
P07203_C 202	GPX1 Glutathione peroxidase 1	7768	Q7L2J0_ C244	MEPCE 7SK snRNA methylphosphate capping enzyme	9374
P08575_C 787	PTPRC Receptor-type tyrosine-protein phosphatase C	7769	Q70CQ2_ C741	USP34 Ubiquitin carboxyl- terminal hydrolase 34	9375
Q9Y6E0_ C394	STK24 Serine/threonine-protein kinase 24	7770	Q08378_ C1403	GOLGA3 Golgin subfamily A member 3	9376
B5ME19_ C444	EIF3CL Eukaryotic translation initiation factor 3 subunit	7771	Q14C86_ C741	GAPVD1 GTPase-activating protein and VPS9 domain- containing protein 1	9377
P33240_C 150	CSTF2 Cleavage stimulation factor subunit 2	7772	O00267_ C626	SUPT5H Transcription elongation factor SPT5	9378
P52597_C 267	HNRNPF Heterogeneous nuclear ribonucleoprotein F	7773	P51159_C 188	RAB27A Ras-related protein Rab-27A	9379
Q9H019_ C52	FAM54B Protein FAM54B	7774	Q9NZ63_ C145	C9orf78 Uncharacterized protein C9orf78	9380
Q9H479_ C24	FN3K Fructosamine-3-kinase	7775	P15374_C 95	UCHL3 Ubiquitin carboxyl- terminal hydrolase isozyme L3	9381
O75369_C 660	FLNB Filamin-B	7776	Q9H9A5_ C633	CNOT10 CCR4-NOT transcription complex subunit 10	9382
P62241_C 100	RPS8 40S ribosomal protein S8	7777	Q99614_ C28	TTC1 Tetatricopeptide repeat protein 1	9383
P30453_C 188	HLA-A HLA class I histocompatibility antigen, A-34 alpha	7778	Q8ND71_ C75	GIMAP8 GTPase IMAP family member 8	9384
P01892_C 188	HLA-A HLA class I histocompatibility antigen, A-2 alpha	7779	P11171_C 224	EPB41 Protein 4.1	9385
P01891_C 188	HLA-A HLA class I histocompatibility antigen, A-68 alpha	7780	Q9H400_ C138	LIME1 Lck-interacting transmembrane adapter 1	9386
P30479_C 188	HLA-B HLA class I histocompatibility antigen, B-41 alpha	7781	Q9BVC5_ C10	C2orf49 Ashwin	9387
P30460_C 188	HLA-B HLA class I histocompatibility antigen, B-8 alpha	7782	Q15007_ C270	WTAP Pre-mRNA-splicing regulator WTAP	9388

P43250_C 474	GRK.6 G protein-coupled receptor kinase 6	7783	P17987_C 76	TCP1 T-complex protein 1 subunit alpha	9389
Q96JB2_C 65	COG3 Conserved oligomeric Golgi complex subunit 3	7784	H7BZ1_1 C99	Uncharacterized protein	9390
P22102_C 646	GART Trifunctional purine biosynthetic protein adenosine	7785	Q969Q0_C 88	RPL36AL 60S ribosomal protein L36a-like	9391
Q9BTC0_C 1079	DIDO1 Death-inducer obliterator 1	7786	Q9NS86_C 187	LANCL2 LanC-like protein 2	9392
Q5SY16_C 648	NOL9 Polynucleotide 5-hydroxyl- kinase NOL9	7787	Q9H7N4_C 675	SCAF1 Splicing factor, arginine/serine-rich 19	9393
075367_C 297	H2AFY Core histone macro-H2A. 1	7788	Q9Y3S1_C 326	WNK2 Serine/threonine- protein kinase WNK2	9394
P10314_C 188	HLA-A HLA class I histocompatibility antigen, A-32 alpha	7789	Q9BYP7_C 278	WNK3 Serine/threonine- protein kinase WNK3	9395
P30512_C 188	HLA-A HLA class I histocompatibility antigen, A-29 alpha	7790	Q9H4A3_C 352	WNK1 Serine/threonine- protein kinase WNK1	9396
P30510_C 188	HLA-C HLA class I histocompatibility antigen, Cw-14 alpha	7791	Q8IYL3_C 124	Clorf1 74 UPF0688 protein C1orf1 74	9397
Q9TNN7_C 188	HLA-C HLA class I histocompatibility antigen, Cw-5 alpha	7792	Q86YS7_C 449	KIAA0528 Uncharacterized protein KIAA0528	9398
P30459_C 188	HLA-A HLA class I histocompatibility antigen, A-74 alpha	7793	Q86UW7_C 1052	CADPS2 Calcium-dependent secretion activator 2	9399
Q29963_C 188	HLA-C HLA class I histocompatibility antigen, Cw-6 alpha	7794	Q9UBS0_C 348	RPS6KB2 Ribosomal protein S6 kinase beta-2	9400
Q29960_C 188	HLA-C HLA class I histocompatibility antigen, Cw-16 alpha	7795	060232_C 152	SSSCA1 Sjogren syndrome/scleroderma autoantigen 1	9401
Q07000_C 188	HLA-C HLA class I histocompatibility antigen, Cw-15 alpha	7796	Q9NZT2_C 87	OGFR Opioid growth factor receptor	9402
P16189_C 188	HLA-A HLA class I histocompatibility antigen, A-31 alpha	7797	Q8N3D4_C 1364	EHBP1L1 EH domain-binding protein 1-like protein 1	9403
Q29865_C 188	HLA-C HLA class I histocompatibility antigen, Cw-18 alpha	7798	Q14980_C 1729	NUMA1 Nuclear mitotic apparatus protein 1	9404
P30504_C 188	HLA-C HLA class I histocompatibility antigen, Cw-4 alpha	7799	Q15365_C 118	PCBP1 Poly(rC)-binding protein 1	9405
060343_C 1277	TBC1D4 TBC1 domain family member 4	7800	Q9UP83_C 64	COG5 Conserved oligomeric Golgi complex subunit 5	9406
Q14152_C 478	EIF3A Eukaryotic translation initiation factor 3 subunit	7801	Q5RKV6_C 117	EXOSC6 Exosome complex component MTR3	9407
E9PMF8_C 721	PTPRC Receptor-type tyrosine-protein phosphatase C	7802	Q96T23_C 1436	RSF1 Remodeling and spacing factor 1	9408
Q01831_C 60	XPC DNA repair protein complementing XP-C cells	7803	P13727_C 147	PRG2 Bone marrow proteoglycan	9409
P55265_C 773	ADAR Double-stranded RNA-specific adenosine deaminase	7804	Q6NYC8_C 276	PPPIR18 Phostensin	9410
P30153_C 377	PPP2R1A Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform	7805	060282_C 393	KIF5C Kinesin heavy chain isoform 5C	9411
			Q92616_C 2015	GCN1L1 Translational activator GCN1	9412
A6NE09_C 148	RPSAP58 Protein RPSAP58	7806	075808_C 101	SOLH Calpain-1 5	9413
Q9TNN7_C 125	HLA-C HLA class I histocompatibility antigen, Cw-5 alpha	7807	Q9UQ35_C 1029	SRRM2 Serine/arginine repetitive matrix protein 2	9414
Q95604_C 125	HLA-C HLA class I histocompatibility antigen, Cw-17 alpha	7808	Q8IZ73_C 246	RPUSD2 RNA pseudouridylate synthase	9415

				domain-containing protein	
Q29963_C125	HLA-C HLA class I histocompatibility antigen, Cw-6 alpha	7809	Q92985_C394	IRF7 Interferon regulatory factor 7	9416
Q29960_C125	HLA-C HLA class I histocompatibility antigen, Cw-16 alpha	7810	P10914_C274	IRF1 Interferon regulatory factor 1	9417
Q07000_C125	HLA-C HLA class I histocompatibility antigen, Cw-15 alpha	7811	P50395_C202	GDI2 Rab GDP dissociation inhibitor beta	9418
Q9ULA0_C144	DNPEP Aspartyl aminopeptidase	7812	Q9UK61_C690	FAM208A Protein FAM208A	9419
P53396_C20	ACLY ATP-citrate synthase	7813	Q9UPN7_C612	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	9420
P35251_C607	RFC1 Replication factor C subunit 1	7814	P07996_C813	THBS1 Thrombospondin-1	9421
Q81Z69_C463	TRMT2A tRNA (uracil-5-)-methyltransferase homolog A	7815	Q96GW9_C428	MARS2 Methionine--tRNA ligase, mitochondrial	9422
O00567_C52	NOP56 Nucleolar protein 56	7816	O14920_C716	IKBKB Inhibitor of nuclear factor kappa-B kinase subunit	9423
Q5JSL3_C160	DOCK11 Dedicator of cytokinesis protein 11	7817	Q7Z616_C20	ARHGAP30 Rho GTPase-activating protein 30	9424
P21333_C649	FLNA Filamin-A	7818	Q9NYV4_C1009	CDK12 Cyclin-dependent kinase 12	9425
P21291_C122	CSRP1 Cysteine and glycine-rich protein 1	7819	Q9UG63_C388	ABCF2 ATP-binding cassette sub-family F member 2	9426
P22314_C278	UBA1 Ubiquitin-like modifier-activating enzyme 1	7820	Q96AE4_C332	FUBP1 Far upstream element-binding protein 1	9427
Q9P289_C410	MST4 Serine/threonine-protein kinase MST4	7821	Q8N3P4_C1371	VPS8 Vacuolar protein sorting-associated protein 8 homolog	9428
P46782_C66	RPS5 40S ribosomal protein S5	7822	O15541_C15	RNF113A RING finger protein 113A	9429
Q92616_C1235	GCN1L1 Translational activator GCN1	7823	Q9UBN7_C426	HDAC6 Histone deacetylase 6	9430
P27707_C45	DCK Deoxycytidine kinase	7824	P41252_C526	IARS Isoleucine--tRNA ligase, cytoplasmic	9431
Q8NF91_C6415	SYNE1 Nesprin-1	7825	O60306_C28	AQR Intron-binding protein aquarius	9432
Q92538_C685	GBF1 Golgi-specific brefeldin A-resistance guanine nucleotide exchange factor 1	7826	Q8NFW8_C432	CMAS N-acylneuraminate cytidyltransferase	9433
			Q9UHB4_C486	NDOR1 NADPH-dependent diflavin oxidoreductase 1	9434
P13639_C290	EEF2 Elongation factor 2	7827	Q5TGY3_C1540	AHDC1 AT-hook DNA-binding motif-containing protein 1	9435
Q15120_C41	PDK3	7828	Q8IW35_C484	CEP97 Centrosomal protein of 97 kDa	9436
O43765_C153	SGTA Small glutamine-rich tetratricopeptide repeat-containing alpha	7829	Q8WUA4_C212	GTF3C2 General transcription factor 3C polypeptide 2	9437
P63244_C182	GNB2L1 Guanine nucleotide-binding protein subunit beta-2-like 1, N-terminally processed	7830	Q6UUV7_C541	CRTC3 CREB-regulated transcription coactivator 3	9438
			Q5T4S7_C2449	UBR4 E3 ubiquitin-protein ligase UBR4	9439
P61978_C	HNRNPK Heterogeneous nuclear	7831	Q13155_	AIMP2 Aminoacyl tRNA	9440

145	ribonucleoprotein K		C291	synthase complex-interacting multif	
Q9Y3D0_C93	FAM96B Mitotic spindle-associated MMXD complex subunit MI	7832	Q8TEU7_C1561	RAPGEF6 Rap guanine nucleotide exchange factor 6	9441
H3BQZ7_C405	Uncharacterized protein	7833	P49792_C1196	RANBP2 E3 SUMO-protein ligase RanBP2	9442
Q1KMD3_C405	HNRNPUL2 Heterogeneous nuclear ribonucleoprotein U-like protein 2	7834	O14617_C574	AP3D1 AP-3 complex subunit delta-1	9443
Q92888_C815	ARHGEF1 Rho guanine nucleotide exchange factor 1	7835	Q6P2E9_C54	EDC4 Enhancer of mRNA-decapping protein 4	9444
P30050_C17	RPL12 60S ribosomal protein L12	7836	Q5VZ89_C975	DENND4C DENN domain-containing protein 4C	9445
P27348_C134	YWHAQ 14-3-3 protein theta	7837	P57772_C406	EEFSEC Selenocysteine-specific elongation factor	9446
Q9UPW5_C1164	AGTPBP1 Cytosolic carboxypeptidase 1	7838	P30041_C91	PRDX6 Peroxiredoxin-6	9447
Q13185_C177	CBX3 Chromobox protein homolog 3	7839	Q9H2G2_C1212	SLK STE20-like serine/threonine-protein kinase	9448
P50914_C42	RPL14 60S ribosomal protein L14	7840	Q16891_C603	IMMT Mitochondrial inner membrane protein	9449
P60709_C217	ACTB Actin, cytoplasmic 1	7841	P55201_C570	BRPF1 Peregrin	9450
Q6S8J3_C917	POTEE POTE ankyrin domain family member E	7842	P09543_C49	CNP 2,3-cyclic-nucleotide 3-phosphodiesterase	9451
Q52LJ0_C63	FAM98B Protein FAM98B	7843	P53701_C178	HCCS Cytochrome c-type heme lyase	9452
Q8TAQ2_C495	SMARCC2 SWI/SNF complex subunit SMARCC2	7844	O75376_C2056	NCOR1 Nuclear receptor corepressor 1	9453
P04083_C324	ANXA1 Annexin A1	7845	O60610_C164	DIAPH1 Protein diaphanous homolog 1	9454
Q86VP6_C413	CAND1 Cullin-associated NEDD8-dissociated protein 1	7846	Q9ULL5_C112	PRR12 Proline-rich protein 12	9455
P40925_C137	MDH1 Malate dehydrogenase, cytoplasmic	7847	Q9UMS4_C230	PRPF19 Pre-mRNA-processing factor 19	9456
P23528_C80	CFL1 Cofilin-1	7848	Q99576_C112	TSC22D3 TSC22 domain family protein 3	9457
Q14C86_C568	GAPVD1 GTPase-activating protein and VPS9 domain-containing protein 1	7849	Q9UFW8_C167	CGGBP1 CGG triplet repeat-binding protein 1	9458
P62241_C182	RPS8 40S ribosomal protein S8	7850	P62873_C25	GNB1 Guanine nucleotide-binding protein G(I)/G(S)/G(T)	9459
Q86WR0_C83	CCDC25 Coiled-coil domain-containing protein 25	7851	P04049_C27	RAF1 RAF proto-oncogene serine/threonine-protein kinase	9460
P00558_C50	PGK1 Phosphoglycerate kinase 1	7852	Q9Y6A5_C426	TACC3 Transforming acidic coiled-coil-containing protein	9461
O00743_C192	PPP6C Serine/threonine-protein phosphatase 6 catalytic subunit	7853	Q9Y6A5_C502	TACC3 Transforming acidic coiled-coil-containing protein	9462
O75934_C106	BCAS2 Pre-mRNA-splicing factor SPF27	7854	Q9H6K4_C164	OPA3 Optic atrophy 3 protein	9463
Q92616_C1692	GCN1L1 Translational activator GCN1	7855	P25205_C360	MCM3 DNA replication licensing factor MCM3	9464
Q63HN8_C1614	RNF213 E3 ubiquitin-protein ligase RNF213	7856	Q9UMS0_C213	NFU1 NFU1 iron-sulfur cluster scaffold homolog, mitochondrial	9465

P17655_C 405	CAPN2 Calpain-2 catalytic subunit	7857	Q0888 1_ C143	ITK Tyrosine-protein kinase ITK/TSK	9466
P43487_C 132	RANBP1 Ran-specific GTPase-activating protein	7858	Q14974_ C455	KPNB 1 Importin subunit beta-1	9467
Q9BVP2_ C25 1	GNL3 Guanine nucleotide-binding protein-like 3	7859	Q8WVJ2_ C14	NUDCD2 NudC domain-containing protein 2	9468
075995_C 152	SASH3 SAM and SH3 domain-containing protein 3	7860	000139_ C525	KIF2 A Kinesin-like protein KIF2A	9469
Q7Z6Z7_ C4341	HUWE1 E3 ubiquitin-protein ligase HUWE1	786 1	Q96T5 1_ C184	RUFY1 RUN and FYVE domain-containing protein 1	9470
P21333_C 2107	FLNA Filamin-A	7862	P08575_C 1178	PTPRC Receptor-type tyrosine-protein phosphatase C	947 1
Q9UQ90_ C353	SPG7 Paraplegin	7863	P30626_C 75	SRI Sorcin	9472
H3BN98_ C196	Uncharacterized protein	7864	P63010_C 95	AP2B 1 AP-2 complex subunit beta	9473
P62244_C 30	RPS1 5A 40S ribosomal protein S15a	7865	F5H5P2_ C231	Uncharacterized protein	9474
Q9UPN7_ C455	PPP6R1 Serine/threonine-protein phosphatase 6 regulatory	7866	P12694_C 197	BCKDHA 2-oxoisovalerate dehydrogenase subunit alpha, mitochondrial	9475
P26641_C 266	EEF1G Elongation factor 1-gamma	7867	Q14C86_ C1129	GAPVD1 GTPase-activating protein and VPS9 domain-containing protein 1	9476
Q96F07_ C346	CYFIP2 Cytoplasmic FMR1-interacting protein 2	7868	A6NKT7_ C349	RGPD3 RanBP2-like and GRIP domain-containing protein 3	9477
Q16555_C 504	DPYSL2 Dihydropyrimidinase-related protein 2	7869	Q9Y3L3_ C56	SH3BP 1 SH3 domain-binding protein 1	9478
Q9H3U1_ C426	UNC45A Protein unc-45 homolog A	7870	Q8IXH7_ C293	TH1L Negative elongation factor C/D	9479
Q9UBT2_ C30	UBA2 SUMO-activating enzyme subunit 2	7871	Q53ET0_ C675	CRTC2 CREB-regulated transcription coactivator 2	9480
060333_C 1661	KIF1B Kinesin-like protein KIF 1B	7872	Q9BZH6_ C363	WDR 11 WD repeat-containing protein 11	948 1
P35579_C 1379	MYH9 Myosin-9	7873	Q9BZH6_ C364	WDR1 1 WD repeat-containing protein 11	9482
PI7844_C 170	DDX5 Probable ATP-dependent RNA helicase DDX5	7874	095466_ C733	FMNL1 Formin-like protein 1	9483
Q92841_C 247	DDX17 Probable ATP-dependent RNA helicase DDX17	7875	P30876_C 1155	POLR2B DNA-directed RNA polymerase II subunit RPB2	9484
I3L3Q1_C 657	Uncharacterized protein	7876	P57764_C 457	GSDMD Gasdermin-D	9485
Q6ZSZ5_ C699	ARHGEF1 8 Rho guanine nucleotide exchange factor 18	7877	P40925_C 251	MDH1 Malate dehydrogenase, cytoplasmic	9486
Q15233_C 145	NONO Non-POU domain-containing octamer-binding protein	7878	Q29RF7_ C1116	PDS5A Sister chromatid cohesion protein PDS5 homolog A	9487
Q9Y490_ C1202	TLN1 Talin-1	7879	PI5498_C 845	VAV1 Proto-oncogene vav	9488
Q9HOC8_ C301	ILKAP Integrin-linked kinase-associated serine/threonine	7880	Q8N163_ C443	KIAA1967 DBIRD complex subunit KIAA1967	9489
Q63HN8_ C41 11	RNF213 E3 ubiquitin-protein ligase RNF2 13	7881	Q32P44_ C307	EML3 Echinoderm microtubule-associated protein-like 3	9490

P54886_C 612	ALDH18A1 Delta-l-pyrroline-5- carboxylate synthase	7882	Q8WZ74_ C759	CTTNBP2 Cortactin-binding protein 2	949 1
Q9Y613_ C502	FHOD1 FH1/FH2 domain-containing protein 1	7883	060264_ C165	SMARCA5 SWI/SNF-related matrix-associated actin- dependent	9492
Q86T10_C 604	TBC1D1 TBC1 domain family member 1	7884	Q9BY77_ C338	POLDIP3 Polymerase delta- interacting protein 3	9493
060234_C 96	GMFG Glia maturation factor gamma	7885	P81877_C 82	SSBP2 Single-stranded DNA- binding protein 2	9494
P60983_C 96	GMFB Glia maturation factor beta	7886	043396_ C34	TXNL1 Thioredoxin-like protein 1	9495
Q9UIS9_ C486	MBD1 Methyl-CpG-binding domain protein 1	7887	Q7Z6Z7_ C1879	HUWE1 E3 ubiquitin-protein ligase HUWE1	9496
Q9HB19_ C332	PLEKHA2 Pleckstrin homology domain-containing family A member 2	7888	Q5VT06_ C2716	CEP350 Centrosome- associated protein 350	9497
060234_C 87	GMFG Glia maturation factor gamma	7889	095466_ C939	FMNL1 Formin-like protein 1	9498
P60983_C 87	GMFB Glia maturation factor beta	7890	Q13045_ C576	FLU Protein flightless-1 homolog	9499
Q6FI81_C 288	CIAPIN1 Anamorsin	7891	Q8WUW 1_C43	BRK1 Protein BRICK1	9500
Q5T4S7_ C1230	UBR4 E3 ubiquitin-protein ligase UBR4	7892	Q86UP2_ C303	KTN1 Kinectin	9501
Q01826_C 173	SATB1 DNA-binding protein SATB1	7893	Q9BSQ5_ C437	CCM2 Malcavernin	9502
Q9Y490_ C1199	TLN1 Talin-1	7894	043149_ C212	ZZEF1 Zinc finger ZZ-type and EF-hand domain- containing	9503
Q16656_C 229	NRF1 Nuclear respiratory factor 1	7895	P19338_C 543	NCL Nucleolin	9504
P60866_C 36	RPS20 40S ribosomal protein S20	7896	P10599_C 35	TXN Thioredoxin	9505
Q9H361_ C132	PABPC3 Polyadenylate-binding protein 3	7897	Q9UNI6_ C265	DUSP12 Dual specificity protein phosphatase 12	9506
Q13310_C 132	PABPC4 Polyadenylate-binding protein 4	7898	043143_ C774	DHX15 Putative pre-mRNA- splicing factor ATP-dependent RN	9507
P11940_C 132	PABPC1 Polyadenylate-binding protein 1	7899	P25205_C 148	MCM3 DNA replication licensing factor MCM3	9508
P31943_C 267	HNRNPH1 Heterogeneous nuclear ribonucleoprotein H	7900	P48553_C 1130	TRAPPC10 Trafficking protein particle complex subunit 10	9509
043390_C 99	HNPvNPR Heterogeneous nuclear ribonucleoprotein R	7901	Q86XR8_ C497	CEP57 Centrosomal protein of 57 kDa	9510
060506_C 96	SYNCRIP Heterogeneous nuclear ribonucleoprotein Q	7902	P27987_C 178	ITPKB Inositol-trisphosphate 3-kinase B	9511
P36578_C 208	RPL4 60S ribosomal protein L4	7903	Q86W50_ C432	METTL16 Methyltransferase- like protein 16	9512
075170_C 247	PPP6R2 Serine/threonine-protein phosphatase 6 regulatory	7904	015042_ C320	U2SURP U2 snRNP- associated SURP motif- containing protein	9513
Q14644_C 58	RASA3 Ras GTPase-activating protein 3	7905	Q8IY17_ C409	PNPLA6 Neuropathy target esterase	9514
Q01433_C 230	AMPD2 AMP deaminase 2	7906	Q8TDD1_ C586	DDX54 ATP-dependent RNA helicase DDX54	9515

P55795_C 267	HNRNPH2 Heterogeneous nuclear ribonucleoprotein H2	7907	Q13905_C C474	RAPGEF1 Rap guanine nucleotide exchange factor 1	9516
P63104_C 94	YWHAZ 14-3-3 protein zeta/delta	7908	A4D1P6_C C246	WDR91 WD repeat-containing protein 91	9517
Q9BXX1_C C233	KLF16 Krueppel-like factor 16	7909	P78371_C C535	CCT2 T-complex protein 1 subunit beta	9518
Q9UKV8_C C188	EIF2C2 Protein argonaute-2	7910	Q08J23_C C502	NSUN2 tRNA (cytosine(34)-C(5))-methyltransferase	9519
Q9NVM9_C C349	Asun Protein asunder homolog	7911	Q8IV53_C C781	DENND1C DENN domain-containing protein 1C	9520
P24928_C 981	POLR2A DNA-directed RNA polymerase II subunit RPB1	7912	O94776_C C261	MTA2 Metastasis-associated protein MTA2	9521
Q15283_C 314	RASA2 Ras GTPase-activating protein 2	7913	E7ENX8_C C353	Uncharacterized protein	9522
P61224_C 141	RAP1B Ras-related protein Rap-1b	7914	Q09666_C C2806	AHNAK Neuroblast differentiation-associated protein AHNA	9523
P13804_C 155	ETFA Electron transfer flavoprotein subunit alpha, mitochondrial	7915	Q63HN8_C C2536	RNF213 E3 ubiquitin-protein ligase RNF213	9524
Q14353_C 91	GAMT Guanidinoacetate N-methyltransferase	7916	Q96EP0_C C59	RNF31 E3 ubiquitin-protein ligase RNF31	9525
Q92616_C 1595	GCN1L1 Translational activator GCN1	7917	Q86VP6_C C1007	CAND1 Cullin-associated NEDD8-dissociated protein 1	9526
O75995_C 351	SASH3 SAM and SH3 domain-containing protein 3	7918	Q9H0J9_C C474	PARP12 Polymerase	9527
Q9H270_C C890	VPS11 Vacuolar protein sorting-associated protein 11 homolog	7919	Q14966_C C259	ZNF638 Zinc finger protein 638	9528
P31948_C 26	STIP1 Stress-induced-phosphoprotein 1	7920	Q8WWW0_C C225	RASSF5 Ras association domain-containing protein 5	9529
Q13303_C 248	KCNAB2 Voltage-gated potassium channel subunit beta-2	7921	Q96K58_C C126	ZNF668 Zinc finger protein 668	9530
Q86X76_C C165	NIT1 Nitrilase homolog 1	7922	Q12768_C C385	KIAA0196 WASH complex subunit strumpellin	9531
P31146_C 285	CORO1A Coronin-1A	7923	Q96CW5_C C168	TUBGCP3 Gamma-tubulin complex component 3	9532
Q02750_C 277	MAP2K1 Dual specificity mitogen-activated protein kinase	7924	Q9BYW2_C C1471	SETD2 Histone-lysine N-methyltransferase SETD2	9533
O95758_C 68	PTBP3 Polypyrimidine tract-binding protein 3	7925	Q7Z2W4_C C518	ZC3HAV1 Zinc finger CCCH-type antiviral protein 1	9534
P53621_C 380	COPA Coatomer subunit alpha	7926	Q6XQN6_C C533	NAPRT1 Nicotinate phosphoribosyltransferase	9535
Q9BUJ2_C C487	HNRNPUL1 Heterogeneous nuclear ribonucleoprotein U-like protein	7927	Q9Y6K9_C C347	IKBKG NF-kappa-B essential modulator K.ASC*QESAR.I	9536
Q92619_C 469	HMHA1 Minor histocompatibility protein HA-1	7928	P11142_C C603	HSPA8 Heat shock cognate 71 kDa protein K.VC*NPIITK.L	9537
Q9Y228_C C380	TRAF3IP3 TRAF3-interacting JNK-activating modulator	7929	I3L2F9_C C269	Uncharacterized protein K.NMMAAC*DPR.H	9538
Q9BW61_C C25	DDA1 DET1- and DDB1-associated protein 1	7930	I3L2F9_C C320	Uncharacterized protein K.TAVC*DIPPR.G	9539
P21333_C 1018	FLNA Filamin-A	7931	Q96JB2_C C349	COG3 Conserved oligomeric Golgi complex subunit 3	9540
O75427_C 105	LRCH4 Leucine-rich repeat and calponin homology domain-containing protein 4	7932	A2A288_C C517	ZC3H12D Probable ribonuclease ZC3H12D	9541

P223 14_C 481	UBA1 Ubiquitin-like modifier-activating enzyme 1	7933	Q9NR33_C85	POLE4 DNA polymerase epsilon subunit 4	9542
Q8N7H5_C218	PAF1 RNA polymerase II-associated factor 1 homolog	7934	Q8IXQ6_C728	PA RP9 Polymerase	9543
Q16644_C203	MAPKAPK3 MAP kinase-activated protein kinase 3	7935	Q13422_C254	IKZF1 DNA-binding protein Ikaros	9544
Q6PD62_C196	CTR9 RNA polymerase-associated protein CTR9 homolog	7936	Q14 15 1_C361	SAFB2 Scaffold attachment factor B2	9545
P23919_C163	DTYMK Thymidylate kinase	7937	Q8TDX7_C298	NEK7 Serine/threonine-protein kinase Nek7	9546
Q9UKG1_C462	APPL1 DCC-interacting protein 13-alpha	7938	P61962_C256	DCAF7 DDB 1- and CUL4-associated factor 7	9547
Q13155_C306	AIMP2 Aminoacyl tRNA synthase complex-interacting multif	7939	Q00653_C738	NFKB2 Nuclear factor NF-kappa-B p100 subunit	9548
Q99439_C215	CNN2 Calponin-2	7940	09567 1_C274	ASMTL N-acetylserotonin O-methyltransferase-like protein	9549
Q99832_C450	CCT7 T-complex protein 1 subunit eta	794 1	Q92619_C599	HMHA1 Minor histocompatibility protein HA-1	9550
Q8IXI2_C175	RHOT1 Mitochondrial Rho GTPase 1	7942	Q9UJV9_C568	DDX4 1 Probable ATP-dependent RNA helicase DDX41	955 1
Q9Y4W2_C474	LAS1L Ribosomal biogenesis protein LAS 1L	7943	C9J4G0_C66	C17orf49 HCG32827, isoform CRA_d	9552
PI37 16_C223	ALAD Delta-aminolevulinic acid dehydratase	7944	I3L1 I5_C221	Uncharacterized protein	9553
Q8IWX8_C168	CHERP Calcium homeostasis endoplasmic reticulum protein	7945	Q9Y6I9_C165	TEX264 Testis-expressed sequence 264 protein	9554
P08575_C1167	PTPRC Receptor-type tyrosine-protein phosphatase C	7946	Q66K14_C289	TBC1D9B TBC1 domain family member 9B	9555
E9PPU0_C406	EPPK1 Epiplakin	7947	Q16875_C155	PFKFB3 6-phosphofructo-2-kinase/fructose-2,6-bisphosphata	9556
P15170_C327	GSPT1 Eukaryotic peptide chain release factor GTP-binding subunit ERF3A	7948	Q9UJX3_C329	ANAPC7 Anaphase-promoting complex subunit 7	9557
Q9NZN3_C138	EHD3 EH domain-containing protein 3	7949	Q9NR56_C27	MBNL1 Muscblind-like protein 1	9558
Q8WUH2_C826	TGFBRAP1 Transforming growth factor-beta receptor-associate protein 1	7950	Q96L21_C105	RPL1 OL 60S ribosomal protein L10-like	9559
Q9BZZ5_C234	API5 Apoptosis inhibitor 5	795 1	P03989_C349	HLA-B HLA class I histocompatibility antigen, B-27 alpha	9560
P53992_C910	SEC24C Protein transport protein Sec24C	7952	Q9Y4W2_C469	LAS 1L Ribosomal biogenesis protein LAS1L	9561
015027_C1619	SEC1 6A Protein transport protein Sec16A	7953	Q9P258_C144	RCC2 Protein RCC2	9562
043791_C361	SPOP Speckle-type POZ protein	7954	Q96BX8_C88	MOB3A MOB kinase activator 3A	9563
095202_C552	LETM1 LETM1 and EF-hand domain-containing protein 1, mitochondrial	7955	Q9BW27_C51	NUP85 Nuclear pore complex protein Nup85	9564
Q9NZ09_C161	UBAP1 Ubiquitin-associated protein 1	7956	Q9H582_C507	ZNF644 Zinc finger protein 644	9565
P45880_C103	VDAC2 Voltage-dependent anion-selective channel protein	7957	Q9H4A6_C84	GOLPH3 Golgi phosphoprotein 3	9566

Q8IWB7_C401	WDFY1 WD repeat and FYVE domain-containing protein 1	7958	Q9H4A5_C70	GOLPH3L Golgi phosphoprotein 3-like	9567
060216_C585	RAD21 Double-strand-break repair protein rad21 homolog	7959	Q96DM3_C333	C18orf8 Uncharacterized protein C18orf8	9568
000567_C142	NOP56 Nucleolar protein 56	7960	P06239_C378	LCK Tyrosine-protein kinase Lck	9569
P55265_C649	ADAR Double-stranded RNA-specific adenosine deaminase	7961	Q95365_C125	HLA-B HLA class I histocompatibility antigen, B-38 alpha	9570
Q8WYP5_C521	AHCTF1 Protein ELYS	7962	P30453_C125	HLA-A HLA class I histocompatibility antigen, A-34 alpha	9571
Q6PKG0_C502	LARP1 La-related protein 1	7963	P30479_C125	HLA-B HLA class I histocompatibility antigen, B-41 alpha	9572
Q6PJW8_C192	CNST Consortin	7964	Q29836_C125	HLA-B HLA class I histocompatibility antigen, B-67 alpha	9573
Q5VSL9_C418	FAM40A Protein FAM40A	7965	P30466_C125	HLA-B HLA class I histocompatibility antigen, B-18 alpha	9574
Q92835_C385	INPP5D Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1	7966	P30462_C125	HLA-B HLA class I histocompatibility antigen, B-14 alpha	9575
Q00610_C736	CLTC Clathrin heavy chain 1	7967	P30460_C125	HLA-B HLA class I histocompatibility antigen, B-8 alpha	9576
Q14019_C10	COTL1 Coactosin-like protein	7968	P01892_C125	HLA-A HLA class I histocompatibility antigen, A-2 alpha	9577
Q9UEW8_C450	STK39 STE20/SPS1-related proline-alanine-rich protein kinase	7969	Q9H7Z7_C110	PTGES2 Prostaglandin E synthase 2	9578
P22626_C50	HNRNPA2B1 Heterogeneous nuclear ribonucleoproteins A2/B1	7970	Q8TEU7_C1368	RAPGEF6 Rap guanine nucleotide exchange factor 6	9579
P55795_C22	HNRNPH2 Heterogeneous nuclear ribonucleoprotein H2	7971	Q14CN2_C308	CLCA4 Calcium-activated chloride channel regulator 4	9580
Q8IXW5_C105	RPAP2 Putative RNA polymerase II subunit B1 CTD phosphatase RPAP2	7972	Q96FK6_C82	WDR89 WD repeat-containing protein 89	9581
Q92841_C584	DDX17 Probable ATP-dependent RNA helicase DDX17	7973	Q95365_C188	HLA-B HLA class I histocompatibility antigen, B-38 alpha	9582
P50552_C334	VASP Vasodilator-stimulated phosphoprotein	7974	Q29836_C188	HLA-B HLA class I histocompatibility antigen, B-67 alpha	9583
P29728_C523	OAS2 2-5-oligoadenylate synthase 2	7975	014981_C939	BTAFI TATA-binding protein-associated factor 172	9584
Q9BUJ2_C391	HNRNPUL1 Heterogeneous nuclear ribonucleoprotein U-like protein	7976	Q9NXC5_C799	MIOS WD repeat-containing protein mio	9585
Q5VWQ0_C282	RSBN1 Round spermatid basic protein 1	7977	Q13613_C117	MTMR1 Myotubularin-related protein 1	9586
075369_C2556	FLNB Filamin-B	7978	Q8IYL3_C215	Clorf174 UPF0688 protein Clorf174	9587
P04075_C178	ALDOA Fructose-bisphosphate aldolase A	7979	Q14289_C899	PTK2B Protein-tyrosine kinase 2-beta	9588
Q9UID3	VPS51 Vacuolar protein sorting-	7980	P26358_C	DNMT1 DNA (cytosine-5)-	9589

C81	associated protein 51 homolog		62	methyltransferase 1	
Q9ULL5_C173	PRR1 2 Proline-rich protein 12	7981	Q7RTR2_C561	NLRC3 Protein NLRC3	9590
P14618_C423	PKM Pyruvate kinase isozymes M1/M2	7982	Q9UKA4_C1488	AKAP11 A-kinase anchor protein 11	9591
O15117_C778	FYB FYN-binding protein	7983	076075_C194	DFFB DNA fragmentation factor subunit beta	9592
Q02880_C426	TOP2B DNA topoisomerase 2-beta	7984	000221_C187	NFKBIE NF-kappa-B inhibitor epsilon	9593
P14618_C424	PKM Pyruvate kinase isozymes M1/M2	7985	Q96F46_C703	IL17RA Interleukin-17 receptor A	9594
O14976_C913	GAK Cyclin-G-associated kinase	7986	P36776_C682	LONP1 Lon protease homolog, mitochondrial	9595
Q14980_C1907	NUMA1 Nuclear mitotic apparatus protein 1	7987	Q9UGK8_C189	SERGEF Secretion-regulating guanine nucleotide exchange factor	9596
Q86WI3_C1190	NLRC5 Protein NLRC5	7988	Q9HAV4_C1131	XP05 Exportin-5	9597
Q6IS14_C129	EIF5AL1 Eukaryotic translation initiation factor 5A-l-like	7989	P38646_C366	HSPA9 Stress-70 protein, mitochondrial	9598
Q9Y2X3_C106	NOP58 Nucleolar protein 58	7990	P30084_C213	ECHS1 Enoyl-CoA hydratase, mitochondrial	9599
Q9NRG7_C78	SDR39U1 Epimerase family protein SDR39U1	7991	Q9Y3P8_C126	SIT1 Signaling threshold-regulating transmembrane adaptor 1	9600
Q14761_C134	PTPRCAP Protein tyrosine phosphatase receptor type C-associated protein	7992	Q92844_C328	TANK TRAF family member-associated NF-kappa-B activator	9601
P30479_C349	HLA-B HLA class I histocompatibility antigen, B-41 alpha	7993	Q9NR50_C281	EIF2B3 Translation initiation factor eIF-2B subunit gamma	9602
P30460_C349	HLA-B HLA class I histocompatibility antigen, B-8 alpha	7994	P36969_C102	GPX4 Phospholipid hydroperoxide glutathione peroxidase, mitochondrial	9603
Q6KC79_C2151	NIPBL Nipped-B-like protein	7995	P29144_C787	TPP2 Tripeptidyl-peptidase 2	9604
P26038_C284	MSN Moesin	7996	P40121_C282	CAPG Macrophage-capping protein	9605
Q9UL15_C118	BAG5 BAG family molecular chaperone regulator 5	7997	Q5JSL3_C592	DOCK11 Dedicator of cytokinesis protein 11	9606
Q15022_C325	SUZ12 Polycomb protein SUZ12	7998	P52306_C85	RAP1GDS1 Rap1 GTPase-GDP dissociation stimulator 1	9607
Q8NBZ0_C179	INO80E INO80 complex subunit E	7999	P61978_C205	HNRNPK Heterogeneous nuclear ribonucleoprotein K	9608
P42226_C355	STAT6 Signal transducer and activator of transcription 6	8000	P35250_C88	RFC2 Replication factor C subunit 2	9609
P37802_C63	TAGLN2 Transgelin-2	8001	Q96PY6_C276	NEK1 Serine/threonine-protein kinase Nek1	9610
O60313_C786	OPA1 Dynamin-like 120 kDa protein, mitochondrial	8002	Q9Y5J1_C90	UTP18 U3 small nucleolar RNA-associated protein 18 homolog	9611
Q8TB24_C881	RIN3 Ras and Rab interactor 3	8003	095365_C123	ZBTB7A Zinc finger and BTB domain-containing protein 7A	9612
P42226_C356	STAT6 Signal transducer and activator of transcription 6	8004	Q9ULG1_C1001	INO80 DNA helicase INO80	9613

P13639_C 693	EEF2 Elongation factor 2	8005	095801_ C63	TTC4 Tetratricopeptide repeat protein 4	9614
P13010_C 493	XRCC5 X-ray repair cross- complementing protein 5	8006	P57772_C 55	EEFSEC Selenocysteine- specific elongation factor	9615
Q9NX46_ C132	ADPRHL2 Poly(ADP-ribose) glycohydrolase ARH3	8007	Q96FE7_ C228	PIK3IP 1 Phosphoinositide-3- kinase-interacting protein 1	9616
Q5RL73_ C199	RBM48 RNA-binding protein 48	8008	Q92945_ C176	KHSRP Far upstream element- binding protein 2	9617
P09001_C 338	MRPL3 39S ribosomal protein L3, mitochondrial	8009	P15121_C 304	AKR1B1 Aldose reductase	9618
Q14204_C 3089	DYNC1H1 Cytoplasmic dynein 1 heavy chain 1	8010	Q15149_ C3017	PLEC Plectin	9619
Q15437_C 767	SEC23B Protein transport protein Sec23B	8011	Q12849_ C476	GRSF1 G-rich sequence factor 1	9620
P30040_C 157	ERP29 Endoplasmic reticulum resident protein 29	8012	P55160_C 338	NCKAP1L Nck-associated protein 1-like	9621
Q9UQ35_ C956	SRRM2 Serine/arginine repetitive matrix protein 2	8013	P50990_C 430	CCT8 T-complex protein 1 subunit theta	9622
Q5RL73_ C204	RBM48 RNA-binding protein 48	8014	P53597_C 60	SUCLG1 Succinyl-CoA ligase	9623
Q12996_C 646	CSTF3 Cleavage stimulation factor subunit 3	8015	Q9Y277_ C229	VDAC3 Voltage-dependent anion-selective channel protein	9624
P15170_C 276	GSPT1 Eukaryotic peptide chain release factor GTP-binding subunit ERF3A	8016	P30481_C 125	HLA-B HLA class I histocompatibility antigen, B- 44 alpha	9625
Q9BY32_ C146	ITPA Inosine triphosphate pyrophosphatase	8017	P04222_C 125	HLA-C HLA class I histocompatibility antigen, Cw-3 alpha	9626
Q9Y3Z3_ C80	SAMHD1 SAM domain and HD domain-containing protein 1	8018	Q96L91_ C162	EP400 E1A-binding protein p400	9627
Q99590_C 566	SCAF1 1 Protein SCAF1 1	8019	Q9Y4E8_ C264	USP15 Ubiquitin carboxyl- terminal hydrolase 15	9628
Q9BSQ5_ C170	CCM2 Malcavernin	8020	Q8IZH2_ C1450	XRN1 5-3 exoribonuclease 1	9629
P07737_C 128	PFN1 Profilin-1	8021	Q29RF7_ C581	PDS5A Sister chromatid cohesion protein PDS5 homolog A	9630
P45974_C 195	USP5 Ubiquitin carboxyl-terminal hydrolase 5	8022	Q3KQU3 C251	MAP7D1 MAP7 domain- containing protein 1	9631
Q9H2U2_ C44	PPA2 Inorganic pyrophosphatase 2, mitochondrial	8023	060318_ C1864	MCM3AP 80 kDa MCM3- associated protein	9632
Q92530_C 185	PSMF1 Proteasome inhibitor PI31 subunit	8024	Q9NT62_ C182	ATG3 Ubiquitin-like- conjugating enzyme ATG3	9633
P26599_C 23	PTBP1 Polypyrimidine tract-binding protein 1	8025	Q14511_ C18	NEDD9 Enhancer of filamentation 1	9634
P57075_C 435	UBASH3A Ubiquitin-associated and SH3 domain-containing protein A	8026	000139_ C406	KIF2A Kinesin-like protein KIF2A	9635
P25208_C 89	NFYB Nuclear transcription factor Y subunit beta	8027	P09914_C 138	IFIT1 Interferon-induced protein with tetratricopeptide	9636
Q8N6S5_ C48	ARL6IP6 ADP-ribosylation factor-like protein 6-interacting protein 6	8028	060216_ C35	RAD21 Double-strand-break repair protein rad21 homolog	9637
Q96AP0_ C406	ACD Adrenocortical dysplasia protein homolog	8029	P04222_C 345	HLA-C HLA class I histocompatibility antigen, Cw-3 alpha	9638

P25208_C 85	NFYB Nuclear transcription factor Y subunit beta	8030	P57764_C 38	GSDMD Gasdermin-D	9639
O14745_C 206	SLC9A3R1 Na(+)/H(+) exchange regulatory cofactor NHE-RF1	8031	Q9Y520_C C2340	PRRC2C Protein PRRC2C	9640
Q9H6S0_C C363	YTHDC2 Probable ATP-dependent RNA helicase YTHDC2	8032	P62913_C 150	RPL11 60S ribosomal protein L11	9641
Q9BY32_C C154	ITPA Inosine triphosphate pyrophosphatase	8033	Q9Y2Y0_C C149	ARL2BP ADP-ribosylation factor-like protein 2-binding protein	9642
Q9UQ13_C C306	SHOC2 Leucine-rich repeat protein SHOC-2	8034	Q16514_C C143	TAF12 Transcription initiation factor TFIID subunit 12	9643
P30876_C 177	POLR2B DNA-directed RNA polymerase II subunit RPB2	8035	O14526_C C571	FCHO1 FCH domain only protein 1	9644
Q8TB24_C C484	RIN3 Ras and Rab interactor 3	8036	Q6F5E8_C C1339	RLTPR Leucine-rich repeat-containing protein 16C	9645
P37802_C 38	TAGLN2 Transgelin-2	8037	Q9H7N4_C C362	SCAF1 Splicing factor, arginine/serine-rich 19	9646
P60174_C 255	TP11 Triosephosphate isomerase	8038	Q8WW01_C C13	TSEN15 tRNA-splicing endonuclease subunit Sen15	9647
Q99832_C 511	CCT7 T-complex protein 1 subunit eta	8039	O15226_C C424	NKRF NF-kappa-B-repressing factor	9648
O75592_C 3152	MYCBP2 Probable E3 ubiquitin-protein ligase MYCBP2	8040	P40763_C 712	STAT3 Signal transducer and activator of transcription 3	9649
Q9BSH5_C C243	HDHD3 Haloacid dehalogenase-like hydrolase domain-containing 3	8041	Q92608_C C1083	DOCK2 Deducator of cytokinesis protein 2	9650
Q13573_C 250	SNW1 SNW domain-containing protein 1	8042	Q8TDZ2_C C837	MICAL1 Protein-methionine sulfoxide oxidase MICAL1	9651
P46777_C 100	RPL5 60S ribosomal protein L5	8043	Q9NRA8_C C318	EIF4ENIF1 Eukaryotic translation initiation factor 4E transporter	9652
O95571_C 170	ETHE1 Protein ETHE1, mitochondrial	8044	P29590_C 227	PML Protein PML	9653
Q92556_C 726	ELMO1 Engulfment and cell motility protein 1	8045	Q9UBU9_C C252	NXF1 Nuclear RNA export factor 1	9654
P84074_C 185	HPCA Neuron-specific calcium-binding protein hippocalcin	8046	P61586_C 159	RHOA Transforming protein RhoA	9655

[0409] Table 5 illustrates an exemplary listing of cysteine-containing polypeptides. The cysteine residue of interest is denoted with (*).

Table 5

Protein Identifier (Accession No.)	Protein Name	Cysteine Residue Number	Sequence	SEQ ID NO:
O75874	Isocitrate dehydrogenase 1 (IDH1)	C269	MSKKISGGSVVEMQGDDEMTRIIWELIKEKLIFFYV ELDLHSYDLGIENRDATNDQVTKDAAEAIKKNV GVKCATITPDEKRVVEFKLKQMWKSPNGTIRNIL GGTVFREAIIICKNIPRLVSGVWVKPIIIGRHAYGDQY RATDFVVPGPVKVEITYTPSDGTQKVTYLVHNFE EGGGVAMGMYNQDKSIEDFAHSSFQMALSKGWP LYLSTKNTILKKYDGRFKDIFQEIYDKQYKSQFEA QKIWYEHRLIDDMVAQAMKSEGGFIWAC*KNYD GDVQSDSVAQGYGSLGMMTSVLVCPDGKTVEAE	9656

			AAHGTVTRHYRMYQKGQETSTNPIASIFAWTRGL AHRAKLDNNKELAFFANALEEVSITIEAGFMTK DLAACIKGLPNVQRSDYLNTEFMDKLGLENLKK LAQAKL	
P48735	Isocitrate dehydrogenase 2 (IDH2)	C308	MAGYLRVVRSLCRASGRPAWAPAALTAPTSQE QPRRHYADKRIKVAKPVVEMDGDDEMTRIIWQFIK EKLILPHVDIQLKYFDLGLPNR-DQTDDQVTIDSAL ATQKYSVAVKCATITPDEARVEEFKLKKMWKSP NGTIRNILGGTVFREPIICKNIPRLVPGWTKPITIGR HAHGDQYKATDFVADRAGTFKMFVTPKDGSGV KEWEVYNFPAGGVGMGMYNNTDESISGFAHSCFQ YAIQKKWPLYMSTKNTILKAYDGRFKDIFQEIFDK HYKTDKDKNKIWIYEHLIDDMV AQLVKS SGGFV WAC*KNYDGDVQSDILAQQFGSLGLMTSVLVC DGKTIEAEAAHGTVTRHYREHQGRPTSTNPIA SIFAWTRGLEHRGKLDGNQDLIRFAQMLEKVCVE TVESGAMTKDLAGCIHGLSNVKNLNEHFLNTDFL DTIKSNLDRALGRQ	9657
Q14790	CASP8	C360	MDFSRNLYD1GEQLDSEDLASLKFSLDYIPQRKQ EPIKDALMLFQRLQEKRMLEESNLSFLKELLFRIN RLDLLITYLNTRKEEMERELQTPGRAQISAYRVM LYQISEEVSRSSELRSFKFLQEEISKCKLDDDMNLL DIFIEMEKRVILGEGKLDILKRVCAQINKSLLKIIN DYEE FSKERSSSLEGPDEFSGEELCGVMTISD SPREQDSESQTLDKVYQMKSKPRGYCLITNNHNF AKAREKVPKLHSIRDRNGTHLDAGALTTTFFELH FEIKPHDDCTVEQIYEILKIYQLMDHSNMDFCICCI LSHGDKGIYGTGQEAPIYELTSQFTGLKCPSLA GKPKVFFIQAC *QGDNYQKGIPVETDSEEQP YLE MDLSSPQTRYIPDEADFLGMATVNNCVSYRNP EGTWYIQSLCQSLRERCPRGDDILTILTEVNVEV SNKDDKKNMGKQMPQPTFTLRKLVFPSD	9658
Q9285 1	CASP 10	C401	MKSQGOHWYS SSDKNCKVSF REKLLIIDS LGVQDVENLK FLCIGLVPNKKLEKSSASD VFEHLLAEDL LSEEDPFFLA ELLYIIRQKK LLQHLNCTKE EVERLLPTRQ RVSLFRNLLY ELSEGIDSENKDMIFLLKD SLPKTEMTSL SFLAFLEKQGKIDEDNLTCL EDLCKTVVPK LLRNIKEYKREKAIQIVTPP VDKEAESYQG EEELVSQTDVKTFLALPQE SWQNKHAGSN GNRATNGAPSLVSRGMQASANTLNSETSTKRA AVYRMNRNHRGLCVIVNNSFTSLKDR QGTHKDAEILSHVFQWLGFV VHIHNNVTKV EMEMVLQKQKCNPAHADGDCVFCILTHGRFGA VYS SDEALPIREIMSHFTALQCPRLAEKPKLFFIQ AC*QGEEIQPSVSIADALNPEQAPTSLODSIPAEA DFLLGLATVPGYVSRHVEEGSWYIQLCNHLKK LVPRMLKFLEKTMEIRGRKRTVWGAKQISATSLP TAISAQTPRPPMRRWSSVS	9659
Q99873	PRMT1	C109	MENFVATLANGMSLQPPLEEVSCGQAESSEKPN EDMTSKDYFDSYAHFGIHEEMLKDEVRTLTYRN SMFHNRLFKDKWLDVGSSTGILCMFAAKAGA PJK:VIGIEC*SSISDYAVKIVKANKLDHVVTIHKGV EVELPVEKVDIIESEWMGYCLFYESMLNTVLYAR	9660

			DKWLAPDGLIFPDRATLYVTAIEDRQYKDYKIH WENVYGFDMSCIKDVAIKEPLVDWDPKQLVTN ACLIKEVDIYTVKVEDLTFTSPFCLQVKNRNDYVH ALVAYFNIEFTRCHKRTGFSTSPESPYTHWKQTVF YMEDYLTVKTGEEIFGTIGMRPNAKNNRDLDFTI DLDFKGQLCELSCSTDYRMR	
Q9NYL2	MAP3 kinase MLTK (or ZAK)	C22	MSSLGASFVQIKFDDLQFFENC +GGGSFGSVYRA KWISQDKEVAVKKLLKIEKEAEILSVLSHRNIIQFY GVILEPPNYGIVTEYASLGSLYDYINSNRSEEMDM DHIMTWATDVAKGMHYLHMEAPVKVIHRDLKS RNWIAADGVLKICDFGASRFHNHTTHMSLVGTF PWMAPEVIQSLPVSETCDTYSYGWLWEMLTREV PFKGLEGLQVAWLVEKNERLTIPSSCPRSFAELL HQCWEADAKKRPSFKQIISILESMSNDTSLPKCN SFLHNKAEWRCIEATLERLKLKLERDLSFKEQELK ERERRLKMWEQKLTEQSNTPLPSFEIGAWTEDD VYCWWVQLVRKGD SSAEMSV YASLFKENNITGK RLLLLEEEDLKDMGIVSKGHIIHFSAIEKLTHDYI NLFHFPLIKDSGGEPEENEKIVNLELVFGFLKP GTGPDQCKWKMYMEMDGEIAITYIKDVTFTNTN LPDAEILKMTKPPFVMEKWIVGIAKSQTVECTVT YESDVRTPKSTKHVHSIQWSRTKPQDEVKAVQLA IQTFTNSDGNPGSRSDSSADCQWLDTLRMRQIAS NTSLQRSQSNPILGSPFFSHFDGQDSYAAAVRRPQ VPIKYQQITPVNQSRSSPTQYGLTKNFSSHLNSR DSGFSSGNTDTSSERGRYSDRSRKYGRGSISLNS SPRGRYSGKSQHSTPSRGRYPGKFYRVSQSALNP HQSPDFKRSRDLHQPN TIPGMPLHPETDSRASEE DSKVSEGGWTKVEYRKKPHRPSAKTNERARG DHRGWRNF	9661
P12268	IMPDH2	C140, C331	MADYLISGGTSYVPDDGLTAQQLFNCGDGLTYN DFLILPGYIDFTADQVDLTSALTKKITLKTPLVSSP MDTVTEAGMAIAMALTGGIGFIHHCNCTPEFQANE VRKVKKYEQGFITDPVVLSPKDRVRDVFEAKARH GFC*GIPITDTGRMG SRLVGISSRDIDFLKEEHDC FLEEIMTKREDLVVAPAGITLKEANEILQRSKKGK LPIVNEDDELVAIIARTDLKKNRDYPLASKDAKKQ LLCGAAIGTHEDDKYRLDLLAQAGVDVWLDSS QGNISIFQINMIKYIKDKYPNLQVIGGNVVTAAQA KNLIDAGVDALRVGMGSGSIC*ITQEV LACGRPQ ATAVYKVSEYARRFGVPVIADGGIQNVGHIAKAL ALGASTVMMGSLLAATTEAPGEYFFSDGIRLKKY RGMGSLDAMDKHLSSQNRYFSEADKIKVAQGVV GAVQDKGSIHKFVPLYIAGIQHSCQDIGAKSLTQV RAMMYSGELKFEKRTSSAQVEGGVHSLHSYEKR LF	9662
Q9NQ88	TIGAR	C114, C161	MARFALTVVVRHGETRFNKEKIIQGQGVDEPLSET GFKQAAAAGIFLNNVKFTHAFSSDLMRKQTMH GILERSKFCKDMTVKYDSRLRERKYGVVEGKALS ELRAMAKAAREEC *PVFTPPGGETLDQ VKMRGID FFEFLCQLILKEADQKEQFSQGSNSC*LETSLAEI FPLGKNHSSKVNSDSGIPGLAASVLVSHGAYMR SLFDYFLTDLKCSLPATLSRSELM SVTPNTGMSLFI INFEEGREVKPTVQCICMNLQDHLNGLTETR	9663
Q04759	PKC9	C14. C17	MSPFLR1GLSNFDC*GSC*QSCQGEAVNPYCAVLV KEYVESENGQMYIQKKPTMYPPWDSTFDAHINK	9664

			GRVMQIIVKGNVDLISETTVELYSLAERCCKNN GKTEIWLELKPQGRMLMNARYFLEMSDTKDMNE FETEGFFALHQRRGAIKQAKVHHVKCHEFTATFF PQPTFCVSCHEFVWGLNKQGYQCRQCNAAIHKK CIDKVIKCTGSAINRETMFHKERFKIDMPHRFK VYNYKSPTFCEHCGTLLWGLARQGLKCDACGMN VH HRCQTKVANLTCGINQKLMAEALAMIESTQQ ARCLRDTEQIFREGPVEIGLPCSIKNEARPPCLPTP GKREPQGISWESPLDEVDKMCHLPEPELNKERPSL QIKLKIEDFILHKMLGKGSFGKVFLAEFKTNQFF AIKALKKDVVLMDDDDVECTMVEKRVLSLAWEHP FLTHMFCTFQTKENLFFVMEYLNGGDLMYHIQSC HKFDLSRATFYAAEIIILGLQFLHSGIVYRDLKLD NILLDKDGHKIADFGMCKENMLGDAKTNTFCGT PDYIAPEILLGQKYNHSVDWW SFGVLLYEMLIGQ SPFHGQDEEELFHSIRMDNPFYPRWLEKEAKDLL VKLFVREPEKRLGVRGDIRQHPLFREINWHEELERK EIDPPFRPKVKSPFDCSNFDKEFLNEKPRLSFADRA LINSMDQNMFRNFSFMNPGMERLIS	
Q96SW2	Cereblon	C188, C287	MAGEGDQQDAAHNMGNHPLLLPAESEEEDEMEV EDQDSKEAKKPNINFDTSLPTSHTYLGADMEEFH GRTLHDDDDSCQVIPVLPQVMMILIPGQTLPLQLFH PQEVSMVRNLIQKDRTFVLA YSNVQEREAQFGT TAEIYAYREEQDFGIEIVKVKAIQRQRFKVLRLT QSDGIQQAQVQILPEC*VLPSTMSAVQLESLNKCCQ IFPSKPVSRDQCSYKWWQKYQKRKFHCANLTS WPRWLYSLYDAETLMDRIKKQLREW DENLKDDS LPSNPIDFSYRVAAC*LPIDDVLRQLLKIGSAIQR RCELDIMNKCTSLCCKQCQETEITTKNEIFSLSLCG PMAAYVNPFGYVHETLTVYKACNLNLIGRPS TEH SWFFPGYAWTVAQCKICASHIGWKFTATKKDMSP QKFWGLTRSALLPTIPDTEDEISPKVILCL	9665

[0410] Table 6A - Table 6E illustrate a list of cysteine containing proteins and potential cysteine site of conjugation separated by protein class. Table 6A illustrates cysteine containing enzymes and potential cysteine conjugation site. Table 6B shows a list of cysteine containing transcription factors and regulators. Table 6C shows an exemplary list of cysteine containing channels, transceptors and receptors. Table 6D illustrates an exemplary cysteine containing adapter, scaffolding, and modulator protein. Table 6E provides an exemplary list of uncategorized cysteine containing proteins.

Table 6A

Identifier	Protein Name	Cysteine Location	Protein Class
O14920	IKBKB Inhibitor of nuclear factor kappa-B kinase subunit	C464	Enzyme
O14933	UBE2L6 Ubiquitin/ISG15-conjugating enzyme E2 L6 PCTK	C98	Enzyme
O94953	KDM4B Lysine-specific demethylase 4B	C694	Enzyme
P00813	ADA Adenosine deaminase	C75	Enzyme
P09211	GSTP1 Glutathione S-transferase P	C48	Enzyme

Identifier	Protein Name	Cysteine Location	Protein Class
P15374	UCHL3 Ubiquitin carboxyl-terminal hydrolase isozyme L3	C95	Enzyme
PI6455	MGMT Methylated-DNA-protein-cysteine methyltransferase	C145; C150	Enzyme
P17812	CTP synthase 1	C491	Enzyme
PI9447	ERCC3 TFIIH basal transcription factor complex helicase	C342	Enzyme
P21580	TNFAIP3 Tumor necrosis factor alpha-induced protein 3	C54	Enzyme
P24752	ACAT1 Acetyl-CoA acetyltransferase, mitochondrial	C119; C126; C196; C413	Enzyme
P40261	Nicotinamide N-methyltransferase	CI65	Enzyme
P41226	UBA7 Ubiquitin-like modifier-activating enzyme 7	C599	Enzyme
P42575	CASP2 Caspase-2	C370	Enzyme
P43403	ZAP70 Tyrosine-protein kinase ZAP-70	C117	Enzyme
P48735	IDH2 Isocitrate dehydrogenase	C308	Enzyme
P51617	IRAK1 Interleukin-1 receptor-associated kinase 1	C608	Enzyme
P61081	NEDD8-conjugating enzyme Ubc12	C47	Enzyme
P61088	Ubiquitin-conjugating enzyme E2 N	C87	Enzyme
P68036	UBE2L3 Ubiquitin-conjugating enzyme E2 L3	C86	Enzyme
Q00535	CDK5 Cyclin-dependent kinase 5	C157	Enzyme
Q04759	PRKCQ Protein kinase C theta type	C14; C17	Enzyme
Q06124	Tyrosine-protein phosphatase non-receptor type 11	C573	Enzyme
Q09472	EP300 Histone acetyltransferase p300	C1738	Enzyme
Q14790	CASP8 Caspase-8	C360	Enzyme
Q15084	PDIA6 Protein disulfide-isomerase A6	C55; C58; CI90; C193	Enzyme
Q15910	EZH2 Histone-lysine N-methyltransferase EZH2	C503	Enzyme
Q16763	UBE2S Ubiquitin-conjugating enzyme E2 S	CI18	Enzyme
Q16822	PCK2 Phosphoenolpyruvate carboxykinase	C306	Enzyme
Q16875	6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase 3	C155	Enzyme
Q16877	PFKFB4 6-phosphofructo-2-kinase/fructose-2,6-bisphosphata	C159	Enzyme
Q6L8Q7	PDE12 2,5-phosphodiesterase 12	C108	Enzyme
Q70CQ2	USP34 Ubiquitin carboxyl-terminal hydrolase 34	C741; CI090	Enzyme
Q86UV5	USP48 Ubiquitin carboxyl-terminal hydrolase 48	C39	Enzyme
Q92851	Caspase-10	C401	Enzyme
Q93009	USP7 Ubiquitin carboxyl-terminal hydrolase 7	C223; C315	Enzyme
Q96FA3	PELI1 E3 ubiquitin-protein ligase pellino homolog 1	C282	Enzyme
Q96JH7	VCPIP1 Deubiquitinating protein VCIP135	C219	Enzyme
Q96RU2	USP28 Ubiquitin carboxyl-terminal hydrolase 28	C171; C733	Enzyme

Identifier	Protein Name	Cysteine Location	Protein Class
Q99873	PRMT1 Protein arginine N-methyltransferase 1	C109	Enzyme
Q9C0C9	UBE20 Ubiquitin-conjugating enzyme E2 O	C375	Enzyme
Q9NRW4	Dual specificity protein phosphatase 22	C124	Enzyme
Q9NWZ3	IRAK4 Interleukin-1 receptor-associated kinase 4	C13	Enzyme
Q9NYL2	MLTK Mitogen-activated protein kinase kinase kinase MLT	C22	Enzyme
Q9UPT9	USP22 Ubiquitin carboxyl-terminal hydrolase 22	C44; C171	Enzyme
Q9Y3Z3	SAMHD1 SAM domain and HD domain-containing protein 1	C522	Enzyme
Q9Y4C1	KDM3A Lysine-specific demethylase 3A	C251	Enzyme
Q9Y5T5	USP16 Ubiquitin carboxyl-terminal hydrolase 16	C205	Enzyme

Table 6B

Identifier	Protein Name	Cysteine Location	Protein Class
O75362	ZNF217 Zinc finger protein 217	C286	Transcription factors and regulators
P04150	NR3C1 Glucocorticoid receptor	C302; C622	Transcription factors and regulators
P09086	POU2F2 POU domain, class 2, transcription factor 2	C346	Transcription factors and regulators
P40763	STAT3 Signal transducer and activator of transcription 3	C259	Transcription factors and regulators
P48200	IREB2 Iron-responsive element-binding protein 2	C137	Transcription factors and regulators
Q01201	RELB Transcription factor RelB	C109	Transcription factors and regulators
Q02556	IRF8 Interferon regulatory factor 8	C306	Transcription factors and regulators
Q15306	IRF4 Interferon regulatory factor 4	C194	Transcription factors and regulators
Q7Z2W4	ZC3HAV1 Zinc finger CCCH-type antiviral protein 1	C645	Transcription factors and regulators
Q8TAQ2	SMARCC2 SWI/SNF complex subunit SMARCC2	C145	Transcription factors and regulators

Table 6C

Identifier	Protein Name	Cysteine Location	Protein Class
P63244	GNB2L1 Guanine nucleotide-binding protein subunit beta-2-like 1	C 182	Channels, Transporters, Receptors
Q 16 186	Proteasomal ubiquitin receptor ADRM1	C88	Channels, Transporters, Receptors
Q9HB90	RRAGC Ras-related GTP-binding protein C	C358; C377	Channels, transporters, and receptors

Table 6D

Identifier	Protein Name	Cysteine Location	Protein Class
P 14598	NCF1 Neutrophil cytosol factor 1	C378	Adapter, scaffolding, modulator proteins

Table 6E

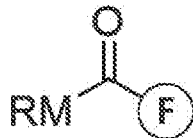
Identifier	Protein Name	Cysteine Location	Protein Class
000170	AIP AH receptor-interacting protein	C 122	Uncategorized
000541	PES1 Pescadillo homolog	C272; C361	Uncategorized
000622	CYR61 Protein CYR61	C39; C70; C 134	Uncategorized
0 14980	XPO1 Exportin-1	C34; C528; CI070	Uncategorized
P5085 1	LRBA Lipopolysaccharide-responsive and beige-like anchor protein	CI704; C2675	Uncategorized
Q96GG9	DCUN1D1 DCN1 -like protein 1	C 1 15	Uncategorized

[0411] While preferred embodiments of the present disclosure have been shown and described herein, it will be obvious to those skilled in the art that such embodiments are provided by way of example only. Numerous variations, changes, and substitutions will now occur to those skilled in the art without departing from the disclosure. It should be understood that various alternatives to the embodiments of the disclosure described herein may be employed in practicing the disclosure. It is intended that the following claims define the scope of the disclosure and that methods within the scope of these claims and their equivalents be covered thereby.

CLAIMS

WHAT IS CLAIMED IS:

1. A method of modulating an immune response in a subject in need thereof, comprising administering to the subject a therapeutically effective amount of a small molecule fragment of Formula (I):



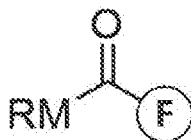
Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and F is a small molecule fragment moiety.

2. The method of claim 1, wherein the small molecule fragment interacts with an endogenous cysteine-containing polypeptide expressed in the subject to form a cysteine-containing polypeptide-small molecule fragment adduct
3. The method of claim 1 or 2, wherein the small molecule fragment is covalently bonded to a cysteine residue of the cysteine-containing polypeptide,
4. The method of claim 2, wherein the cysteine-containing polypeptide-small molecule fragment adduct induces an immune response,
5. The method of claim 2 or 4, wherein the cysteine-containing polypeptide-small molecule fragment adduct induces a humoral immune response or a cell-mediated immune response.
6. The method of claim 2, wherein the cysteine-containing polypeptide-small molecule fragment adduct increases an immune response relative to a control,
7. The method of claim 6, wherein the control is the level of an immune response in the subject prior to administration of the small molecule fragment or the level of an immune response in a subject who has not been exposed to the small molecule fragment.
8. The method of claim 2, wherein the cysteine-containing polypeptide is overexpressed in a disease or condition.
9. The method of claim 2, wherein the cysteine-containing polypeptide comprises one or more mutations, optionally overexpressed in a disease or condition.
10. The method of claim 8 or 9, wherein the disease or condition is cancer.

11. The method of claim 1, wherein the cysteine-containing polypeptide comprises a biologically active cysteine site, optionally located about 10A or less to an active-site ligand or residue.
12. The method of claim 2, wherein the cysteine-containing polypeptide comprises a protein illustrated in Tables 1-6,
13. The method of claim 2, wherein the cysteine-containing polypeptide comprises cereblon.
14. The method of claim 2, wherein the cysteine-containing polypeptide is at most 50 amino acid residues in length,
15. The method of claim 14, wherein the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, or 99% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655.
16. The method of claim 1, wherein F is a small molecule fragment moiety illustrated in Fig. 1,
17. An isolated and purified antibody or its binding fragment thereof comprising a heavy chain CDR1, CDR2 and CDR3 sequence and a light chain CDR1, CDR2 and CDR3 sequence, wherein the heavy chain and light chain CDRs interact with a cysteine-containing polypeptide that is covalently bonded to a small molecule fragment, wherein the small molecule fragment is a small molecule fragment of Formula (I):



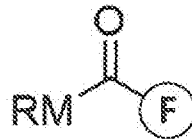
Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and wherein the small molecule fragment is covalently bonded to a cysteine residue of the cysteine-containing polypeptide.

18. The isolated and purified antibody or its binding fragment thereof of claim 17, wherein the antibody or its binding fragment thereof comprises a humanized antibody or binding fragment thereof chimeric antibody or binding fragment thereof, monoclonal antibody or binding fragment thereof, monovalent Fab', divalent Fab2, single-chain variable fragment (scFv), diabody, minibody, nanobody, single-domain antibody (sdAb), or camelid antibody or binding fragment thereof.

19. The isolated and purified antibody or its binding fragment thereof of claim 17, wherein F is a small molecule fragment moiety illustrated in Fig. 1,
20. The isolated and purified antibody or its binding fragment thereof of claim 17, wherein the cysteine-containing polypeptide comprises a protein illustrated in Tables 1-6.
21. The isolated and purified antibody or its binding fragment thereof of claim 17, wherein the cysteine-containing polypeptide comprises cerebion.
22. The isolated and purified antibody or its binding fragment thereof of claim 17, wherein the cysteine-containing polypeptide is at most 50 amino acid residues in length.
23. The isolated and purified antibody or its binding fragment thereof of claim 22, wherein the cysteine-containing polypeptide comprises an isolated and purified polypeptide comprising at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, or 99% sequence identity to at least seven contiguous amino acids of an amino acid sequence selected from SEQ ID NOs: 1-9655.,
24. A vaccine comprising a small molecule fragment of Formula (I):

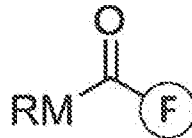


Formula (I)

wherein:

RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and F is a small molecule fragment moiety.

25. The vaccine of claim 24, wherein F is a small molecule fragment moiety illustrated in Fig. 1.
26. A kit comprising an isolated and purified antibody or its binding fragment thereof of claims 17-23, or a vaccine of claims 24-25:
27. A method of modulating cerebion activity, comprising:
 - contacting a cell expressing cerebion with a small molecule fragment of Formula (I):



wherein RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of cysteine residue; and F is a small molecule fragment moiety;

wherein the small-molecule fragment of Formula (I) covalently binds to residue 187 or residue 288 of cereblon; and

wherein residue positions 187 and 288 correspond to positions 187 and 288 of SEQ ID NO: 9665.

28. The method of claim 27, wherein F is a small molecule fragment moiety illustrated in Fig. 1.
29. The method of claim 27, wherein F optionally comprises a second reactive moiety.
30. The method of claim 27, wherein the cell is a mammalian cell.
31. The method of claim 27, wherein the method is an *in vivo* method.

1/2

Fragment electrophiles screened by isoTOP-ABPP

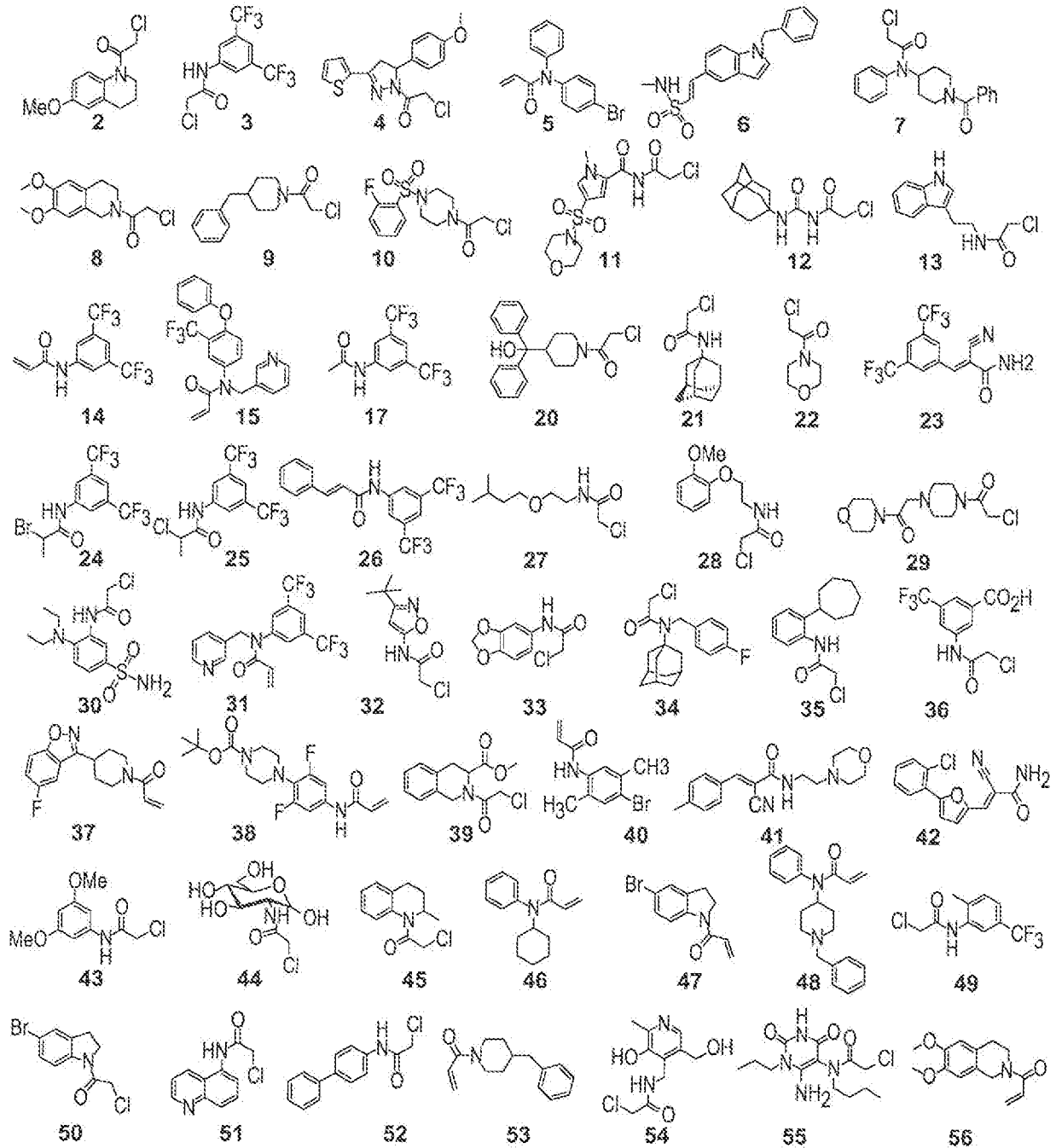


FIG. 1A

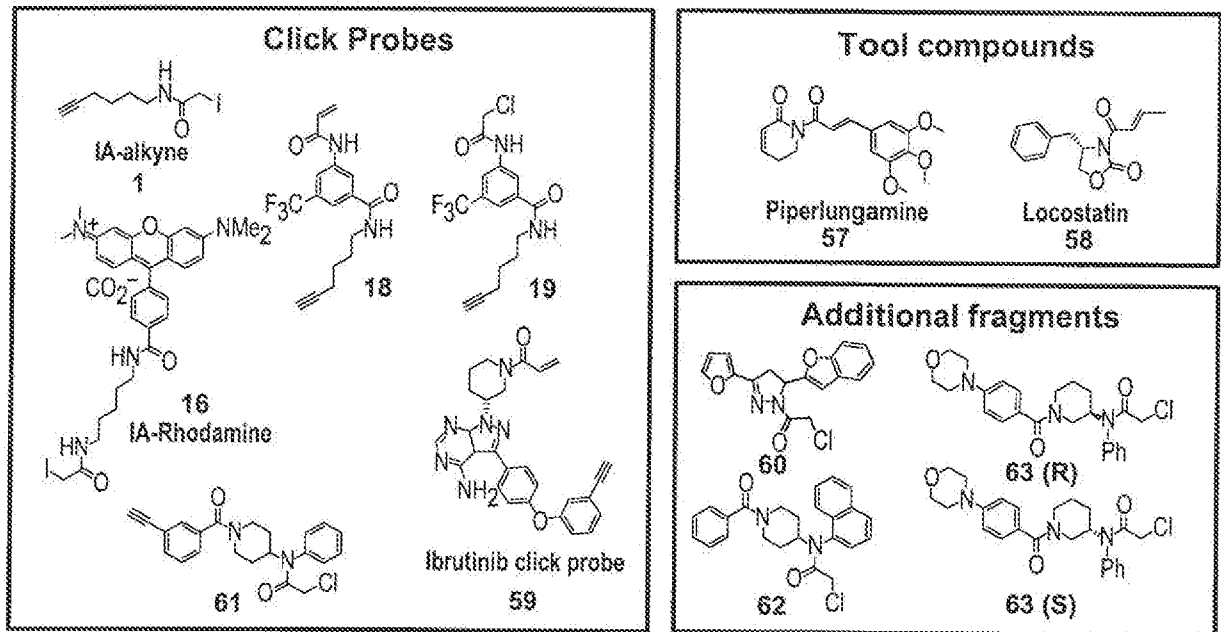


FIG. 1B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/35748

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(8) - G01 N 33/68, C07D 471/00, C07D 233/00 (201 7.01)
 CPC - G01 N 33/68, C07D 471/00, C07D 233/00

According to International Patent Classification (IPC) or to both national classification and IPC.

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History Document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History Document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 2016/0016893 A1 (Northwestern University) 21 January 2016 (21.01.2016) para [0010], [0015], [0067], [0068], [0070], [0109], [0114], [0122], [0124], [0255], Claim 11, 13, 16, Fig. 1A, 1B	1-4, 8-11, 14 --- 5-7, 12, 15-16
Y	"Clinical perspectives for irreversible tyrosine kinase inhibitors in cancer" (Carmi et al.) Biochemical Pharmacology 84 (2012) 1388-1399; Fig. 2	1
Y	"Regulation of T-cell responses by PTEN" (Buckler et al.) Immunol Rev. 2008 August ; 224: 239-248; abstract, pg 5, para 6	5-7
Y	"Ribosomal protein S3 interacts with the NF-kB inhibitor IκBa" (Stanborough et al.) (hereinafter 'Stanborough') FEBS Letters 588 (2014) 659-664; abstract, pg 663, col 2, para 1, Fig. 1, 3,	12, 15
Y	PubChem CID 16227198; 30 July 2007 (30.07.2007) [retrieved on 20 September 2017, https://pubchem.ncbi.nlm.nih.gov/compound/16227198#section=Top] pg 1	16
Y	US 2012/0053244 A1 (Baroni et al.) 01 March 2012 (01.03.2012) abstract, para [0100], [0103]	16
X, P	US 2017/01 15303 A1 (THE SCRIPPS RESEARCH INSTITUTE) 27 April 2017 (27.04.2017) whole doc.	1-12, 14-16

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"G" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

20 September 2017

Date of mailing of the international search report

06 OCT 2017

Name and mailing address of the ISA/US
 Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
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 Facsimile No. 571-273-8300

Authorized officer:
 Lee W. Young

PCT Helpdesk: 571-272-4300
 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/35748

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.: 26
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
- Please see extra sheet for Box No. III Observations where unity of invention is lacking -

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-12, 14-16 limited to SEQ ID NO: 1 and compound 2

- Remark on Protest
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
 - The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
 - No protest accompanied the payment of additional search fees.

Continuation of:

Box NO III. Observations where unity of invention is lacking

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I+: Claims 1-16, 27-31, directed to a method of modulating an immune response in a subject in need thereof, comprising administering to the subject a small molecule fragment of Formula (I): $RM-(C=O)-F$; wherein RM is a reactive moiety capable of forming a covalent bond with a cysteine-containing polypeptide; and F is a small molecule fragment moiety. The method will be searched to the extent that the cysteine-containing polypeptide encompasses RPS3 40S ribosomal protein S3 (SEQ ID NO: 1); and the small molecule fragment encompasses compound 2. It is believed that claims 1-12, 14-16 encompass this first named invention, and thus these claims will be searched without fee to the extent that they encompass SEQ ID NO: 1 and compound 2. Additional cysteine-containing polypeptide(s) and small molecule fragment(s) will be searched upon the payment of additional fees. Applicants must specify the claims that encompass any additionally elected cysteine-containing polypeptide(s) and small molecule fragment(s). Applicants must further indicate, if applicable, the claims which encompass the first named invention, if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched. An exemplary election would be wherein the cysteine-containing polypeptide encompasses cereblon SEQ ID NO: 9665 and small molecule fragment encompasses compound 2 (claims 1-14, 16, 27-31).

Group II: claims 17-25, drawn to a composition comprising a small molecule fragment of Formula (I): $RM-(C=O)-F$; and antibody directed at said small molecule fragment of Formula (I).

Special Technical Features

Group I+ includes the special technical feature of a method of modulating an immune response in a subject in need thereof, not required by Group II.

Group II includes the special technical feature of a composition comprising a small molecule fragment, not required by Group I+.

The technical feature of each of the inventions listed as Group I+ is the specific small molecule fragment-cysteine containing polypeptide conjugates, recited therein. Each invention requires a specific small molecule fragment-cysteine containing polypeptide conjugate, not required by any of the other inventions.

Common Technical Features

The inventions of Groups I+ and II share the technical feature of a small molecule fragment-cysteine containing polypeptide conjugate. However, these shared technical features do not represent a contribution over prior art in view of US 2016/0016893 A1 to Northwestern University (hereinafter 'Northwestern Univ').

Northwestern Univ teaches a method of modulating an immune response in a subject in need thereof para [0067], methods for treating a disease or disorder that is associated with NEDD4-1 activity in a subject in need thereof where the methods comprise administering to the subject the disclosed compounds which are NEDD4-1 inhibitors; [0070], a subject may refer to a human subject having or at risk for developing infection by human immunodeficiency virus 1 (HIV-1). (See Weiss et al., "Rescue of HIV-1 Release by Targeting Widely Divergent NEDD4-Type Ubiquitin Ligases and Isolated Catalytic HECT Domains to Gag" PLoS Pathog. 2010 September; 6(9): e1001107), comprising administering to the subject a therapeutically effective amount of a small molecule fragment of Formula (I): $RM-(C=O)-F$; wherein: RM is a reactive moiety selected from a Michael acceptor moiety, a leaving group moiety, or a moiety capable of forming a covalent bond with the thiol group of a cysteine residue; and F is a small molecule fragment moiety (para [0109], We have developed a novel fragment-based drug discovery method, irreversible tethering, which employs the irreversible covalent trapping of drug-like fragments at active site cysteines. We rationally designed a chemical system to attach a cysteine reactive electrophile, (E)-methyl 4-aminobut-2-enoate, to 100 drug-like fragments without significant alterations in the thiol reactivity of the attached electrophile, ensuring that specific binding and not reactivity will produce candidate inhibitors.; [0114], To find an electrophile which is suitable for irreversible tethering, we explored the cysteine-reactivity profiles of four Michael acceptors: acrylamides 1 and vinylsulfonamides 2, and aminomethyl methyl acrylates 3 and methyl vinylsulfones 4 (See FIGS. 1A-B). [Note, the article "Clinical perspectives for irreversible tyrosine kinase inhibitors in cancer" by Carmi et al. (hereinafter 'Carmi') [Biochemical Pharmacology 84 (2012) 138871399] teaches formation of $RM-(C=O)-F$ moiety (Fig. 2, Reaction mechanism of acrylamides toward cysteines).]

As said technical features were known in the art at the time of the invention, these cannot be considered special technical feature that would otherwise unify the groups.

Groups I+ and II therefore lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.