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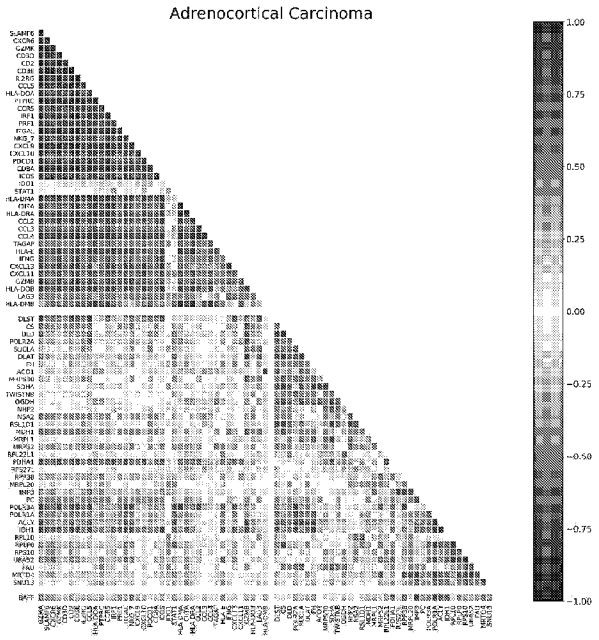


FIG. 22

(57) Abstract: Provided herein are analytical methods to be applied to samples, diagnostic methods, methods of determining a therapeutic regimens, and methods of treating cancer in a subject comprising compositions described herein.

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COMPOSITIONS AND METHODS FOR CANCER IMMUNOTHERAPY

CROSS REFERENCE

[0001] This application claims priority to U.S. Application No. 62/614,294, filed January 5, 2018, which is entirely incorporated herein by reference.

BACKGROUND

[0002] Cancer is a leading cause of death throughout the world. One approach to cancer treatment is cancer immunotherapy. Cancer immunotherapy involves the use of compositions and methods to elicit or enhance an individual's immune system against cancerous cells.

BRIEF SUMMARY

[0003] Disclosed herein are methods comprising administering to a subject, a therapeutically effective amount of a B-cell activating factor (BAFF) inhibitor or a salt thereof and a therapeutically effective amount of an immune checkpoint inhibitor or salt thereof. In some embodiments, the BAFF inhibitor or a salt thereof can comprise an antibody, single chain antibody molecule, or an active fragment thereof. In some embodiments, the antibody or an active fragment thereof can be a monoclonal antibody or an active fragment thereof or a polyclonal antibody or an active fragment thereof. In some embodiments, the antibody or an active fragment thereof can be a monoclonal antibody or an active fragment thereof. In some embodiments, the antibody or an active fragment thereof can be bispecific. In some embodiments, the antibody or an active fragment thereof can comprise a first domain that binds BAFF or B-cell activating factor receptor (BAFF-R). In some embodiments, the antibody or an active fragment thereof can comprise a second domain that binds PD-1 or PD-L1. In some embodiments, the antibody or an active fragment thereof can be humanized. In some embodiments, the antibody or an active fragment thereof can be an IgG, IgE, IgM, IgD, IgA or IgY. In some embodiments, the antibody or an active fragment thereof can be a recombinant protein. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a heavy chain having at least 80% sequence identity with a sequence shown in SEQ ID NO: 150. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a heavy chain having at least 90% sequence identity with a sequence shown in SEQ ID NO: 150. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a light chain having at least 80% sequence identity with a sequence shown in SEQ ID NO: 151. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a light chain having at least 90% sequence identity with a sequence shown

in SEQ ID NO:151. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a light chain variable region having at least 80% sequence identity with a sequence shown in SEQ ID NO: 153. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a heavy chain variable region having at least 80% sequence identity with a sequence shown in SEQ ID NO: 152. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a heavy chain having at least 80% sequence identity with a sequence shown in SEQ ID NO: 154. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a heavy chain having at least 90% sequence identity with a sequence shown in SEQ ID NO: 154. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a light chain having at least 80% sequence identity with a sequence shown in SEQ ID NO: 155. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a light chain having at least 90% sequence identity with a sequence shown in SEQ ID NO: 155. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a light chain variable region having at least 80% sequence identity with a sequence shown in SEQ ID NO: 157. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a heavy chain variable having at least 90% sequence identity with a sequence shown in SEQ ID NO: 156. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a sequence having at least 80% length homology to a sequence shown in SEQ ID NO:1 –16 or SEQ ID NO:150-163. In some embodiments, the BAFF inhibitor or a salt thereof can be a biosimilar product to a reference product, wherein the reference product can comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, MEDI-700, NOV-5, rGel/BlyS, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor or a salt thereof can be an interchangeable product to a reference product, wherein the reference product can comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, MEDI-700, NOV-5, rGel/BlyS, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor or a salt thereof can comprise a posttranslational modification. In some embodiments, the posttranslational modification can comprise glycosylation, methylation, phosphorylation, lipidation, acetylation, nitrosylation, or any combination thereof. In some embodiments, the posttranslational modification can comprise the glycosylation. In some embodiments, the BAFF inhibitor or a salt thereof can bind a polypeptide having at least 80% sequence identity with a sequence shown in SEQ ID NOs: 31, 32 or 33. In some embodiments, the BAFF inhibitor or a salt thereof can bind a polypeptide having at least 80% sequence identity with a sequence shown in SEQ ID NOs: 149. In some embodiments, the BAFF or a BAFF-R inhibitor can comprise an aptamer comprising 100% homology, 95% homology,

90% homology, 85% homology, 80% homology, 75% homology, 70% homology, 65% homology, 60% homology, 55% homology, 50% homology, to an entire length or a fraction of an entire length of Aptamer 1(SEQ ID NO: 175) 5'-GGG AGG ACG AUG CGG GAG GCU CAA CAA UGA UAG AGC CCG CAA UGU UGA UAG UUG UGC CCA GUC UGC AGA CGA CUC GCC CGA-3'; Aptamer 2 (SEQ ID NO: 176) 5'-GGG AGG ACG AUG CGG AUA ACU AUU GUG CUA GAG GGC UUA UUU AUG UGA GCC GGU UGA UAG UUG CGC AGA CGA CUC GCC CGA-3'; or Aptamer 3 (SEQ ID NO: 177) 5'-GGG AGG ACG AUG CGG AUC CUC CGA AGG UCG CGC CAA CGU CAC ACA UUA AGC UUU UGU UCG UCU GCA GAC GAC UCG CCC GA-3'. In some embodiments, the subject can have a cancer or is suspected of having the cancer. In some embodiments, the cancer can comprise leukemia, melanoma, prostate cancer, bladder cancer, osteosarcoma, cervical cancer, liver cancer, multiple myeloma, testicular, renal cancer or a combination thereof. In some embodiments, the cancer can be at least partially refractive to an immune checkpoint inhibitor or a salt thereof. In some embodiments, the cancer was or can be diagnosed by an assay. In some embodiments, the assay can be a companion diagnostic. In some embodiments, the immune checkpoint inhibitor can inhibit PD-1, PD-L1, PD-L2, CTLA-4, A2AR, B7-H3, B7-H4, BTLA, IDO, KIR, LAG3, TIM-3, VISTA, CD160, TIGIT or PSGL-1. In some embodiments, the immune checkpoint inhibitor or a salt thereof can comprise a PD-1 inhibitor or a salt thereof. In some embodiments, the PD-1 inhibitor or a salt thereof can comprise nivolumab, pembrolizumab, pidilizumab, BGB-A31, AMP-224, MEDI0680 (AMP-514), PDR001, Cemiplimab or a salt of any one thereof. In some embodiments, the immune checkpoint inhibitor or a salt thereof can comprise a PD-L1 inhibitor or a salt thereof. In some embodiments, the PD-L1 inhibitor or a salt thereof can comprise nivolumab, docetaxel, pembrolizumab, pidilizumab, BGB-A31, MEDI0680 (AMP-514), or a salt of any one thereof. In some embodiments, the PD-1 or PD-L1 inhibitor may be any one of structure 1-7, or a analogue or a derivative thereof. In some embodiments, the PD-1 or PD-L1 inhibitor may have the sequence of SEQ ID NO: 17, SEQ ID NO: 18, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 165, SEQ ID NO: 166, SEQ ID NO: 167, SEQ ID NO: 168, SEQ ID NO: 169, SEQ ID NO: 170, SEQ ID NO: 171, SEQ ID NO: 172, SEQ ID NO: 173, SEQ ID NO: 174, a fragment of any of these, a sequence having at least about: 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, 99% or more sequence homology to any of these, or any combination thereof. In some embodiments, the BAFF inhibitor or a salt thereof can be administered intra-arterially, intravenously, intramuscularly, orally, subcutaneously, via inhalation, or any combination thereof. In some embodiments, the BAFF inhibitor or a salt thereof can be administered intravenously. In some embodiments, the therapeutically effective amount of the BAFF inhibitor

or a salt thereof can comprise a dose of about 0.04 mg/kg to about 20 mg/kg relative to a body weight of the subject. In some embodiments, the immune checkpoint inhibitor or said salt thereof can be administered intra-arterially, intravenously, intramuscularly, orally, subcutaneously, via inhalation, or any combination thereof. In some embodiments, the immune checkpoint inhibitor or a salt thereof can be administered intravenously. In some embodiments, the therapeutically effective amount of the immune checkpoint inhibitor or a salt thereof can comprise a dose of about 0.04 mg/kg to about 20 mg/kg relative to a body weight of the subject. In some embodiments, the BAFF inhibitor or a salt thereof and the immune checkpoint inhibitor or the salt thereof can be administered concurrently. In some embodiments, the BAFF inhibitor or a salt thereof and the immune checkpoint inhibitor or a salt thereof can be administered together in a single composition. In some embodiments, the BAFF inhibitor or salt thereof and the immune checkpoint inhibitor or the salt thereof can be administered sequentially. In some embodiments, the BAFF inhibitor or a salt thereof can be first administered and the immune checkpoint inhibitor or salt thereof can administered second. In some embodiments, the immune checkpoint inhibitor or a salt thereof can be first administered and the BAFF inhibitor or the salt thereof can be administered second. In some embodiments, administering can be performed at least once a month. In some embodiments, administering can be performed at least twice a month. In some embodiments, the subject can be a human. In some embodiments, the subject can be in need thereof. Further disclosed herein are pharmaceutical compositions for use in the methods disclosed herein. In some embodiments, the pharmaceutical composition can comprise the BAFF inhibitor or a salt thereof; and the immune checkpoint inhibitor or a salt thereof. In some embodiments, the pharmaceutical composition can further comprise a pharmaceutically acceptable excipient. In some embodiments, the pharmaceutical composition can be in unit dose form. Disclosed herein are bispecific antibodies. In some embodiments, the bispecific antibody can comprise a first domain, wherein the first domain binds BAFF, BAFF-R or a portion thereof; and a second domain, wherein the second domain binds PD-1, PD-L1 or a portion thereof. In some embodiments, the first domain can comprise a heavy chain variable region, light chain variable region, light chain or heavy chain of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, MEDI-700, NOV-5, rGel/BlyS or a combination thereof. In some embodiments, the second domain can comprise a heavy chain variable region, light chain variable region, light chain or heavy chain of nivolumab, docetaxel, pembrolizumab, pidilizumab, BGB-A31, MEDI0680, AMP-224, MEDI0680, PDR001, Cemiplimab or a combination thereof. In some embodiments, disclosed herein are the

bispecific antibody and a pharmaceutically acceptable carrier. In some embodiments, the compositions disclosed herein can be used in a method disclosed herein.

[0004] In an aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one B-cell activating factor (BAFF) inhibitor and/or at least one B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof; and administering a therapeutically effective amount of at least one checkpoint inhibitor or a salt thereof. The subject may have been diagnosed with a cancer or a tumor. The method may be a method of treating a cancer or a tumor in the subject. The subject may have not previously undergone treatment for the cancer or the tumor. The subject may have previously or may be currently undergoing treatment for the cancer or the tumor. The subject may have previously undergone treatment with surgery or radiation, and the subject may remain in remission. The subject may have previously undergone treatment with surgery, radiation, an anticancer agent, and any combination thereof, and the cancer or the tumor may have been at least partially refractive to the treatment. In some embodiments, a subject may have been previously treated with surgery, radiation therapy, an anticancer agent, and any combination thereof, and the cancer or the tumor may have re-occurred in the subject following a period of remission, wherein the period of remission may have been at least about: 1 month, 2 months, 3 months, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 6 years, 7 years, 8 years, 9 years, or 10 years. The subject may have been previously treated with a checkpoint inhibitor or a salt thereof, and the cancer or the tumor may have been at least partially refractive to the checkpoint inhibitor or a salt thereof. The subject may have been previously treated with a checkpoint inhibitor or a salt thereof, and the cancer or the tumor may have re-occurred in the subject following a period of remission, wherein a period of the remission may have been at least about: 1 month, 2 months, 3 months, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 6 years, 7 years, 8 years, 9 years, or 10 years. The checkpoint inhibitor or a salt thereof may be administered sequentially with the BAFF inhibitor and/or BAFF-R inhibitor or a salt thereof. In some embodiments, the checkpoint inhibitor or a salt thereof may be administered concurrently with the BAFF inhibitor and/or BAFF-R inhibitor or a salt thereof. The checkpoint inhibitor may comprise an agent that binds to anti-programmed cell death protein 1 (PD-1), anti-programmed death ligand 1 (PD-L1), anti-programmed death ligand 2 (PD-L2), cytotoxic T-lymphocyte-associated protein 4 (CTLA4), cluster of differentiation 276 (B7-H3), V-set domain-containing T-cell activation inhibitor 1 (B7-H4), T-cell immunoglobulin and mucin-domain containing-3 (TIM-3), lymphocyte-activation gene 3 (LAG3), Indoleamine-pyrrole 2,3-dioxygenase (IDO), a salt of any one thereof, or any combination thereof. The checkpoint inhibitor may be selected

from the group consisting of an agent that binds to anti-programmed cell death protein 1 (PD-1), anti-programmed death ligand 1 (PD-L1), anti-programmed death ligand 2 (PD-L2), cytotoxic T-lymphocyte-associated protein 4 (CTLA4), cluster of differentiation 276 (B7-H3), V-set domain-containing T-cell activation inhibitor 1 (B7-H4), T-cell immunoglobulin and mucin-domain containing-3 (TIM-3), lymphocyte-activation gene 3 (LAG3), Indoleamine-pyrrole 2,3-dioxygenase (IDO), a salt of any one thereof, and any combination thereof. The checkpoint inhibitor or a salt thereof may be a PD-1 inhibitor or a salt thereof. In some embodiments, the PD-1 inhibitor or a salt thereof may comprise nivolumab, pembrolizumab, pidilizumab, BGB-A31, MEDI0680 (AMP-514), a salt of any one thereof, or any combination thereof. The PD-1 inhibitor or a salt thereof may be selected from the group consisting of nivolumab, pembrolizumab, pidilizumab, BGB-A31, MEDI0680 (AMP-514), a salt of any one thereof, and any combination thereof. The PD-1 inhibitor may be nivolumab or a salt thereof. The PD-1 inhibitor may be pembrolizumab or a salt thereof. The PD-1 inhibitor may be pidilizumab or a salt thereof. The PD-1 inhibitor may be BGB-A31 or a salt thereof. The PD-1 inhibitor may be MEDI0680 (AMP-514) or a salt thereof. The checkpoint inhibitor or a salt thereof may be a PD-L1 inhibitor or a salt thereof. The PD-L1 inhibitor or a salt thereof may comprise atezolizumab, avelumab, durvalumab, MDX-1105, MSB0010718C, a salt of any one thereof, or any combination thereof. The PD-L1 inhibitor or a salt thereof may be selected from the group consisting of atezolizumab, avelumab, durvalumab, MDX-1105, MSB0010718C, a salt of any one thereof, and any combination thereof. The PD-L1 inhibitor may be atezolizumab or a salt thereof. The PD-L1 inhibitor may be avelumab or a salt thereof. The PD-L1 inhibitor may be durvalumab or a salt thereof. In some embodiments, the PD-L1 inhibitor may be MDX-1105 or a salt thereof. In some embodiments, the PD-L1 inhibitor may be MSB0010718C or a salt thereof. In some embodiments, the checkpoint inhibitor may be a CTLA4 inhibitor or a salt thereof. The CTLA4 inhibitor or a salt thereof may comprise ipilimumab, tremelimumab, AGEN1884, a salt of any one thereof, or any combination thereof. The CTLA4 inhibitor or a salt thereof may be selected from the group consisting of ipilimumab, tremelimumab, AGEN1884, a salt of any one thereof, and any combination thereof. The CTLA4 inhibitor may be ipilimumab or a salt thereof. The CTLA4 inhibitor may be tremelimumab or a salt thereof. The CTLA4 inhibitor may be AGEN1884 or a salt thereof. In some embodiments, the checkpoint inhibitor or a salt thereof may be a LAG3 inhibitor or a salt thereof. The LAG3 inhibitor may be BMS-986016 or a salt thereof. The checkpoint inhibitor or a salt thereof may be a TIM3 inhibitor or a salt thereof. The TIM3 inhibitor or a salt thereof may comprise MBG453, TSR-022, a salt of any one thereof, or any combination thereof. The TIM3 inhibitor or a salt thereof may be selected from the group

consisting of MBG453, TSR-022, a salt of any one thereof, and any combination thereof. The TIM3 inhibitor may be MBG453 or a salt thereof. The TIM3 inhibitor may be TSR-022 or a salt thereof. In some embodiments, the BAFF inhibitor may be an antibody, antigen binding fragment, a bispecific antibody, or a recombinant fusion protein. The BAFF inhibitor antibody may be human, humanized, chimeric, composite, polyclonal or monoclonal. The BAFF antibody or antigen binding fragment may block interaction of molecules to BAFF. The BAFF inhibitor may comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may comprise MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be tabalumab or a salt thereof. The BAFF inhibitor may be blisibimod or a salt thereof. The BAFF inhibitor may be belimumab or a salt thereof. The BAFF inhibitor may be atacicept or a salt thereof. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0005] In an aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof to the subject; and administering at least one immune agonist agent or a salt thereof to the subject. The immune agonist agent or a salt thereof may comprise an agent that binds to glucocorticoid-induced tumor necrosis factor receptor-related protein (GITR), cluster of differentiation 134 (OX40), cluster of differentiation 137 (CD137), cluster of differentiation 40 (CD40), Toll-like receptor (TLR), a salt of any one thereof, or any combination thereof. The immune agonist agent or a salt thereof may be selected from the group consisting of an agent that binds to glucocorticoid-induced tumor necrosis factor receptor-related protein (GITR), cluster of differentiation 134 (OX40), cluster of differentiation 137 (CD137), cluster of differentiation 40 (CD40), Toll-like receptor (TLR), a salt of any one thereof, and any combination thereof. The immune agonist agent may be a GITR agonist or a salt thereof. The GITR agonist or a salt thereof may comprise an agent that binds to TRX518, GWN323, MEDI1873, INCAGN01876, a salt of any one thereof, or any combination thereof.

The GITR agonist or a salt thereof may be selected from the group consisting of an agent that binds to TRX518, GWN323, MEDI1873, INCAGN01876, a salt of any one thereof, and any combination thereof. The GITR agonist may be TRX518 or a salt thereof. The GITR agonist may be GWN323 or a salt thereof. The GITR agonist may be MEDI1873 or a salt thereof. The GITR agonist may be INCAGN01876 or a salt thereof. The immune agonist agent may be an OX40 agonist or a salt thereof. In some embodiments, the OX40 agonist may comprise GSK3174998, PF-04518600, MEDI6469, INCAGN01949, a salt of any one thereof, or any combination thereof. The OX40 agonist may be selected from the group consisting of GSK3174998, PF-04518600, MEDI6469, INCAGN01949, a salt of any one thereof, and any combination thereof. The OX40 agonist may be GSK3174998 or a salt thereof. The OX40 agonist may be PF-04518600 or a salt thereof. The OX40 agonist may be MEDI6469 or a salt thereof. The OX40 agonist may be INCAGN01949 or a salt thereof. In some embodiments, the immune agonist agent may be a cluster of differentiation 137 (4-1BB) agonist or a salt thereof. The 4-1BB agonist may be urelumab, utomilumab, or a salt of any one thereof. The 4-1BB agonist may be isurelumab or a salt thereof. The 4-1BB agonist may be isutomilumab or a salt thereof. The immune agonist agent may be a CD40 agonist or a salt thereof. The CD40 agonist may be APX005M, CP870893, or a salt thereof. The CD40 agonist may be APX005M or a salt thereof. The CD40 agonist may be CP870893 or a salt thereof. The immune agonist agent may be a TLR agonist or a salt thereof. The TLR agonist may comprise an agent that binds to TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-13, a salt or any one thereof, or any combination thereof. The TLR agonist may be selected from the group consisting of an agent that binds to TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-13, a salt or any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may be an antibody, antigen binding fragment, a bispecific antibody, or a recombinant fusion protein. The BAFF inhibitor antibody may be human, humanized, chimeric, composite, polyclonal or monoclonal. The BAFF antibody or antigen binding fragment may block interaction of molecules to BAFF. The BAFF inhibitor may comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may comprise MEDI-700,

NOV-5, rGel/BLyS, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be tabalumab or a salt thereof. The BAFF inhibitor may be blisibimod or a salt thereof. The BAFF inhibitor may be belimumab or a salt thereof. The BAFF inhibitor may be atacicept or a salt thereof. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0006] In an aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one vaccine agent or a salt thereof. The vaccine agent may comprise MAGE-3, NY-ESO-1, TRAG-3, p53, at least one or more α-actinin-4 and malic enzymes, carcinoembryonic antigen, HER2, MUC1, survivin, WT-1, PRAME, Survivin-2b, Bacillus Calmette-Guerin, MVAX, at least one or more heat shock proteins, keyhole limpet hemocyanin, interleukin–2, QS21, montanide ISA-51, granulocyte monocyte-colony stimulating factor, GVAX, GI-4000, CDX-1307, IMA910, TroVAX, CRS-207, CA-9, a salt of any one thereof, or any combination thereof. The vaccine agent may be selected from the group consisting of MAGE-3, NY-ESO-1, TRAG-3, p53, at least one or more α-actinin-4 and malic enzymes, carcinoembryonic antigen, HER2, MUC1, survivin, WT-1, PRAME, Survivin-2b, Bacillus Calmette-Guerin, MVAX, at least one or more heat shock proteins, keyhole limpet hemocyanin, interleukin–2, QS21, montanide ISA-51, granulocyte monocyte-colony stimulating factor, GVAX, GI-4000, CDX-1307, IMA910, TroVAX, CRS-207, CA-9, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may be an antibody, antigen binding fragment, a bispecific antibody, or a recombinant fusion protein. The BAFF inhibitor antibody may be human, humanized, chimeric, composite, polyclonal or monoclonal. The BAFF antibody or antigen binding fragment may block interaction of molecules to BAFF. The BAFF inhibitor may comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may comprise MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group

consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be tabalumab or a salt thereof. The BAFF inhibitor may be blisibimod or a salt thereof. The BAFF inhibitor may be belimumab or a salt thereof. The BAFF inhibitor may be atacicept or a salt thereof. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0007] In an aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one oncolytic viral based agent or a salt thereof. The oncolytic viral based agent may comprise enadenotucirev, talimogene laherparepvec, reolysin, CG0070, Pexastimogene devacirepvec, cavatak, oncolytic vesicular stomatitis virus, ONCOS-102, a salt of any one thereof, or any combination thereof. The oncolytic viral based agent may be selected from the group consisting of enadenotucirev, talimogene laherparepvec, reolysin, CG0070, Pexastimogene devacirepvec, cavatak, oncolytic vesicular stomatitis virus, ONCOS-102, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may be an antibody, antigen binding fragment, a bispecific antibody, or a recombinant fusion protein. The BAFF inhibitor antibody may be human, humanized, chimeric, composite, polyclonal or monoclonal. The BAFF antibody or antigen binding fragment may block interaction of molecules to BAFF. The BAFF inhibitor may comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may comprise MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be tabalumab or a salt thereof. The BAFF inhibitor may be blisibimod or a salt thereof. The BAFF inhibitor may be belimumab or a salt thereof. The BAFF inhibitor may be atacicept or a salt thereof. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0008] In an aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one cell-based therapy, any cell derivative thereof, or a salt of any one thereof. The cell-based therapy may comprise at least one or more autologous lymphocytes, at least one or more genetically engineered autologous lymphocytes, at least one or more chimeric antigen receptor cells, at least one or more chimeric antigen receptor T-cells, at least one or more dendritic cell based vaccines, a salt of any one thereof, or any combination thereof. The cell-based therapy may be selected from the group consisting of: at least one or more autologous lymphocytes, at least one or more genetically engineered autologous lymphocytes, at least one or more chimeric antigen receptor cells, at least one or more chimeric antigen receptor T-cells, at least one or more dendritic cell based vaccines, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may be an antibody, antigen binding fragment, a bispecific antibody, or a recombinant fusion protein. The BAFF inhibitor antibody may be human, humanized, chimeric, composite, polyclonal or monoclonal. The BAFF antibody or antigen binding fragment may block interaction of molecules to BAFF. The BAFF inhibitor may comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may comprise MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be tabalumab or a salt thereof. The BAFF inhibitor may be blisibimod or a salt thereof. The BAFF inhibitor may be belimumab or a salt thereof. The BAFF inhibitor may be atacicept or a salt thereof. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0009] In an aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one chemotherapeutic agent or a salt thereof. The chemotherapeutic agent may be an alkylating agent,

an antimetabolite agent, a plant alkaloid agent, an antitumor antibiotic, a salt of any one thereof, or any combination thereof. In some embodiments, the BAFF inhibitor may be an antibody, antigen binding fragment, a bispecific antibody, or a recombinant fusion protein. The BAFF inhibitor antibody may be human, humanized, chimeric, composite, polyclonal or monoclonal. The BAFF antibody or antigen binding fragment may block interaction of molecules to BAFF. The BAFF inhibitor may comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may comprise MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be tabalumab or a salt thereof. The BAFF inhibitor may be blisibimod or a salt thereof. The BAFF inhibitor may be belimumab or a salt thereof. The BAFF inhibitor may be atacicept or a salt thereof. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0010] In an aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one targeted therapeutic agent or a salt thereof. The targeted therapeutic agent may be an agent that inhibits signal transduction, angiogenesis, hormone expression, or any combination thereof. The BAFF inhibitor and/or BAFF-R inhibitor may prevent binding of BAFF or a BAFF-induced ligand to a BAFF-R, may be a partial antagonist of a BAFF may be a partial agonist of a BAFF, may be a competitive antagonist of a BAFF-R, may be a non-competitive antagonist of a BAFF-R receptor, or any combination thereof. In some embodiments, the BAFF inhibitor may be an antibody, antigen binding fragment, a bispecific antibody, or a recombinant fusion protein. The BAFF inhibitor antibody may be human, humanized, chimeric, composite, polyclonal or monoclonal. The BAFF antibody or antigen binding fragment may block interaction of molecules to BAFF. The BAFF inhibitor may comprise tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and

calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, and any combination thereof. In some embodiments, the BAFF inhibitor may comprise MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, or any combination thereof. The BAFF inhibitor may be selected from the group consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be tabalumab or a salt thereof. The BAFF inhibitor may be blisibimod or a salt thereof. The BAFF inhibitor may be belimumab or a salt thereof. The BAFF inhibitor may be atacicept or a salt thereof. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0011] In an aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of an immunotherapeutic agent or a salt thereof, wherein the immunotherapeutic agent or a salt thereof may inhibit a biological cascade selected from the group consisting of a B-cell activating factor receptor cascade, a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor cascade, a B-cell maturation antigen receptor cascade, and any combination thereof; wherein the immunotherapeutic agent may be co-administered with a checkpoint inhibitor. The subject may have been diagnosed with a cancer or a tumor. The method may be a method of treating a cancer or a tumor in the subject. The subject may have previously or may be currently undergoing treatment for the cancer or the tumor. The subject may have been previously treated with a checkpoint inhibitor, and the cancer or the tumor may have been at least partially refractive to the checkpoint inhibitor. In some embodiments, the method may further comprise administering a therapeutically effective amount of the checkpoint inhibitor. The checkpoint inhibitor may be a salt. The checkpoint inhibitor may be selected from the group consisting of an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, a salt of any of these, and any combination thereof. The method may further comprise administering the anti-programmed cell death protein 1 agent or a salt thereof. The anti-programmed cell death protein 1 agent or a salt thereof may comprise docetaxel, nivolumab, pembrolizumab, a salt of any of these, or any combination thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be selected from the group consisting of docetaxel, nivolumab, pembrolizumab, a salt of any of these, and any

combination thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be pembrolizumab. The method may comprise administering the anti-programmed death ligand 1 agent or a salt thereof to the subject. The anti-programmed death ligand 1 agent or a salt thereof may comprise atezolizumab, avelumab, durvalumab, a salt of any of these, or any combination thereof. The anti-programmed death ligand 1 agent or a salt thereof may be selected from the group consisting of atezolizumab, avelumab, durvalumab, a salt of any of these, and any combination thereof. In some embodiments, the immunotherapeutic agent or a salt thereof at least partially may prevent binding of a ligand to a B-cell activating factor receptor; may be a partial antagonist of a B-cell activating factor receptor; may be a partial agonist of a B-cell activating factor receptor; may be a competitive antagonist of a B-cell activating factor receptor; may be a non-competitive antagonist of a B-cell activating factor receptor; or any combination thereof. The immunotherapeutic agent or a salt thereof at least partially may prevent ligand binding to a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; may be a partial antagonist of a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; may be a partial agonist of a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; or any combination thereof. In some embodiments, the immunotherapeutic agent or a salt thereof at least partially may prevent ligand binding to a B-cell maturation antigen receptor; may be a partial antagonist of a B-cell maturation antigen receptor; may be a partial agonist of a B-cell maturation antigen receptor; or any combination thereof. The immunotherapeutic agent may be an antibody or a salt thereof. The immunotherapeutic agent may be a human or humanized monoclonal antibody or a salt thereof. The immunotherapeutic agent or a salt thereof may comprise ardenermin, briobacept, blisibimod, belimumab, atransmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, tabalumab, atacicept, RCT-18, a salt of any of these, or any combination thereof. The immunotherapeutic agent or a salt thereof may be selected from the group consisting of ardenermin, briobacept, blisibimod, belimumab, atransmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, tabalumab, atacicept, RCT-18, a salt of any of these, and any combination thereof. The immunotherapeutic agent or a salt thereof may comprise MEDI-700, NOV-5, rGel/BLyS, a salt of any of these, or any combination thereof. The immunotherapeutic agent or a salt thereof may be selected from the group consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any of these, and any combination thereof. In some embodiments, the immunotherapeutic agent may be tabalumab or a salt thereof. The immunotherapeutic agent may be blisibimod or a salt thereof. The immunotherapeutic agent may be belimumab or a salt thereof. The immunotherapeutic agent may be atacicept or a salt thereof.

The method may further comprise, before the administering: determining a count of cluster of differentiation 8 (CD8) protein, and at least one selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, B-cell activating factor protein, B-cell activating factor receptor protein, and paired box Pax-5 (PAX5) protein, in a cancer or a tumor or a cancer sample or a tumor sample of a subject. In some embodiments, the at least one of: CD19, CD20, CD138, B-cell activating factor, B-cell activating factor-R, and PAX5 may be present in the cancer or the tumor or the cancer sample or the tumor sample of the subject. In some embodiments, the at least one of: CD19, CD20, CD138, B-cell activating factor, B-cell activating factor-R, and PAX5 may be individually present in the cancer or the tumor or the cancer sample or the tumor sample of the subject in an amount ranging from 1 protein to at least about 10,000,000 proteins. The method may further comprise monitoring the treatment after the administering. In some embodiments, the treatment may maintain at least partial remission of the cancer or the tumor, wherein a period of the remission may have been at least about: 1 month, 2 months, 3 months, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 6 years, 7 years, 8 years, 9 years, or 10 years. The treatment may comprise, after administering, delaying progression of the cancer or the tumor in the subject. The treatment may comprise, after administering, regression of the cancer or the tumor. Regression may be a reduction in mass of the cancer or the tumor, a reduction in volume of the cancer or the tumor, or both. The treatment may comprise prolonging the subject's life. The subject may have previously shown at least partial refraction to a monotherapy for the cancer or the tumor. The subject may have shown refraction to a monotherapy for the cancer or the tumor. The cancer may have metastasized from a first location of the subject to a second location of the subject. In some embodiments, the cancer at the first location of the body may be less than fully responsive to the monotherapy, and wherein the cancer at the second location of the body may be responsive to the treatment. The checkpoint inhibitor and the immunotherapeutic agent may be synergistic. The synergy on the cancer or the tumor may be at least 10% more than an additive effect. A heatmap of a cancer sample or a tumor sample of the subject may show a profile substantially similar to that of FIG. 8. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and the immunotherapeutic agent or a salt thereof may be administered concurrently. The anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and the immunotherapeutic agent or a salt thereof may be administered sequentially. The anti-

programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and the immunotherapeutic agent or a salt thereof may be administered in different formulations within a same treatment schedule. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered at least once a week. The anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered at least once a day. The anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered at least once during a treatment schedule. In some embodiments, the immunotherapeutic agent or a salt thereof may be administered at least once a week. The immunotherapeutic agent or a salt thereof may be administered at least once a day. The immunotherapeutic agent or a salt thereof may be administered at least once during a treatment schedule. The immunotherapeutic agent or a salt thereof may be administered in an amount from about 0.1 mg to about 1,000 mg per kg body weight. In some embodiments, the immunotherapeutic agent or a salt thereof may be administered in an amount from about 0.1 mg to about 100 mg per kg body weight. The immunotherapeutic agent or a salt thereof may be administered in an amount from about 1 mg to about 50 mg per kg body weight. The immunotherapeutic agent or a salt thereof may be administered in a pharmaceutical composition. The anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered in an amount from about 0.1 mg to about 1,000 mg per kg body weight. The anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered in an amount from about 1 mg to about 100 mg per kg body weight. The anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, may be individually present as a pharmaceutical formulation. In some embodiments, the pharmaceutical formulation may be in unit dose form. The pharmaceutical formulation may further comprise a pharmaceutically-acceptable excipient. At least one of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof; and the immunotherapeutic agent or salt thereof may be isolated and purified. The administration may be

oral. The administration may be topical, intravenous, intramuscular, or spinal. The administration may be administered directly to the cancer or the tumor. The administration may be an administration at a location different from the cancer or the tumor. The subject may have been previously diagnosed with the cancer or the tumor. The cancer or the tumor may be a solid tumor or a solid cancer. The cancer or the tumor may be a liquid cancer or a liquid tumor. The cancer or the tumor may be malignant. The cancer or the tumor may be present in an organ. The tumor or the cancer may be present in at least one of: blood, lymph, cerebral spinal fluid. The cancer or the tumor may be located in a head or neck region, abdominal region, a upper limb, a lower limb, skin, blood, digestive tract, germ cell, or nervous system. The method may comprise treating the cancer, wherein the cancer may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, melanoma, multiple myeloma, Hodgkin's lymphoma, ovarian cancer, or any combination thereof. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0012] In an aspect, the present disclosure provides a composition. The composition may comprise an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and an immunotherapeutic agent or a salt thereof. The composition may be a pharmaceutical composition. The pharmaceutical composition may be in unit dose form. The immunotherapeutic agent or a salt thereof may be an antibody or a salt thereof. The immunotherapeutic agent or a salt thereof may be a human or humanized monoclonal antibody or a salt thereof. The immunotherapeutic agent or a salt thereof may comprise ardenermin, briobacept, blisibimod, belimumab, atransmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, MEDI-0700, NOV-5, rGel/BLyS, tabalumab, atacicept, RCT-18, a salt of any of these, or any combination thereof. The immunotherapeutic agent or a salt thereof may be selected from the group consisting of ardenermin, briobacept, blisibimod, belimumab, atransmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, MEDI-0700, NOV-5, rGel/BLyS, tabalumab, atacicept, RCT-18, a salt of any of these, and any combination thereof. The immunotherapeutic agent or a salt thereof may be tabalumab or a salt thereof. The method may further comprise a pharmaceutically acceptable excipient. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and the immunotherapeutic agent or a salt thereof may be independently administered in an amount from about 0.1 mg to about 10 g. The anti-programmed

cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and the immunotherapeutic agent or a salt thereof may be independently 0.001% to 99% by weight of the composition. The anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and the immunotherapeutic agent or a salt thereof may be independently administered in an amount of about 0.1 mg to about 100 mg per kg body weight. The composition may be in a form of a tablet, a capsule, a gel, or a liquid formulation. In an aspect, the present disclosure provides a kit comprising a composition described herein. In some embodiments, the kit may contain instructions for use.

[0013] In an aspect, the present disclosure provides a method of making a kit described herein. The method may comprise contacting or combining the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and the immunotherapeutic agent or a salt thereof. The composition may be in a form of a tablet, a capsule, a gel, or a liquid formulation. The method may comprise contacting or combining the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and the immunotherapeutic agent or a salt thereof.

[0014] In an aspect, the present disclosure provides a method of selecting a therapeutic regimen. The method may comprise: determining the presence or absence of cluster of differentiation 8 (CD8) protein, and at least one of: B-cell activating factor (BAFF) protein, B-cell activating factor receptor (BAFF-R) protein, and paired box Pax-5 (PAX5) protein in a cancer or a tumor of a subject or a cancer sample or a tumor sample of the subject; if CD8 protein and at least one of B-cell activating factor, B-cell activating factor-R, and PAX5 may be present in the cancer or the tumor or the cancer sample or the tumor sample, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof; if CD8 protein and at least one of B-cell activating factor, B-cell activating factor-R, and PAX5 may be not present in the cancer or the tumor or the cancer sample or the tumor sample, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof. The method may further comprise determining whether cluster of differentiation 19

(CD19) protein, cluster of differentiation 20 (CD20) protein, cluster of differentiation 138 (CD138) protein, or any combination thereof may be present. The method may further comprise treating the subject. The treating may comprise: administering a therapeutically effective amount of an immunotherapeutic agent or a salt thereof, wherein the immunotherapeutic agent or a salt thereof may inhibit a biological cascade selected from the group consisting of a B-cell activating factor receptor cascade, a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor cascade, a B-cell maturation antigen receptor cascade, and any combination thereof; wherein the immunotherapeutic agent may be co-administered with a checkpoint inhibitor. In some embodiments, the subject may have been diagnosed with a cancer or a tumor. The subject may have previously or may be currently undergoing treatment for the cancer or the tumor. The method may comprise administering a therapeutically effective amount of the checkpoint inhibitor. The checkpoint inhibitor may be selected from the group consisting of an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, a salt of any of these, and any combination thereof. The method may comprise administering the anti-programmed cell death protein 1 agent of a salt thereof. In some embodiments, the anti-programmed cell death protein 1 agent or a salt thereof may comprise docetaxel, nivolumab, pembrolizumab, a salt of any of these, or any combination thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be selected from the group consisting of docetaxel, nivolumab, pembrolizumab, a salt of any of these, and any combination thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be pembrolizumab. The immunotherapeutic agent may be tabalumab or a salt thereof. The immunotherapeutic agent may be belimumab or a salt thereof. The immunotherapeutic agent may be atacicept or a salt thereof. The immunotherapeutic agent may be blisibimod or a salt thereof. In some embodiments, the cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof. The cancer or the tumor may contact a blood vessel. The cancer or the tumor may be in the interior of a blood vessel.

[0015] In an aspect, the present disclosure provides a method of selecting a therapeutic regimen. The method may comprise: determining a count of B cells, T cells, and plasma cells in a cancer or a tumor of a subject or a cancer sample or a tumor sample of the subject; if a count of T cells in the cancer or the tumor or the cancer sample or the tumor sample may be greater than 500 cells/mm2 and a count of B cells may be less than < 150 cells/mm2, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination

thereof; if a count of T cells in the cancer or the tumor or the cancer sample or the tumor sample may be greater than 300 cells/mm2 and a count of B cells, a count of plasma cells, or a combination of B cells and plasma cells may be greater than 100 cells/mm2, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof. In some embodiments, the method may further comprise conveying a result via a communication medium.

[0016] In an aspect, the present disclosure provides a method of treating or maintaining remission of a cancer or a tumor in a subject. The method may comprise: administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, if a percentage of T cells in a cancer sample or a tumor sample of a subject may be greater than 10% and a percentage of B cells may be less than 5%, or administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof if a percentage of T cells in a cancer or a tumor sample of the subject may be less than 10% and a percentage of B cells, a percentage of plasma cells, or a combination of the percentage of B cells and the percentage of plasma cells may be greater than 10% in the cancer sample of the subject. In some embodiments, after the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a percentage of T cells, a percentage of B cells, and a percentage of plasma cells. In some embodiments, the cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof.

[0017] In an aspect, the present disclosure provides a method of assessing a likelihood of a subject having a cancer or a tumor exhibiting a clinically beneficial response to treatment. The method may comprise: assessing a count of T cells, B cells, and plasma cells in a cancer or a tumor sample of a subject; and calculating, using a computer system, a probability of treatment responsiveness based on (1) a ratio between the count of T cells and a reference count of T cells, (2) a ratio between the count of B cells and a reference count of B cells, and/or (3) a ratio between the count of plasma cells and a reference count of plasma cells. The method may further comprise designating the subject as having a high probability of exhibiting a clinically beneficial

response to treatment if the ratio between the count of B cells and the reference count of B cells may be less than 1. The method may further comprise designating the subject as having a high probability of exhibiting a clinically beneficial response to treatment if the ratio between the count of plasma cells and the reference count of plasma cells may be less than 1. In some embodiments, wherein after the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a count of T cells, a count of B cells, and a count of plasma cells. The cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof. The method may further comprise surgery, radiation therapy, or administering a pharmaceutical agent, wherein the pharmaceutical agent may be an immunotherapeutic agent, a chemotherapeutic agent, a targeted therapeutic agent, a hormonal therapy agent, cell-based therapy agent, radiation therapy agent, or any salt thereof, or any combination thereof.

[0018] In an aspect, the present disclosure provides a method of treating a cancer or a tumor in a subject. The method may comprise: administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, if a cancer or a tumor sample of a subject contains at least one cell contains a cluster of differentiation 8 (CD8) protein and no cell contains a cluster of differentiation 19 (CD19) protein or a cluster of differentiation 138 (CD138) protein; or administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof if a cancer or a tumor sample of a subject contains at least one cell contains a CD8 protein and at least one cell contains a CD19 or CD138 protein. In some embodiments, after the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a count of T cells, a count of B cells, and a count of plasma cells. In some embodiments, after the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a count of T cells, a count of B cells, and a count of plasma cells. In some

embodiments, a decrease in a count of T cells, a decrease in a count of B cells, a decrease in a count of plasma cells, or any combination thereof, may be observed. In some embodiments, the method may be a method of treating a cancer or a tumor in the subject. The cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof. In an aspect, the present disclosure provides a method of treating a cancer or a tumor in a subject. The method may comprise administering a therapeutically effective amount of a pharmaceutical agent and an immunotherapeutic agent. In some embodiments, a presence of CD8 protein, the CD19 protein, the CD20 protein, the CD139 protein, the B-cell activating factor protein, the B-cell activating factor-R protein, and the PAX5 protein may be determined by staining, imaging after staining, microscopy, or any combination thereof. The staining may comprise binding of an antibody to the protein. The staining may further comprise binding of a second antibody to a first antibody, wherein the second antibody may contain a fluorescence marker. The method may be repeated after administration of the therapeutic. The cancer sample or the tumor sample may comprise at least one cell comprising a CD8 protein and at least one cell comprising a CD19 protein, wherein the CD8 protein and the CD19 protein have a distance apart of at most 100 microns. The cancer sample or the tumor sample may comprise at least one cell comprising a CD8 protein and at least one cell comprising a CD19 protein, wherein the CD8 protein-containing cell and the CD19 protein-containing cell may have a distance apart of at most about 100 microns.

[0019] In an aspect, the present disclosure provides a method of treating a solid cancer in a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one B-cell activating factor (BAFF) inhibitor and/or at least one B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof; and administering a therapeutically effective amount of at least one checkpoint inhibitor or a salt thereof. The subject may be not an appropriate candidate for a monotherapy comprising the at least one checkpoint inhibitor. The solid cancer may be at least partially resistant to a monotherapy comprising the at least one checkpoint inhibitor. The solid cancer may have an incomplete response to a monotherapy comprising the at least one checkpoint inhibitor. The subject may be currently receiving treatment of a monotherapy comprising the at least one checkpoint inhibitor. In some embodiments, the BAFF inhibitor may be tabalumab or a salt thereof. The BAFF inhibitor may be blisibimod or a salt thereof. The BAFF inhibitor may be belimumab or a salt thereof. The BAFF inhibitor may be atacicept or a salt thereof. The BAFF inhibitor may be an anti-BAFF-R antibody or a portion thereof. The anti-BAFF-R antibody may be an anti-BAFF-R3 antibody.

The at least one checkpoint inhibitor or a salt thereof may be selected from the group consisting of a monoclonal antibody, a humanized antibody, a chimeric antibody, a fully human antibody, a fusion protein, a salt of any one thereof, and any combination thereof. The checkpoint inhibitor may be a biologic or a small molecule. A checkpoint protein may be selected from the group consisting of PDl, PDLl, CTLA-4, PDL2, TIM3, LAG3, VISTA, B7.1, B7-H3, B7-H4, BTLA, HVEM, GAL9, KIR, 2B4, CD137, CD27, CD28, CD40, CD122, CD160, CGEN-15049, CHK 1, CCR4, CHK2, Ox40, GITR, ICOS, IDO, A2aR, B-7 family ligands, or any combination thereof. The checkpoint inhibitor may inhibit a checkpoint protein selected from the group consisting of PDl, PDLl, CTLA-4, PDL2, TIM3, LAG3, VISTA, B7.1, B7-H3, B7-H4, BTLA, HVEM, GAL9, KIR, 2B4, CD137, CD27, CD28, CD40, CD122, CD160, CGEN-15049, CHK 1, CCR4, CHK2, GITR, ICOS, IDO, Ox40, A2aR, B-7 family ligands, and any combination thereof. The checkpoint inhibitor may interact with a ligand of a checkpoint protein comprising PDl, PDLl, CTLA-4, PDL2, TIM3, LAG3, VISTA, B7.1, B7-H3, B7-H4, BTLA, HVEM, GAL9, KIR, 2B4, CD137, CD27, CD28, CD40, CD122, CD160, CGEN-15049, CHK 1, CCR4, CHK2, GITR, ICOS, IDO, Ox40, A2aR, B-7 family ligands, or a combination thereof. The checkpoint inhibitor may interact with a ligand of a checkpoint protein selected from the group consisting of PDl, PDLl, CTLA-4, PDL2, TIM3, LAG3, VISTA, B7.1, B7-H3, B7-H4, BTLA, HVEM, GAL9, KIR, 2B4, CD137, CD27, CD28, CD40, CD160, CGEN-15049, CHK 1, CCR4, CHK2, GITR, ICOS, Ox40, A2aR, B-7 family ligands, and a combination thereof. In some embodiments, the solid cancer may be selected from the group consisting of urogenital, gynecological, lung, gastrointestinal, head and neck cancer, malignant glioblastoma, malignant mesothelioma, non-metastatic or metastatic breast cancer, malignant melanoma, Merkel Cell Carcinoma or bone and soft tissue sarcoma, non-small cell lung cancer (NSCLC), breast cancer, metastatic colorectal cancers, hormone sensitive or hormone refractory prostate cancer, colorectal cancer, ovarian cancer, hepatocellular cancer, renal cell cancer, pancreatic cancer, gastric cancer, esophageal cancer, hepatocellular cancer, cholangiocellular cancer, small cell lung cancer, and combinations thereof. The method may further comprise administering an immunotherapeutic agent, a chemotherapeutic agent, or a targeted therapy to the subject prior to, simultaneously with, or after the treating. The treating may be evaluated by a decrease in tumor growth, induction of tumor cell death, tumor regression, preventing or delaying tumor recurrence, preventing or delaying tumor spread, or any combination thereof.

[0020] In an aspect, the current disclosure may provide a method for treating a cancer in a subject. The method may comprise: screening a cancer sample or a tumor sample isolated from the subject, wherein the screening may comprise determining a presence or an absence of a

genomic polymorphism or genotype that may be correlative to a treatment outcome of the cancer; administering a therapeutically effective amount of at least one B-cell activating factor (BAFF) inhibitor, or a salt thereof, and/or at least one B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof; and administering a therapeutically effective amount of at least one PD-L1 inhibitor or a salt thereof, wherein the administering of the at least one B-cell activating factor (BAFF) inhibitor, or salt thereof, and/or the at least one B-cell activating factor receptor (BAFF-R), or salt thereof, and the PD-L1 inhibitor, or salt thereof may be based on the screening for the presence or absence of the genomic polymorphism or genotype that may be correlative to the treatment outcome of the cancer. In some embodiments, the PD-L1 inhibitor or a salt thereof may comprise nivolumab, pembrolizumab, pidilizumab, BGB-A31, MEDI0680 (AMP-514), a salt of any one thereof, or any combination thereof. In some embodiments, the PD-L1 inhibitor or a salt thereof may be selected from the group consisting of nivolumab, pembrolizumab, pidilizumab, BGB-A31, MEDI0680 (AMP-514), a salt of any one thereof, and any combination thereof. The method may further comprise, before the administering: determining a number of an aggregate in the cancer sample or the tumor sample isolated from the subject, wherein the aggregate may comprise at least a first cell and a second cell, wherein the first cell and the second cell may be of a different cell type, and wherein a population of the first cells and a population of the second cells may be in contact with each other. In some embodiments, the determining of the number of the aggregate may be determined by staining, microscopy, imaging after staining, or any combination thereof. The aggregate may comprise at least about 5 cells. The aggregate may comprise from about 5 to about 100,000 cells. The cancer sample or the tumor sample may comprise at least 1 aggregate. The cancer sample or the tumor sample may comprise about 1 aggregate to about 20 aggregates. The aggregate may be an immune cell aggregate. The cell type of the first cell may be a lymphoid cell, a plasma cell, a myeloid cell, or a mast cell. The cell type of the second cell may be a lymphoid cell, a plasma cell, a myeloid cell, or a mast cell. The aggregate may be a lymphoid aggregate. In some embodiments, the aggregate may comprise a germinal center. The aggregate may not comprise a germinal center. The aggregate may be located at an invasive margin, a perivascular space, a tumor parenchyma of the cancer, or any combination thereof. A first cell may be a B-cell, and wherein the aggregate may comprise a B-cell density of at least about 1 cell/mm^2 by area of the aggregate. A first cell may be a B-cell, and wherein the aggregate may comprise a B-cell density of from about 1 cell/mm^2 by area of the aggregate to about 1000 cells/mm^2 by area of the aggregate. In some embodiments, a first cell may be a B-cell, and wherein the aggregate may comprise a B-cell density of at least about 100 cells/mm^2 by area of the aggregate. A first cell may be a B-cell, and wherein the

aggregate may comprise at least about 1 B-cell. A first cell may be a B-cell, and wherein the aggregate may comprise at least about 10 B-cells. A second cell may be a T-cell. A second cell may be a T-cell, and wherein the aggregate may comprise at least about 10 T-cells. A second cell may be a T-cell, and wherein the aggregate may comprise about 100 T-cells. The aggregate may comprise BAFF and BAFF-R. The aggregate may comprise BAFF and at least one of: CD19, CD20, or CD138. The first cell or second cell in the aggregate may express a protein. The protein may be BAFF, BAFF-R, CD3, CD19, CD20, PAX5, or PD-L1. The determining of the number of the aggregate may be assessed by hematoxylin staining, eosin staining, DAPI staining, or any combination thereof.

[0021] In an aspect, the current disclosure provides a method of detecting a number aggregates in a tissue sample of a subject. The method may comprise staining the tissue sample that may have been previously diagnosed with a cancer with hematoxylin, eosin, or DAPI, wherein the staining may detect CD3, CD19, CD20, PAX5, BAFF-R, BAFF, PD-L1, or any combination thereof. In an aspect, the current disclosure provides a method comprising determining a presence of at least one aggregate of T-cells in a cancer sample or a tumor sample of a subject, wherein the at least one aggregate T-cells may be in proximity to at least one B-cell, wherein the B-cell may express at least one protein selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, and any combination thereof. The determining may comprise staining, microscopy, imaging after staining, or any combination thereof. The aggregate may comprise at least about 5 cells. The aggregate may comprise about 5 cells to about 100,000 cells. In some embodiments, the cancer sample or the tumor sample may comprise at least 1 aggregate. The aggregate may be an immune cell aggregate. The aggregate may be a lymphoid aggregate. The aggregate may comprise a germinal center. The aggregate may not comprise a germinal center. The aggregate may be located at an invasive margin, a perivascular space, or a tumor parenchyma of the cancer, or any combination thereof. The method may be a method of determining if a cancer or a tumor may be responsive to a single therapeutic agent. The single therapeutic agent may be an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof. In some embodiments, the at least one aggregate of T-cells may be in proximity to at least one B-cell, wherein the B-cell may express at least one protein selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, and any combination thereof. The method may further comprise selecting a therapeutic regimen

comprising: an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof; and an therapeutic agent or a salt thereof; wherein the at least one aggregate of T-cells may be in proximity to at least one B-cell, wherein the B-cell may express at least one protein selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, and any combination thereof. In some embodiments, the anti-programmed cell death protein 1 agent or a salt thereof may comprise docetaxel, nivolumab, pembrolizumab, a salt of any of these, or any combination thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be selected from the group consisting of docetaxel, nivolumab, pembrolizumab, a salt of any of these, and any combination thereof. The therapeutic agent or a salt thereof may comprise ardenermin, briobacept, blisibimod, belimumab, atransmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, tabalumab, atacicept, RCT-18, a salt of any of these, or any combination thereof. The therapeutic agent or a salt thereof may be selected from the group consisting of ardenermin, briobacept, blisibimod, belimumab, atransmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, tabalumab, atacicept, RCT-18, a salt of any of these, and any combination thereof. At least one of the following proteins may be present in the at least one B-cell, the at least one aggregate of T-cells, or both: CD3, CD19, CD20, PAX5, BAFF-R, BAFF, and PD-L1. The method may be a method of diagnosing a cancer or a tumor in the subject. The method may be a method of determining if the cancer or the tumor may be becoming non-responsive to a single agent therapy.

[0022] In an aspect, the current disclosure provides a method comprising obtaining a cancer sample or a tumor sample of a subject and identifying a presence of a T-cell interacting with at least one cell bearing at least one protein selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, and any combination thereof. The at least one cell may be a B-cell. Staining the B-cell may detect CD3, CD19, CD20, PAX5, BAFF-R, BAFF, or PD-L1, or any combination thereof. In an aspect, the current disclosure provides a method of treating a cancer in a subject. The method may comprise: administering a therapeutically effective amount of an immunotherapeutic agent or a salt thereof and a therapeutically effective amount of a checkpoint inhibitor. The cancer or the tumor may comprise a T-cell interacting with at least one cell bearing at least one protein selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, and any combination thereof. The at least one cell may be a B-cell. Staining the

B-cell may detect CD3, CD19, CD20, PAX5, BAFF-R, BAFF, PD-L1, or any combination thereof. In some aspects, the current disclosure provides a method. The method may comprise: obtaining a cancer sample or a tumor sample from a subject; identifying a presence of B-cell activating factor (BAFF) and B-cell activating factor receptor (BAFF-R) in the cancer sample or the tumor sample; or identifying a presence of B-cell activating factor (BAFF) and at least one protein selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, and any combination thereof in the cancer sample or the tumor sample. The method may further comprise administering a therapeutically effective amount of an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof. In some embodiments, the cancer or the tumor may comprise a T-cell interacting with at least one cell bearing at least one protein selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, and any combination thereof. The cancer sample or the tumor sample may comprise at least one aggregate of T-cells in proximity to at least one B-cell, wherein the B-cell expresses at least one protein may be selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, and any combination thereof. In some aspects, the current disclosure may provide a method of determining a first amount of cluster of differentiation 8 protein in a cancer sample or a tumor sample of a subject prior to a single agent treatment and determining a second amount of cluster of differentiation 8 protein in the cancer sample or the tumor sample of the subject on or after day 20 of the single agent treatment.

[0023] In some aspects, the current disclosure provides a method of selecting combination therapeutic regimen. The method may comprise: selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof wherein the second amount of cluster of differentiation 8 protein in the cancer sample or the tumor sample of the subject on or after day 20 of the single agent treatment may be higher than the first amount of cluster of differentiation 8 protein in the cancer sample or the tumor sample of the subject prior to the single agent treatment.One embodiment provides a method comprising: (I)determining expression levels of:(a) a gene listed in Table 4, a protein product thereof, a variant thereof, or a fragment thereof, and (b) a gene that codes for the BAFF protein or the BAFF-receptor protein, a variant thereof, or a fragment

thereof, wherein the expression levels are determined in a biological sample isolated from a tumor microenvironment within the subject; and (II) identifying the subject as: (i)responsive to a combination therapy comprising an immunotherapy and agent that is capable of regulating activity of a gene that codes for a BAFF protein or a BAFF-receptor protein; or (ii) resistant to an immunotherapy comprising a single agent, wherein the identifying is based on expression levels of (a) and (b). One embodiment provides a method of identifying a subject as responsive to a combination therapy comprising an immunotherapy and an agent capable of regulating activity of a BAFF protein or a BAFF-receptor protein, comprising: (I) determining expression levels of (a) a gene listed in Table 4, a protein product thereof, a variant thereof, or a fragment thereof; and an expression level of (b) a gene that codes for the BAFF protein or the BAFF-receptor protein, a variant thereof, or a fragment thereof, wherein the expression levels are determined in a biological sample isolated from a tumor microenvironment within the subject; and (II) identifying the subject as responsive to the combination therapy based on the expression levels of (a) and (b). One embodiment provides a method of identifying a subject as resistant to an immunotherapy comprising a single agent, comprising: (I) determining expression levels of (a) a gene listed in Table 4, a protein product thereof, a variant thereof, or a fragment thereof; and (b) a gene that codes for the BAFF protein or the BAFF-receptor protein, a variant thereof, or a fragment thereof, wherein the expression levels are determined in a biological sample isolated from a tumor microenvironment within the subject; and (II) identifying the subject as resistant to the immunotherapy comprising a single agent based on the expression levels of (a) and (b). In some embodiments, the method further comprises determining an expression level of (c) a gene listed in Table 5, a protein product thereof, a variant thereof, or a fragment thereof. In some embodiments, the expression levels of (a), (b), and (c) are independently determined by RNA-seq. In some embodiments, the expression levels of (a), (b), and (c) are independently determined by immunohistochemistry or immunofluorescence or multiplexed ion beam based imaging methods. In some embodiments, the method further comprises determining a correlation between the expression levels of (a) and (b). In some embodiments, the method further comprises determining a correlation between the expression levels of (b) and (c). In some embodiments, the method further comprises determining a correlation between the expression levels of (a) and (c). In some embodiments, the correlations between expression levels of (a) and (b), (a) and (c), and (b) and (c), are independently determined by a t-test, a paired t-test, an analysis of variance (ANOVA), a repeated measures ANOVA, a simple linear regression, a nonlinear regression, a multiple linear regression, a multiple nonlinear regression, a Wilcoxon signed-rank test, a MannWhitney test, a Kruskal-Wallis test, a Friedman test, a Spearman rank

order correlation coefficient, a Kendall Tau analysis, or a nonparametric regression test. In some embodiments, the correlations between expression levels of (a) and (b), and (b) and (c), are independently determined by the Spearman rank order correlation coefficient. In some embodiments, the correlation between expression levels of (a) and (b) comprises a Spearman's rank order correlation coefficient that is higher than a Spearman's rank order correlation coefficient for the correlation between expression levels of (b) and (c). In some embodiments, genes listed in Table 4 are representatives of a T-cell inflamed phenotype of the tumor microenvironment. In some embodiments, the immunotherapy comprises administering an immune checkpoint protein inhibitor. In some embodiments, the immune checkpoint protein comprises PD-1, PD-L1, PD-L2, CTLA-4, A2AR, B7-H3, B7-H4, BTLA, IDO, KIR, LAG3, TIM-3, VISTA, CD160, TIGIT or PSGL-1. In some embodiments, the immune checkpoint protein comprises PD-1 or PD-L1. In some embodiments, the immune checkpoint protein inhibitor comprises at least one of a PD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, or any combination thereof. One embodiment provides a method of identifying a subject for initiating or continuing a combination therapy or an immunotherapy comprising a single agent, comprising: (I) determining expression levels of: (a) a gene listed in Table 4, a protein product thereof, a variant thereof, or a fragment thereof; and (b) a gene that codes for a BAFF protein or a BAFF-receptor protein, a variant thereof, or a fragment thereof, wherein the expression levels are determined in a biological sample isolated from a tumor microenvironment within a subject; and (II) identifying the subject as (i) a suitable candidate for the initiating or continuing the combination therapy; or, (ii) a suitable candidate for the initiating or continuing the immunotherapy comprising the single agent, wherein the identifying is based on the expression levels of (a) and (b). In some embodiments, the combination therapy comprises an immunotherapy and an agent capable of regulating activity of a gene that codes for a BAFF protein or a BAFF-receptor protein. In some embodiments, the combination therapy comprises an immunotherapy comprising administering a single agent. In some embodiments, the subject has previously been identified as resistant to the immunotherapy comprising the single agent. In some embodiments, the subject has previously been administered the immunotherapy comprising the single agent. In some embodiments, the subject has previously been administered the combination therapy. In some embodiments, the method further comprises determining an expression level of (c) a gene listed in Table 5, a protein product thereof, a variant thereof, or a fragment thereof. In some embodiments, the expression levels of (a), (b), and (c), are independently determined by RNA-seq. In some embodiments, the method further comprises determining a correlation between the expression levels of (a) and (b). In some embodiments, the

method further comprises determining a correlation between the expression levels of (b) and (c). In some embodiments, the method further comprises determining a correlation between the expression levels of (a) and (c). In some embodiments, the correlations between (a) and (b), (a) and (c), and (b) and (c), are independently determined by a t-test, a paired t-test, an analysis of variance (ANOVA), a repeated measures ANOVA, a simple linear regression, a nonlinear regression, a multiple linear regression, a multiple nonlinear regression, a Wilcoxon signed-rank test, a MannWhitney test, a Kruskal-Wallis test, a Friedman test, a Spearman rank order correlation coefficient, a Kendall Tau analysis, or a nonparametric regression test. In some embodiments, the correlations between (a) and (b), (a) and (c), and (b) and (c), are independently determined by the Spearman rank order correlation coefficient. In some embodiments, the correlation between expression levels of (a) and (b) comprises a Spearman's rank order correlation coefficient that is higher than a Spearman's rank order correlation coefficient for the correlation between expression levels of (b) and (c). In some embodiments, genes listed in Table 4 are representatives of a T-cell inflamed phenotype of the tumor microenvironment. In some embodiments, the single agent comprises administering an immune checkpoint protein inhibitor. In some embodiments, the immunotherapy comprises administering an immune checkpoint protein inhibitor. In some embodiments, the immune checkpoint protein comprises PD-1, PD-L1, PD-L2, CTLA-4, A2AR, B7-H3, B7-H4, BTLA, IDO, KIR, LAG3, TIM-3, VISTA, CD160, TIGIT or PSGL-1. In some embodiments, the immune checkpoint protein comprises the PD-1 or the PD-L1. In some embodiments, the immune checkpoint protein inhibitor comprises at least one of a PD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, or any combination thereof.

[0024] In some embodiments provided herein are methods of treating a cancer in a subject resistant to an immunotherapy comprising a single agent, comprising: administering a combination of (i) a therapeutically effective amount of an agent that regulates activity of a BAFF protein or a BAFF-receptor protein, and (ii) the immunotherapy comprising the single agent.

[0025] In some embodiments, the subject has previously been identified as resistant to the immunotherapy comprising the single agent by a method comprising: (I) determining expression levels of (a) a gene listed in Table 4, a protein product thereof, a variant thereof, or a fragment thereof; and (b) a gene that codes for a BAFF protein or a BAFF-receptor protein, a variant thereof, or a fragment thereof, wherein the expression levels are determined in a biological sample isolated from a tumor microenvironment within the subject; and (II) identifying the subject as resistant to the combination therapy comprising an immunotherapy and agent that

regulates activity of a BAFF protein or a BAFF-receptor protein, wherein the identifying is based on the expression levels of (a) and (b). In some embodiments, the method further comprises determining and expression level of (c) a gene listed in Table 5, a protein product thereof, a variant thereof, or a fragment thereof. In some embodiments, the expression levels of (a), (b), and (c) are independently determined by RNA-seq. In some embodiments, the method further comprises determining a correlation between the expression levels of (a) and (b). In some embodiments, the method further comprises determining a correlation between the expression levels of (b) and (c). In some embodiments, the method further comprises determining a correlation between the expression levels of (a) and (c). In some embodiments, the correlations between expression levels of (a) and (b), (a) and (c), and (b) and (c), are independently determined by a t-test, a paired t-test, an analysis of variance (ANOVA), a repeated measures ANOVA, a simple linear regression, a nonlinear regression, a multiple linear regression, a multiple nonlinear regression, a Wilcoxon signed-rank test, a MannWhitney test, a Kruskal-Wallis test, a Friedman test, a Spearman rank order correlation coefficient, a Kendall Tau analysis, or a nonparametric regression test. In some embodiments, the correlations between expression levels of (a) and (b), (a) and (c), and (b) and (c), are independently determined by the Spearman rank order correlation coefficient. In some embodiments, the correlation between expression levels of (a) and (b) comprises a Spearman's rank order correlation coefficient that is higher than a Spearman's rank order correlation coefficient for the correlation between expression levels of (b) and (c). In some embodiments, genes listed in Table 4 are representatives of a T-cell inflamed phenotype of the tumor microenvironment. In some embodiments, the immunotherapy comprising the single agent comprises administering an immune checkpoint protein inhibitor. In some embodiments, the immune checkpoint protein comprises PD-1, PD-L1, PD-L2, CTLA-4, A2AR, B7-H3, B7-H4, BTLA, IDO, KIR, LAG3, TIM-3, VISTA, CD160, TIGIT or PSGL-1. In some embodiments, the immune checkpoint protein comprises PD-1 or PD-L1. In some embodiments, the immune checkpoint protein inhibitor comprises at least one of a PD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, or any combination thereof.

[0026] In some embodiments provided herein are methods comprising: (I) determining expression levels of (a) a gene listed in Table 4, a protein product thereof, a variant thereof, or a fragment thereof; and (b) a gene that codes for a BAFF protein or a BAFF-receptor protein, a variant thereof, or a fragment thereof, wherein the expression levels are determined in a biological sample isolated from a tumor microenvironment within a subject; and (II)

administering a therapeutically effective amount of an agent that regulates activity of a BAFF protein or a BAFF-receptor protein,

wherein the administering is based on the expression levels of (a) and (b) in the biological sample. In some embodiments, the method further comprises determining an expression level of (c) a gene listed in Table 5, a protein product thereof, a variant thereof, or a fragment thereof. In some embodiments, the expression levels of (a), (b), and (c) are independently determined by RNA-seq. In some embodiments, the method further comprises determining a correlation between the expression levels of (a) and (b). In some embodiments, the method further comprises determining a correlation between the expression levels of (b) and (c). In some embodiments, the method further comprises determining a correlation between the expression levels of (a) and (c). In some embodiments, the correlations between expression levels of (a) and (b), (a) and (c), and (b) and (c), are independently determined by a t-test, a paired t-test, an analysis of variance (ANOVA), a repeated measures ANOVA, a simple linear regression, a nonlinear regression, a multiple linear regression, a multiple nonlinear regression, a Wilcoxon signed-rank test, a MannWhitney test, a Kruskal-Wallis test, a Friedman test, a Spearman rank order correlation coefficient, a Kendall Tau analysis, or a nonparametric regression test. In some embodiments, the correlations between expression levels of (a) and (b), (a) and (c), and (b) and (c), are independently determined by the Spearman rank order correlation coefficient. In some embodiments, the correlation between expression levels of (a) and (b) comprises a Spearman's rank order correlation coefficient that is higher than a Spearman's rank order correlation coefficient for the correlation between expression levels of (b) and (c). In some embodiments, genes listed in Table 4 are representatives of a T-cell inflamed phenotype of the tumor microenvironment. In some embodiments, the method further comprises administering an immunotherapy. In some embodiments, the immunotherapy comprises administering an immune checkpoint protein inhibitor. In some embodiments, the immune checkpoint protein comprises PD-1, PD-L1, PD-L2, CTLA-4, A2AR, B7-H3, B7-H4, BTLA, IDO, KIR, LAG3, TIM-3, VISTA, CD160, TIGIT or PSGL-1. In some embodiments, the immune checkpoint protein comprises PD-1 or PD-L1. In some embodiments, the immune checkpoint protein inhibitor comprises at least one of aPD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, or any combination thereof. In some embodiments, the agent that regulates activity of the BAFF protein or the BAFF-receptor protein comprises a B-cell activating factor (BAFF) inhibitor, or a salt thereof, a B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof, or any combination thereof. In some embodiments, the combination therapy comprises administering a therapeutically effective amount of a B-cell activating factor (BAFF) inhibitor, or a salt thereof, a

B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof, or any combination thereof and at least one of aPD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, or any combination thereof. In some embodiments, the administering of the B-cell activating factor (BAFF) inhibitor, or a salt thereof, a B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof, or any combination thereof the and the administering the at least one of aPD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, or any combination thereof, is concurrent or sequential. In some embodiments, the administering of the B-cell activating factor (BAFF) inhibitor, or a salt thereof, a B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof, or any combination thereof precedes the administering the at least one of aPD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, or any combination thereof. In some embodiments, the administering of the B-cell activating factor (BAFF) inhibitor, or a salt thereof, a B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof, or any combination thereof follows the administering the at least one of aPD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, or any combination thereof. In some embodiments, the method further comprises conveying result of expression levels of one or more of (a), (b), and (c) through a computer communication medium.

[0027] In some embodiments provided herein are methods of identifying an inflammation status of a tumor comprising: determining expression levels of: (a) a gene listed in Table 4, a protein product thereof, a variant thereof, or a fragment thereof; and (b) a gene that codes for a BAFF protein or a BAFF-receptor protein, a variant thereof, or a fragment thereof, wherein the expression levels are determined in a biological sample isolated from a tumor microenvironment within a subject. In some embodiments, the inflammation status comprises a T-cell inflamed signature. In some embodiments, the method further comprises administering a B-cell activating factor (BAFF) inhibitor, or a salt thereof, a B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof, or any combination thereof the and at least one of a PD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, based on the T-cell inflamed signature. In some embodiments provided herein are methods comprising: determining expression levels of: a gene that codes for the BAFF protein or the BAFF-receptor protein, a variant thereof, or a fragment thereof, wherein the expression levels are determined in a biological sample isolated from a tumor microenvironment within the subject; and identifying the subject as: responsive to a combination therapy comprising an immunotherapy and agent that is capable of regulating activity of a gene that codes for a BAFF protein or a BAFF-receptor protein; or resistant to an immunotherapy comprising a single agent, wherein the identifying is based on expression level of the gene. In some embodiments, the method further comprises administering a B-cell

activating factor (BAFF) inhibitor, or a salt thereof, a B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof, or any combination thereof the and at least one of a PD-1 inhibitor, a PD-L1 inhibitor, a PD-L2 inhibitor, or a salt thereof, based on the T-cell inflamed tumor signature.

[0028] Additional aspects and advantages of the present disclosure will become readily apparent to those skilled in this art from the following detailed description, wherein only illustrative embodiments of the present disclosure are shown and described. As will be realized, the present disclosure is capable of other and different embodiments, and its several details are capable of modifications in various obvious respects, all without departing from the disclosure. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not as restrictive.

INCORPORATION BY REFERENCE

[0029] All publications, patents, patent applications, and NCBI accession numbers mentioned in this specification are herein incorporated by reference to the same extent as if each individual publication, patent, or patent application was specifically and individually indicated to be incorporated by reference, and as if set forth in their entireties. In the event of a conflict between a term as used herein and the term as defined in the incorporated reference, the definition of this disclosure controls.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The novel features of the invention 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 (also "figure" and "FIG." herein), of which:

[0031] FIG. 1 provides a representative example of a matrix that defines cellular boundaries.

[0032] FIG. 2 provides a 9 x 9 representative example, which corresponds with FIG. 1 and is an example of an intensity matrix, wherein the relative intensity of each marker of interest per pixel is defined.

[0033] FIG. 3 provides an example of pixel labeling.

[0034] FIG. 4 provides frequency polygons of pixel staining intensities.

[0035] FIG. 5 shows an example of positive intensity thresholding with heatmap visualization.

[0036] FIG. 6 provides an example of an adjacency graph.

[0037] FIG. 7 parts A-C provides an example heatmap.

[0038] FIG. 8 shows an adjacency heatmap of a subject that did not respond to treatment, or a non-responder subject.

[0039] FIG. 9 shows a fraction of adjacency heatmap.

[0040] FIG. 10 shows an adjacency heatmap of the difference between the heatmap of a responder minus the heatmap of a non-responder.

[0041] FIG. 11 illustrates the use of pixel-based analytics for diagnostic and therapeutic development.

[0042] FIG. 12 shows a computer control system.

[0043] FIG. 13A-13C and FIG. 14A-14C illustrate three types of tumors before and after treatment, including Type II resistant tumors.

[0044] FIG. 15A-15B illustrates the proliferation of $CD8^+$ T cells and cancer cells in Type II resistant tumors.

[0045] FIG. 16 illustrates the proliferation of $CD8^+$ T cells and cancer cells Type I and Type II resistant tumors.

[0046] FIG. 17 illustrates the Type II resistant tumors are associated with high PD-L1 expression at baseline.

[0047] FIG. 18 illustrates BAFF expression in samples obtained before anti-PD1 therapy according to clinical response.

[0048] FIG. 19 illustrates BAFF-R expression in samples obtained before anti-PD1 therapy according to clinical response.

[0049] FIG. 20 illustrates BAFF/BAFF-R expression in breast cancer, non-small cell lung cancer (squamous), non-small cell lung cancer (adeno), and head and neck squamous cell carcinoma.

[0050] FIG. 21 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Acute Myeloid Leukemia with BAFF.

[0051] FIG. 22 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Adrenocortical Carcinoma with BAFF.

[0052] FIG. 23 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Head and Neck Squamous Cell Carcinoma with BAFF.

[0053] FIG. 24 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Breast Invasive Carcinoma with BAFF.

[0054] FIG. 25 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Lung Adenocarcinoma with BAFF.

[0055] FIG. 26 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Lung Squamous Cell Carcinoma with BAFF.

[0056] FIG. 27 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Bladder Urothelial Carcinoma with BAFF.

[0057] FIG. 28 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Skin Cutaneous Melanoma with BAFF.

[0058] FIG. 29 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Mesothelioma with BAFF.

[0059] FIG. 30 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Brain lower grade glioma with BAFF.

[0060] FIG. 31 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Cervical squamous cell carcinoma and Endocervical adenocarcinoma with BAFF.

[0061] FIG. 32 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Cholangiocarcinoma with BAFF.

[0062] FIG. 33 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Colon adenocarcinoma with BAFF.

[0063] FIG. 34 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Esophageal carcinoma with BAFF.

[0064] FIG. 35 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Glioblastoma multiforme with BAFF.

[0065] FIG. 36 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of High-risk Wilms Tumor with BAFF.

[0066] FIG. 37 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Kidney chromophobe with BAFF.

[0067] FIG. 38 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Kidney renal clear cell carcinoma with BAFF.

[0068] FIG. 39 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Kidney renal papillary cell carcinoma with BAFF.

[0069] FIG. 40 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Liver hepatocellular carcinoma with BAFF.

[0070] FIG. 41 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Lymphoid neoplasm diffuse large B-cell lymphoma with BAFF.

[0071] FIG. 42 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Stomach adenocarcinoma with BAFF.

[0072] FIG. 43 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of neuroblastoma with BAFF.

[0073] FIG. 44 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Ovarian serous cystadenocarcinoma with BAFF.

[0074] FIG. 45 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Pancreatic adenocarcinoma with BAFF.

[0075] FIG. 46 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Pheochromocytoma and Paraganglioma with BAFF.

[0076] FIG. 47 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Prostate adenocarcinoma with BAFF.

[0077] FIG. 48 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Rectum adenocarcinoma with BAFF.

[0078] FIG. 49 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Rhabdoid tumor with BAFF.

[0079] FIG. 50 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Sarcoma with BAFF.

[0080] FIG. 51 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Testicular germ cell tumors with BAFF.

[0081] FIG. 52 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Thymoma with BAFF.

[0082] FIG. 53 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Thyroid carcinoma with BAFF.

[0083] FIG. 54 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Uterine carcinosarcoma with BAFF.

[0084] FIG. 55 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of Uterine corpus endothelial carcinoma with BAFF.

[0085] FIG. 56 illustrates a correlation heatmap demonstrating the T-cell inflamed signature of uveal melanoma with BAFF.

[0086] Fig. 57 illustrates an aggregate heatmap for correlation between BAFF expression and T-cell inflamed signatures.

[0087] Fig. 58 illustrates sample data points for BAFF expression (TCGA identifier ENSG00000102524.10) as a boxplot with outliers and ordered left to right based on increasing median FPKM (Fragments Per Kilobase of transcript per Million mapped reads).

DETAILED DESCRIPTION

[0088] As used herein, the singular forms “a”, “an”, and “the” include plural references unless the context clearly dictates otherwise. Any reference to “or” herein may be intended to encompass “and/or” unless otherwise stated.

[0089] As used herein, the term “about” may mean the referenced numeric indication plus or minus 15% of that referenced numeric indication.

[0090] The term “fragment,” as used herein, may be a portion of a sequence, a subset that may be shorter than a full-length sequence. A fragment may be a portion of a gene. A fragment may be a portion of a peptide or protein. A fragment may be a portion of an amino acid sequence. A fragment may be a portion of an oligonucleotide sequence. A fragment may be less than about: 20, 30, 40, 50 amino acids in length. A fragment may be less than about: 20, 30, 40, 50 oligonucleotides in length.

[0091] The term “homology,” as used herein, may be to calculations of "homology" or “percent homology” between two or more nucleotide or amino acid sequences that can be determined by aligning the sequences for optimal comparison purposes (*e.g.*, gaps can be introduced in the sequence of a first sequence). The nucleotides at corresponding positions may then be compared, and the percent identity between the two sequences may be a function of the number of identical positions shared by the sequences (i.e., % homology = (# of identical positions/total # of positions) x 100). For example, a position in the first sequence may be occupied by the same nucleotide as the corresponding position in the second sequence, then the molecules are identical at that position. The percent homology between the two sequences may be a function of the number of identical positions shared by the sequences, taking into account the number of gaps, and the length of each gap, which need to be introduced for optimal alignment of the two sequences. In some embodiments, the length of a sequence aligned for comparison purposes may be at least about: 30%, 40%, 50%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 95%, of the length of the reference sequence. A BLAST® search may determine homology between two sequences. The two sequences can be genes, nucleotides sequences, protein sequences, peptide sequences, amino acid sequences, or fragments thereof. The actual comparison of the two sequences can be accomplished by well-known methods, for example, using a mathematical algorithm. A non-

limiting example of such a mathematical algorithm may be described in Karlin, S. and Altschul, S., Proc. Natl. Acad. Sci. USA, 90- 5873-5877 (1993). Such an algorithm may be incorporated into the NBLAST and XBLAST programs (version 2.0), as described in Altschul, S. et al., Nucleic Acids Res., 25:3389-3402 (1997). When utilizing BLAST and Gapped BLAST programs, any relevant parameters of the respective programs (*e.g.*, NBLAST) can be used. For example, parameters for sequence comparison can be set at score= 100, word length= 12, or can be varied (*e.g.* , W=5 or W=20). Other examples include the algorithm of Myers and Miller, CABIOS (1989), ADVANCE, ADAM, BLAT, and FASTA. In another embodiment, the percent identity between two amino acid sequences can be accomplished using, for example, the GAP program in the GCG software package (Accelrys, Cambridge, UK). The term "length homology" can mean percent length identity between the length of a particular polypeptide and the length of another polypeptide. "Length homology" can in some instances be calculated by dividing the number of amino acids in a first peptide chain by the number of amino acids in a second peptide chain and multiplying the result by 100%. Chain amino acids can be those forming the backbone of the peptide.

[0092] The term "microenvironment," as used herein, may refer to the tumor microenvironment as a whole or to an individual subset of cells within the microenvironment. Exemplary cells within the tumor microenvironment may include but not limited to Tumor Infiltrating Lymphocytes (TILs), leukocytes, macrophages, and/or other cells of the immune system, and/or stromal cells, and/or fibroblasts (*e.g.*, cancer or tumor associated fibroblasts).

[0093] The phrase "pharmaceutically acceptable" may be employed herein to refer to those compounds, materials, compositions, and/or dosage forms which are, within the scope of sound medical judgment, suitable for use in contact with the tissues of human beings and animals without excessive toxicity, irritation, allergic response, or other problem or complication, commensurate with a reasonable benefit/risk ratio.

[0094] The phrase "pharmaceutically acceptable excipient" or "pharmaceutically acceptable carrier" as used herein may refer to a pharmaceutically acceptable material, composition or vehicle, such as a liquid or solid filler, diluent, excipient, solvent or encapsulating material. Some examples of materials which may serve as pharmaceutically acceptable carriers may include: (1) sugars, such as lactose, glucose and sucrose; (2) starches, such as corn starch and potato starch; (3) cellulose, and its derivatives, such as sodium carboxymethyl cellulose, ethyl cellulose and cellulose acetate; (4) powdered tragacanth; (5) malt; (6) gelatin; (7) talc; (8) excipients, such as cocoa butter and suppository waxes; (9) oils, such as peanut oil, cottonseed oil, safflower oil, sesame oil, olive oil, corn oil and soybean oil; (10) glycols, such as propylene

glycol; (11) polyols, such as glycerin, sorbitol, mannitol and polyethylene glycol; (12) esters, such as ethyl oleate and ethyl laurate; (13) agar; (14) buffering agents, such as magnesium hydroxide and aluminum hydroxide; (15) alginic acid; (16) pyrogen-free water; (17) isotonic saline; (18) Ringer's solution; (19) ethyl alcohol; (20) phosphate buffer solutions; or (21) other non-toxic compatible substances employed in pharmaceutical formulations.

[0095] In some embodiments, the term "prevent" or "preventing" as related to a disease or disorder may refer to a compound or composition that, in a statistical sample, may reduce the occurrence of the disorder or condition in the treated sample relative to an untreated control sample, or may delay the onset or may reduce the severity of one or more symptoms of the disorder or condition relative to the untreated control sample.

[0096] The terms "treat," "treating" or "treatment," as used herein, may include at least partially: alleviating, abating or ameliorating a disease or condition symptom; preventing an additional symptom; ameliorating or preventing the underlying causes of symptom; inhibiting the disease or condition, *e.g.*, at least partially arresting the development of the disease or condition; relieving the disease or condition; causing regression of the disease or condition; relieving a condition caused by the disease or condition; or stopping a symptom of the disease or condition either prophylactically and/or therapeutically. Treatment may include stopping the growth of a cancer, shrinking the mass of a cancer, slowing the growth of a cancer shrinking the volume of a cancer, or prolonging the life span of a subject when compared to an otherwise substantially identical subject who may not be treated.

[0097] Included in the present disclosure may be salts, including pharmaceutically acceptable salts, of the compositions described herein. The compounds or compositions of the present disclosure that may possess a sufficiently acidic, a sufficiently basic, or both functional groups, may react with any of a number of inorganic bases, inorganic acids, or organic acids, to form a salt. Alternatively, compositions containing compounds that are inherently charged, such as those with quaternary nitrogen, may form a salt with an appropriate counterion, *e.g.*, a halide such as bromide, chloride, or fluoride, particularly bromide.

[0098] As used herein, "agent" or "biologically active agent" may refer to a biological, pharmaceutical, or chemical compound or a salt of any of these. Non-limiting examples may include a simple or complex organic or inorganic molecule, a peptide, a protein, an oligonucleotide, an antibody, an antibody derivative, antibody fragment, a vitamin derivative, a carbohydrate, a toxin, or a chemotherapeutic compound. Various compounds may be synthesized, for example, small molecules and oligomers (*e.g.*, oligopeptides and oligonucleotides), or synthetic organic compounds based on various core structures. In addition,

various natural sources may provide compounds for screening, such as plant or animal extracts, and the like.

[0099] As used herein, an "immunotherapeutic agent" may refer to an agent that may be used on or used to modify an immune mechanism or immune response.

[0100] As used herein, a "pharmaceutical agent" may refer to an agent or a therapy that may be used to prevent, diagnose, treat, or cure a disease, or combinations thereof.

[0101] Activity of a protein, as used herein, may refer to a transcript level of mRNA transcribed from a gene that codes for said protein, expression level of said protein, nature of the expressed protein, such as folding, ability of said protein to interact with other proteins in the tumor microenvironment, and ability of said protein to interact with downstream or upstream signaling molecules in a signaling cascade of which said protein is a member.

[0102] The methods and compositions described herein include the use of amorphous forms as well as crystalline forms or polymorphs. The compounds described herein may be in the form of pharmaceutically acceptable salts. As well, active metabolites of these compounds having the same type of activity may be included in the scope of the present disclosure. In addition, the compounds described herein may exist in unsolvated as well as solvated forms with pharmaceutically acceptable solvents such as water, ethanol, and the like. The solvated forms of the compounds presented herein may also considered to be disclosed herein.

[0103] As used herein, a "biosimilar" or a "biosimilar product" may refer to a biological product that is licensed based on a showing that it is highly similar to an FDA-approved biological product, known as a reference product, and has no clinically meaningful differences in terms of safety and effectiveness from the reference product. Only minor differences in clinically inactive components may be allowable in biosimilar products. A "biosimilar" of an approved reference product/biological drug refers to a biologic product that is similar to the reference product based upon data derived from (a) analytical studies that demonstrate that the biological product is highly similar to the reference product notwithstanding minor differences in clinically inactive components; (b) animal studies (including the assessment of toxicity); and/or (c) a clinical study or studies (including the assessment of immunogenicity and pharmacokinetics or pharmacodynamics) that are sufficient to demonstrate safety, purity, and potency in one or more appropriate conditions of use for which the reference product is licensed and intended to be used and for which licensure is sought for the biological product. In some embodiments, the biosimilar biological product and reference product utilize the same mechanism or mechanisms of action for the condition or conditions of use prescribed, recommended, or suggested in the proposed labeling, but only to the extent the mechanism or mechanisms of action are known for

the reference product. In some embodiments, the condition or conditions of use prescribed, recommended, or suggested in the labeling proposed for the biological product have been previously approved for the reference product. In some embodiments, the route of administration, the dosage form, and/or the strength of the biological product are the same as those of the reference product. In some embodiments, the facility in which the biological product is manufactured, processed, packed, or held may meet standards designed to assure that the biological product continues to be safe, pure, and potent. The reference product may be approved in at least one of the U.S., Europe, or Japan. In some embodiments, a response rate of human subjects administered the biosimilar product can be 50%-150% of the response rate of human subjects administered the reference product. For example, the response rate of human subjects administered the biosimilar product can be 50%-100%, 50%-110%, 50%-120%, 50%-130%, 50%-140%, 50%-150%, 60%-100%, 60%-110%, 60%-120%, 60%-130%, 60%-140%, 60%-150%, 70%-100%, 70%-110%, 70%-120%, 70%-130%, 70%-140%, 70%-150%, 80%-100%, 80%-110%, 80%-120%, 80%-130%, 80%-140%, 80%-150%, 90%-100%, 90%-110%, 90%-120%, 90%-130%, 90%-140%, 90%-150%, 100%-110%, 100%-120%, 100%-130%, 100%-140%, 100%-150%, 110%-120%, 110%-130%, 110%-140%, 110%-150%, 120%-130%, 120%-140%, 120%-150%, 130%-140%, 130%-150%, or 140%-150% of the response rate of human subjects administered the reference product. In some embodiments, a biosimilar product and a reference product can utilize the same mechanism or mechanisms of action for the condition or conditions of use prescribed, recommended, or suggested in the proposed labeling, but only to extent the mechanism or mechanisms are known for the reference product.

[0104] A polypeptide disclosed herein may have one or more modifications, such as a post-translational modification (e.g., glycosylation, phosphorylation, etc.) or any other modification (e.g., pegylation, etc.). The polypeptide may contain one or more non-naturally-occurring amino acids (e.g., such as an amino acid with a side chain modification).

[0105] To obtain approval for biosimilar drugs, studies and data of structure, function, animal toxicity, pharmacokinetics, pharmacodynamics, immunogenicity, and clinical safety and efficacy may be needed.

[0106] A biosimilar may also be known as a follow-on biologic or a subsequent entry biologic. In some embodiments, a biosimilar product may be highly similar to the reference product notwithstanding minor different in clinically inactive components.

[0107] The expression construct for a proposed product may encode the same primary amino acid sequence as its reference product. Minor modifications may be present. Minor modifications may include N- or C-terminal truncations or alterations.

[0108] In some embodiments, a method described herein may comprise administering a therapeutically effective amount of an antibody or a fragment thereof.

[0109] As used herein, a "interchangeable biological product" may refer to biosimilar to an FDA-approved reference product and meets additional standards for interchangeability. In some embodiments, an interchangeable biological product can, for example, produce the same clinical result as the reference product in any given patient. In some embodiments, an interchangeable product may contain the same amount of the same active ingredients, may possess comparable pharmacokinetic properties, may have the same clinically significant characteristics, and may be administered in the same way as the reference compound. In some embodiments, an interchangeable product can be a biosimilar product that meets additional standards for interchangeability. In some embodiments, an interchangeable product can produce the same clinical result as a reference product in all of the reference product's licensed conditions of use. In some embodiments, an interchangeable product can be substituted for the reference product by a pharmacist without the intervention of the health care provider who prescribed the reference product. In some embodiments, when administered more than once to an individual, the risk in terms of safety or diminished efficacy of alternating or switching between use of the biological product and the reference product is not greater than the risk of using the reference product without such alternation or switch. In some embodiments, an interchangeable product can be a regulatory agency approved product. In some embodiments, a response rate of human subjects administered the interchangeable product can be 80%-120% of the response rate of human subjects administered the reference product. For example, the response rate of human subjects administered the interchangeable product can be 80%-100%, 80%-110%, 80%-120%, 90%-100%, 90%-110%, 90%-120%, 100%-110%, 100%-120%, or 110%-120 of the response rate of human subjects administered the reference product.

[0110] In some embodiments, a method of the current disclosure comprises administering a therapeutically effective amount of a diagnostic to a patient who has been administered an FDA approved diagnostic.

Methods

[0111] In some embodiments, a method of the current disclosure may comprise administering a therapeutically effective amount of an immunotherapeutic agent or a salt thereof, wherein the immunotherapeutic agent or a salt thereof may inhibit a biological cascade selected from the group consisting of: a B-cell activating factor receptor cascade, a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor cascade, a B-cell

maturation antigen receptor cascade, and any combination thereof; wherein the immunotherapeutic agent may be co-administered with a checkpoint inhibitor.

[0112] In some embodiments, a method of the current disclosure may comprise treating a subject in need thereof, comprising: administering a therapeutically effective amount of an immunotherapeutic agent or a salt thereof, wherein the immunotherapeutic agent or a salt thereof may inhibit a biological cascade selected from the group consisting of: a B-cell activating factor receptor cascade, a transmembrane activator, calcium-modulator, cyclophilin ligand interactor receptor cascade, a B-cell maturation antigen receptor cascade, and any combination thereof; and administering a checkpoint inhibitor.

[0113] In some embodiments, a method of treatment of the current disclosure may result in at least partial remission of a cancer or a tumor. After administration of a composition described herein, progression of a cancer or a tumor may be delayed. Methods described herein may delay progression of a cancer or a tumor. After administration of a composition, the mass of a cancer or a tumor may be reduced, or the volume of a cancer or a tumor may be reduced. A method described herein may prolong the lifespan, the expected lifespan, or the life of a subject.

[0114] In one aspect, the present disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one B-cell activating factor (BAFF) inhibitor and/or at least one B-cell activating factor receptor (BAFF-R) inhibitor, or a salt thereof; and administering a therapeutically effective amount of at least one checkpoint inhibitor or a salt thereof. The subject may have been diagnosed with a cancer or a tumor. In some embodiments, the method may be a method of treating a cancer or a tumor in the subject. The subject may not have previously undergone treatment for the cancer or the tumor. The subject may have previously or may be currently undergoing treatment for the cancer or the tumor. The subject may have previously undergone treatment with surgery or radiation, and the subject remains in remission. The subject may have previously undergone treatment with surgery, radiation, an anticancer agent, and any combination thereof, and the cancer or the tumor may have been at least partially refractive to the treatment. The subject may have been previously treated with surgery, radiation therapy, an anticancer agent, and any combination thereof, and the cancer or the tumor may have re-occurred in the subject following a period of remission, wherein the period of remission may be at least about: 1 month, 2 months, 3 months, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 6 years, 7 years, 8 years, 9 years, or 10 years.

[0115] In some embodiments, the subject may have been previously treated with a checkpoint inhibitor or a salt thereof, and the cancer or the tumor may have been at least partially

refractive to the checkpoint inhibitor or a salt thereof. The subject may have been previously treated with a checkpoint inhibitor or a salt thereof, and the cancer or the tumor may have re-occurred in the subject following a period of remission, wherein a period of the remission may have been at least about: 1 month, 2 months, 3 months, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 6 years, 7 years, 8 years, 9 years, or 10 years. The checkpoint inhibitor or a salt thereof may be administered sequentially with the BAFF inhibitor and/or BAFF-R inhibitor or a salt thereof. The checkpoint inhibitor or a salt thereof may be administered concurrently with the BAFF inhibitor and/or BAFF-R inhibitor or a salt thereof. The checkpoint inhibitor may be selected from the group consisting of an agent that binds to anti-programmed cell death protein 1 (PD-1), anti-programmed death ligand 1 (PD-L1), anti-programmed death ligand 2 (PD-L2), cytotoxic T-lymphocyte-associated protein 4 (CTLA4), cluster of differentiation 276 (B7-H3), V-set domain-containing T-cell activation inhibitor 1 (B7-H4), T-cell immunoglobulin and mucin-domain containing-3 (TIM-3), lymphocyte-activation gene 3 (LAG3), Indoleamine-pyrrole 2,3-dioxygenase (IDO), a salt of any one thereof, and any combination thereof. In some embodiments, a composition disclosed herein can be administered with IL-6 or an antihistamine. In some embodiments, a compositions disclosed herein can be administered with a third agent. In some embodiment, a third agent can be administered together with a composition disclosed herein, subsequently, or before a composition disclosed herein.

[0116] In some embodiments, the BAFF-inhibitor may comprise the sequence of any of SEQ ID Nos. 1-16, 150-163, a fragment of any of SEQ ID Nos. 1-19, 150-163 or a sequence having at least about 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or more sequence homology to any of SEQ ID Nos. 1-19, 150-163. In some embodiments, the BAFF-R inhibitor may comprise the sequence of any of SEQ ID Nos. 21-30, 74-85, a fragment of any of SEQ ID Nos. 21-30, 84, 85, or a sequence having at least about 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or more sequence homology to any of SEQ ID Nos. 21-30, 74-85. In some embodiments, the checkpoint inhibitor may comprise the sequence of any of SEQ ID NOs: 17-20, 165-174 (see **Table 3B**), a fragment of any of SEQ ID Nos: 17-20, 165-174 a sequence having at least about: 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or more sequence homology to a sequence of any of SEQ ID Nos: 17-20, 165-174 or any combination thereof.

[0117] In some embodiments, the BAFF-R inhibitor is VAY736. VAY736 is a fully human combinatorial antibody library (HuCAL)-derived monoclonal antibody targeting BAFF-R. In some examples, the heavy chain CDR1 of VAY736 can have the amino acid sequence of GDSVSSNSAAWG (SEQ ID NO: 74). The heavy chain CDR2 of VAY736 can have the amino

acid sequence of RIYYRSKWYNSYAVSVKS (SEQ ID NO: 75). The heavy chain CDR3 of VAY736 can have the amino acid sequence of YDWVPKIGVFDS (SEQ ID NO: 76). The light chain CDR1 of VAY736 can have the amino acid sequence of RASQFISSSYLS (SEQ ID NO: 77). The light chain CDR2 of VAY736 can have the amino acid sequence of LLIYGSSSRAT (SEQ ID NO: 78). The light chain CDR3 of VAY736 can comprise the amino acid sequence of QQLYSSPM (SEQ ID NO: 79). The heavy chain variable region of VAY736 has the amino acid sequence of:
QVQLQQSGPGLVKPSQTLSLTCAISGDSVSSNSAAWGWIRQSPGRGLEWLGRIYYRSKW YNSYAVSVKSRITINPDTSKNQFSLQLNSVTPEDTAVYYCARYDWVPKIGVFDSWGQGT LVTVSS (SEQ ID NO: 80). The light chain variable region of VAY736 has the amino acid sequence of:
DIVLTQSPATLSLSPGERATLSCRASQFISSSYLSWYQQKPGQAPRLLIYGSSSRATGVPA RFSG SGSGTDFTLTISSLEPEDFAVYYCQQLYSSPMTFGQGTKVEIKRT (SEQ ID NO: 81). The heavy chain of VAY736 has the amino acid sequence of:
QVQLQQSGPGLVKPSQTLSLTCAISGDSVSSNSAAWGWIRQSPGRGLEWLGRIYYRSKW YNSYAVSVKSRITINPDTSKNQFSLQLNSVTPEDTAVYYCARYDWVPKIGVFDWGQGTL VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAP ELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKP REEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVY TLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSK LTVDKSRWQQGNVFSCSVM HEALHNHYTQKSLSLSPGK (SEQ ID NO: 82). The light chain variable region of VAY736 can have the amino acid sequence of:
DIVLTQSPATLSLSPGERATLSCRASQFISSSYLSWYQQKPGQAPRLLIYGSSSRATGVPA RFSGSGSGTDFTLTISSLEPEDFAVYYCQQLYSSPMTFGQGTKVEIKRTVAAPSVFIFPPSD EQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQDSKDSTYSLSSTLTL SKADYEKHK VYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 83).

[0118] In some embodiments, the BAFF inhibitor can comprise the entire length or a fraction of any one of the sequences SEQ ID Nos. 1-16 or 150-163. The BAFF inhibitor, in some examples, can comprise a sequence that can be about 50% to about 99% homologous to the entire length of or a fraction of the entire length of any of SEQ ID Nos. 1-16 or 150-163. In some cases, the BAFF inhibitor can comprise a sequence that can be about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, about

96%, about 97%, about 98%, or about 99% homologous to the entire length of or a fraction of the entire length of any of SEQ ID Nos. 1-16 or 150-163.

[0119] A BAFF inhibitor may comprise an antibody, a small molecule, a protein, a peptide, an aptamer, an enzyme, or any combination thereof. In some embodiments, A BAFF inhibitor may comprise an antibody, an antigen binding fragment thereof, a BAFF binding domain, or any combination thereof. The BAFF inhibitor may comprise a mouse antibody. The BAFF inhibitor may comprise a rat antibody. The BAFF inhibitor may comprise a human antibody. The BAFF inhibitor may comprise a humanized antibody. The BAFF inhibitor may comprise a light chain region, a heavy chain region, or a combination thereof. The light chain region may comprise any one of CDR1, CDR2, CDR3, or any combination thereof. The heaving chain may comprise any one of CDR1, CDR2, CDR3, or any combination thereof. The BAFF inhibitor may comprise one or more antibody framework regions. In some embodiments, one or more of the framework regions may be humanized.

[0120] A BAFF inhibitor may comprise a sequence having at least about: 80%, 85%, 90%, 95%, or 99% sequence homology to a light chain CDR1, light chain CDR2, light chain CDR3, heavy chain CDR1, heavy chain CDR2, heavy chain CDR3, or any combination thereof of one of the following: tabalumab, atacicept, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, or belimumab.

[0121] A BAFF inhibitor may comprise a sequence having at least about: 80%, 85%, 90%, 95%, or 99% sequence homology to at least a portion of a variable region of one of the following: tabalumab, atacicept, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, or belimumab.

[0122] A BAFF inhibitor may comprise a sequence having at least about: 80%, 85%, 90%, 95%, or 99% sequence homology to at least a portion of an antibody binding domain of one of the following: tabalumab, atacicept, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, or belimumab.

[0123] A BAFF, BLyS, TALL-1, THANK, neutrokine-α, or zTNF inhibitor may comprise a light chain sequence, a heavy chain sequence, wherein the light chain comprises CDR1, 2, and 3 and the heavy chain region also comprises CDR1, CDR2, CDR3. Exemplary heavy chain, light chain, and CDR sequences are provided in Table 1. Table 1B further comprises sequences of anti-BAFF-R antibodies. Contemplated are sequences that have about 80%, 85%, 90%, 96%, 97%, 98%, 99%, or more homology to heavy chain, light chain, and CDR sequences of Table 1 or Table 1B.

[0124] Table 1

SEQ ID NO	SEQUENCE
1: exemplary polynucleotide sequence encoding light chain variable region	GAAATTGTGTTGACGCAGTCTCCAGCCACCCTGTCTTTGTCTCCAGG GGAAAGAGCCACCCTCTCCTGCAGGGCCAGTCAGAGTGTTAGCCGCTACTTAGCCT GGTACCAGCAGAAACCTGGCCAGGCTCCCAGGCTCCTCATCTATGATGCATCCAAC AGGGCCACTGGCATCCCAGCCAGGTTCAGTGGCAGTGGGTCTGGGACAGACTCCAC TCTCACCATCAGCAGCCTAGAGCCTGAAGATTTTGCAGTTTATTACTGTCAGCAGCG TAGCAACTGGCCTCGGACGTTCGGC CAAGGGACCAAGGTGGAAATCAAACGAACT
2: exemplary amino acid sequence for light chain variable region	EIVLTQSPATLSLSPGERATLSCRASQSVSRYLAWYQQKPGQAPRLLIYDASNRATGIPA RFSGSGSGTDSTLTISSLEPEDFAVYYCQQRSNWPRTFGQGTKVEIKRT
3: exemplary polynucleotide sequence for light chain CDR1	AGGGCCAGTCAGAGTGTTAGCCGCTACTTAGCC
4: exemplary amino acid sequence for light chain CDR1	RASQSVSRYLA
5: exemplary polynucleotide sequence for light chain CDR2	GATGCATCCAACAGGGCCACT
6: exemplary amino acid sequence for light chain CDR2	DASNRAT
7: exemplary polynucleotide sequence for light chain CDR3	CAGCAGCGTAGCAACTGGCCTCGGACG
8: exemplary amino acid sequence for light chain CDR3	QQRSNWPRT
9: exemplary polynucleotide sequence encoding heavy chain variable region	ATGAAACACCTGTGGTTCTTCCTCCTCCTGGTGGCAGCTCCCAGATGGGTCCTGTCC CAGGTGCAACTACAGCAGTGGGGCGCAGGACTGTTGAAGCCTTCGGAGACCCTGTC CCTCACCTGCGCTGTCTATGGTGGGTCCTTCAGTGGTTACTACTGGAGCTGGATCCG CCAGCCCCCAGGGAAGGGGCTGGAGTGGATTGGGGAAATCAATCATAGTGGAAGC ACCAACTACAACCCGTCCCTCAAGAGTCGAGTCACCATATCAGTAGACACGTCCAA GAACCAGTTCTCCCTGAAACTGAGCTCTGTGACCGCCGCGGACACGGCTGTGTATTA CTGTGCGAGAGGGTATTACGATATTTTGACTGGTTATTATTACTACTTTGACTACTG GGGCCAGGGAACCCTGGTCACCGTCTCCTCA
10: exemplary amino acid sequence encoding heavy chain variable region	MKHLWFFLLLVAAPRWVLSQVQLQQWGAGLLKPSETLSLTCAVYGGSFSGYYWSWIR QPPGKGLEWIGEINHSGSTNYNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYYCARG YYDILTGYYYYFDYWGQGTLVTVSS
11: exemplary polynucleotide sequence encoding heavy chain CDR1	GGTGGGTCCTTCAGTGGTTACTACTGGAGC
12: exemplary amino acid sequence for heavy chain	GGSFSGYYWS

CDR1	
13: exemplary polynucleotide sequence encoding heavy chain CDR2	GAAATCAATCATAGTGGAAGCACCAACTACAACCCGTCCCTCAAGAGT
14: exemplary amino acid sequence for heavy chain CDR2	EINHSGSTNYNPSLKS
15: exemplary polynucleotide sequence encoding heavy chain CDR3	GGGTATTACGATATTTTGACTGGTTATTATTACTACTTTGACTAC
16: exemplary amino acid sequence for heavy chain CDR3	GYYDILTGYYYYFDY
150: exemplary amino acid sequence for heavy chain	QVQLQQWGAGLLKPSETLSLTCAVYGGSFSGYYWSWIRQPPGKGLEWIGEINHSGSTN YNPSLKSRVTISVDTSKNQFSLKLSSVTAADTAVYYCARGYYDILTGYYYYFDYWGQG TLVTVSSASTKGPSVFPLAPCSRSTSESTAALGCLVKDYFPEPVTVSWNSGALTSGVHTF PAVLQSSGLYSLSSVVTVPSSSLGTKTYTCNVDHKPSNTKVDKRVESKYGPPCPPCPAPE FLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSQEDPEVQFNWYVDGVEVHNAKTKP REEQFNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKGLPSSIEKTISKAKGQPREPQVYT LPPSQEEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSR LTVDKSRWQEGNVFSCSVMHEALHNHYTQKSLSLSLGK
151: exemplary amino acid sequence for light chain	EIVLTQSPATLSLSPGERATLSCRASQSVSRYLAWYQQKPGQAPRLLIYDASNRATGIPA RFSGSGSGTDSTLTISSLEPEDFAVYYCQQRSNWPRTFGQGTKVEIKRTVAAPSVFIFPPS DEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQDSKDSTYSLSNTL T LSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC
152: exemplary amino acid sequence for VH	MKHLWFFLLL VAAPRWVLSQ VQLQQWGAGL LKPSETLSLT CAVYGGSFSG YYWSWIRQPP GKGLEWIGEI NHSGSTNYNP SLKSRVTISV DTSKNQFSLK LSSVTAADTA VYYCARGYYD ILTGYYYYFD YWGQGTLVTV SS
153: exemplary amino acid sequence for VL	EIVLTQSPAT LSLSPGERAT LSCRASQSVS RYLAWYQQKP GQAPRLLIYD ASNRATGIPA RFSGSGSGTD STLTISSLEP EDFAVYYCQQ RSNWPRTFGO GTKVEIKRT
154: exemplary amino acid sequence for heavy chain	QVQLQQSGAE VKKPGSSVRV SCKASGGTFN NNAINWVRQA PGQGLEWMGG I IPMFGTAKY SQNFQGRVAI TADESTGTAS MELSSLRSED TAVYYCARSR DLLLFPHHAL SPWGRGTMVT VSSASTKGPS VFPLAPSSKS TSGGTAALGC LVKDYFPEPV TVS NSGALT SGVHTFPAVLQSSGLYSLSS VVTVPSSSLG TQTYICNVNH KPSNTKVDKK VEPKSCDKTH TCPPCPAPELLGGPSVFLFP PKPKDTLMI S RTPEVTCVVV DVSHEDPEVK FNWYVDGVEV HNAKTKPREE QYNSTYRVVS VLTVLHQDWL NGKEYKCKVS NKALPAPIEK TI SKAKGQPR EPQVYTLPPSRDELTKNQVS LTCLVKGFYP SDIAVEWESN GQPENNYKTT PPVLDSDGSF FLYSKLTVDKSRWQQGNVFS CSVMHEALHN HYTQKSLSLS PGK
155: exemplary amino acid sequence for light chain	SSELTQDPAV SVALGQTVRV TCQGDSLRSY YASWYQQKPG QAPVLVIYGK NNRPSGI PDR FSGSSSGNTA SLTITGAQAE DEADYYCSSR DSSGNHWVFG GGTELTVLGQ PKAAPSVTLF PPSSEELQAN KATLVCLISD FYPGAVTVAW KADSSPV AG VETTTPSKQS NNKYAASSYL SLTPEQWKSH RSYSCQVTHE GSTVEKTVAP TECS
156: exemplary amino acid sequence for VH	QVQLQQSGAE VKKPGSSVRV SCKASGG FN NNAINWVRQA PGQGLE GG I IP FGTAKY SQNFQGRV I TADESTGTAS MELSSLRSED TAVYYCARSR DLLLFPHHAL SPWGRGTMVT VSS
157: exemplary amino acid sequence for VL	SSELTQDPAV SVALGQTVRV TCQGDSLRSY YASWYQQKPG QAPVLVIYGK NNRP FSGSSSGNTA SLTITGAQAE DEADYYCSSR DSSGNHWVFG GGTELTVLGGTKVEIKRT
158: exemplary amino acid sequence for	GGTFNNNAIN

CDRH1	
159: exemplary amino acid sequence for CDRH2	GIIPMFGTAK YSQNFQG
160: exemplary amino acid sequence for CDRH3	SRDLLLFPHH ALSP
161: exemplary amino acid sequence for CDRL1	QGDSLRSYYA S
162: exemplary amino acid sequence for CDRL2	GKNNRPS
163: exemplary amino acid sequence for CDRL3	SSRDSSGNHW V

[0125] In some embodiments, a sequence of a composition described herein may comprise at least about: 100% homology, 95% homology, 90% homology, 85% homology, 80% homology, 75% homology, 70% homology, 65% homology, 60% homology, 55% homology, 50% homology, to an entire length or a fraction of an entire length of a reference sequence, or a sequence listed in Table 1 or Table 1B.

[0126] **Table 1B**

Seq ID NO:	Sequence
21: exemplary heavy chain CDR1	GDSVSSNSAAWG
22: exemplary heavy chain CDR2	RIYYRSKWYNSYAVSVKS
23: exemplary heavy chain CDR3	YDWVPKIGVFDS
24: exemplary light chain CDR1	RASQFISSSYLS
25: exemplary light chain CDR2	LLIYGSSSRAT
26: exemplary light chain CDR3	QQLYSSPM
27: exemplary heavy chain variable region	QVQLQQSGPGLVKPSQTLSLTCAISGDSVSSNSAAWGWIRQSPGRGLEWLGRIYYRSK WYNSYAVSVKSRITINPDTSKNQFSLQLNSVTPEDTAVYYCARYDWVPKIGVFDSWGQ GTLVTVSS
28: exemplary light chain	DIVLTQSPATLSLSPGERATLSCRASQFISSSYLSWYQQKPGQAPRLLIYGSSSRATGVPA RFSGSGSGTDFTLTISSLEPEDFAVYYCQQLYSSPMTFGQGTKVEIK

variable region	
29: exemplary heavy chain	QVQLQQSGPGLVKPSQTLSLTCAISGDSVSSNSAAWGWIRQSPGRGLEWLGRIYYRSK WYNSYAVSVKSRITINPDTSKNQFSLQLNSVTPEDTAVYYCARYDWVPKIGVFDSWGQ GTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVH TFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPP CPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNA KTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPRE PQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSF FLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK
30: exemplary light chain variable region	DIVLTQSPATLSLSPGERATLSCRASQFISSSYLSWYQQKPGQAPRLLIYGSSSRATGVPA RFSGSGSGTDFTLTISSLEPEDFAVYYCQQLYSSPMTFGQGTKVEIKRTVAAPSVFIFPPS DEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQDSKDSTYSLSSTL TLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC
84: exemplary light chain CDR2	GSSSRAT
85: exemplary light chain CDR3	QQLYSSPMT

[0127] In some embodiments, the BAFF or a BAFF-R inhibitor can comprise an aptamer comprising 100% homology, 95% homology, 90% homology, 85% homology, 80% homology, 75% homology, 70% homology, 65% homology, 60% homology, 55% homology, 50% homology, to an entire length or a fraction of an entire length of Aptamer 1(SEQ ID NO: 175) 5'-GGG AGG ACG AUG CGG GAG GCU CAA CAA UGA UAG AGC CCG CAA UGU UGA UAG UUG UGC CCA GUC UGC AGA CGA CUC GCC CGA-3'; Aptamer 2 (SEQ ID NO: 176) 5'-GGG AGG ACG AUG CGG AUA ACU AUU GUG CUA GAG GGC UUA UUU AUG UGA GCC GGU UGA UAG UUG CGC AGA CGA CUC GCC CGA-3'; or Aptamer 3 (SEQ ID NO: 177) 5'-GGG AGG ACG AUG CGG AUC CUC CGA AGG UCG CGC CAA CGU CAC ACA UUA AGC UUU UGU UCG UCU GCA GAC GAC UCG CCC GA-3'.

[0128] In some cases, a BAFF-R protein can comprise an amino acid sequence substantially the same as described in Table 1C.

[0129] Table 1C

SEQ ID NO	SEQUENCE
164: Human BAFFR amino acid sequence	MRRGPRSLRGRDAPAPTPCVPAECFDLLVRHCVACGLLRTPRPKPAGASSP APRTALQPQESVGAGAGEAALPLPGLLFGAPALLGLALVLALVLVGLVSWRR RQRRLRGASSAEAPDGDKDAPEPLDKVIILSPGISDATAPAWPPPGEDPGTT PPGHSVPVPATELGSTELVTTKTAGPEQQ

[0130] In some cases, a BAFF protein can comprise an amino acid sequence substantially the same as described in Table 2.

[0131] Table 2

SEQ ID NO	SEQUENCE
31: Polypeptide sequence of BAFF Isoform 1	MDDSTEREQSRLTSCLKKREEMKLKECVSILPRKESPSVRSSKDGKLLAATLLLALLSCC LTVVSFYQVAALQGDLASLRAELQGHHAEKLPAGAGAPKAGLEEAPAVTAGLKIFEPP APGEGNSSQNSRNKRAVQGPEETVTQDCLQLIADSETPTIQKGSYTFVPWLLSFKRGSAL EEKENKILVKETGYFFIYGQVLYTDKTYAMGHLIQRKKVHVFGDELSLVTLFRCIQNMP ETLPNNSCYSAGIAKLEEGDELQLAIPRENAQISLDGDVTFFGALKLL

32: Polypeptide sequence of BAFF Isoform 2	MDDSTEREQSRLTSCLKKREEMKLKECVSILPRKESPSVRSSKDGKLLAATLLLALLSCC LTVVSFYQVAALQGDLASLRAELQGHHAEKLPAGAGAPKAGLEEAPAVTAGLKIFEPP APGEGNSSQNSRNKRAVQGPEETGSYTFVPWLLSFKRGSALEEKENKILVKETGYFFIY GQVLYTDKTYAMGHLIQRKKVHVFGDELSLVTLFRCIQNMPETLPNNSCYSAGIAKLEE GDELQLAIPRENAQISLDGDVTFFGALKLL
33: Polypeptide sequence of BAFF Isoform 3	MDDSTEREQSRLTSCLKKREEMKLKECVSILPRKESPSVRSSKDGKLLAATLLLALLSCC LTVVSFYQVAALQGDLASLRAELQGHHAEKLPAGAGAPKAGLEEAPAVTAGLKIFEPP APGEGNSSQNSRNKRAVQGPEETVTQDCLQLIADSETPTIQKGFIY
34: Polypeptide sequence of BAFF Isoform 1 Variant	MDDSTEREQSRLTSCLKKREEMKLKECVSILPRKESPSVRSSKDGKLLAATLLLALLSCC LTVVSFYQVAALQGDLASLRAELQGHHAEKLPAGAGAPKAGLEETPAVTAGLKIFEPP APGEGNSSQNSRNKRAVQGPEETVTQDCLQLIADSETPTIQKGSYTFVPWLLSFKRGSAL EEKENKILVKETGYFFIYGQVLYTDKTYAMGHLIQRKKVHVFGDELSLVTLFRCIQNMP ETLPNNSCYSAGIAKLEEGDELQLAIPRENAQISLDGDVTFFGALKLL
149: Polypeptide BAFF soluble sequence	AVQGPEETVTQDCLQLIADS ETPTIQKGSY TFVPWLLSFK RGSALEEKEN KILVKETGYF FIYGQVLYTD K Y MGHLIQ RKKVHVFGDE LSLVTLFRCI QNMPETLPNN SCYSAGIAKL EEGDELQLAI PRE AQI SLD GDVTFFGALK LL

[0132] In some embodiments, a BAFF protein described herein may comprise at least about: 100% identity, 95% identity, 90% identity, 85% identity, 80% identity, 75% identity, 70% identity, 65% identity, 60% identity, 55% identity, 50% identity, of a reference sequence, or a sequence listed in Table 2.

[0133] In some cases, a BAFF protein can be expressed from one or more coding regions from chromosome 13. In some cases, a BAFF protein can be expressed from one or more coding regions of the polynucleotide sequence of SEQ ID NO. 35 depicted in Table 3.

[0134] **Table 3**

SEQ ID NO	SEQUENCE
35: NC_00013.11	AGACTAAAAAATGGGTTCAATGTGTACACTGCTCGGGTGATGGGTGCACCAAAATCTC ACAAATCACCACTAAATAACTTAACCATGTAATCAAATACCACCTATTCCCCAAAAAC CTGTGGAAATAATTTTTTTTTAAATGGAAGCATCCAAAATGTAATTTGTTTCCACATTC TTGTAAGCCTCATTATGTATCCCAGGGACAGTTAATATCGTCATACGAATTCACAGGT GAGGAAATGGAATCACAGAGAGATTATGTACTTTGCATAAGGAGAGCGAGGGTGAGG CAGGATTTGCAGTCTAGAAGCCTGGGTCTGGAGTTCTCCACTTTGCACTATATCATTTC TGTAAACTTCTTACTTAAGACTGTGTGGAAATGTAGAGTGAGACAGAACTAAAGCTCA CTATTCTTAGTCCACAGGGGAGTAGTGACTACCCAGGGCTTGGTAAGTGCTCAGTAAC GTTTGTTGAAAGATGAATCAATATTTCAATGCTGGGGCAAAGCAGTGAAAAACTGGG GAATGTCCAGGAACCAGCCATCAGGATAAGGCAGGACTAGAATGAATGCAACAGTCC TCACAGGTCCACCAAGTCAACAACAGAAAAATCCAAAGCTAAGGTGGCTCTTGTGTG ATCAAGGACCTCTTGTACACCGACCTGTTAGGCTGTGGCACAGTCAACATGGGAGTTG TAGACAAGCTACTTGAGAGTGGTTAATGGTAGCAGTCAGGCATTTGGAGCTGGAGGC AAGGCTGATTCTCCTCAACTAGTATCATATTGAGCGGGGACTTAAAGCCTCAGAAGTC TGAGCAGAAAAGCTGAGACCAGGCTCCTTGGGACAGGCTGTTCATATGCATGATTGAG TTTCAGTGATGAGTCCCAGAAGGAAAAAGTTTATGCATGTTTTCCTTAAAAATATATTC ACTTATATTTAGAGAATCCTTCAGATATCTAACCTAAATACGTCTGTAACATTTACTCT CATTCTTTTTATGACATTATTAGTATAATAATATGAATAATTCCCAGTGGACTTACTTC CACACTTCCTTCAAGGATTCTCCATTTTATTTCATAATTGAAGACTGTTAATAAATCAC TCTCTAGCTAAGAACAATTCAATGCTAAAACACTTAGCTTATCTGACCTTCACATTAAT TATTTTTATGACAGCAGCAGGAACTTTCAGCTGCTTTTCCCCCTTCCTTATGAAGCCAT GTGGTCCCAAGCAGACAGAGTTCCCTTGCTACACTTAAGGGTGGGCTTCTCAGACCTG AGCATATCTTAAAAGCTTTCCCTTGACTGTGCCAATCCAAACTCCAAGTTTCCTCAGCA GATTTAAGGGGTTTTAAATCTACTTGAGCATGAGTGTTATGAGAAGACTTTGAAATTC TTACAAAAACTGAAAGTGAAATGAGGAAGACAGATTGAGCAATCCAATCGGAGGGTA AATGCCAGCAAACCTACTGTACAGTAGGGGTAGAGATGCAGAAAGGCAGAAAGGAG AAAATTCAGGATAACTCTCCTGAGGGGTGAGCCAAGCCCTGCCATGTAGTGCACGCAG GACATCAACAAACACAGATAACAGGAAATGATCCATTCCCTGTGGTCACTTATTCTAA AGGCCCCAACCTTCAAAGTTCAAGTAGTGATATGGATGACTCCACAGAAAGGGAGCA GTCACGCCTTACTTCTTGCCTTAAGAAAAGAGAAGAAATGAAACTGAAGGAGTGTGTT TCCATCCTCCCACGGAAGGAAAGCCCCTCTGTCCGATCCTCCAAAGACGGAAAGCTGC TGGCTGCAACCTTGCTGCTGGCACTGCTGTCTTGCTGCCTCACGGTGGTGTCTTTCTAC CAGGTGGCCGCCCTGCAAGGGGACCTGGCCAGCCTCCGGGCAGAGCTGCAGGGCCAC CACGCGGAGAAGCTGCCAGCAGGAGCAGGAGCCCCCAAGGCCGGCCTGGAGGAAGCT

	CCAGCTGTCACCGCGGGACTGAAAGTGAGTTTGCAGCAGCTGCAAGACGCAGGCAAG ATCCTGCCTACACTGCTGCCTCTCCCTCGCCTCAGCTGTCTTTCTAATAACTTGAAGTTT TTCTGTTCATAGATCTTTGAACCACCAGCTCCAGGAGAAGGCAACTCCAGTCAGAACA GCAGAAATAAGCGTGCCGTTCAGGGTCCAGAAGAAACAGGTATGTTTTGGGCACAGA CACTTTTAGGAGTCAGGGATTAGAGAATAACATCCAGTCTGGGGGGAGCTGGAGGTGA GTATCCCCTCTATGAACCTATTAAATAGAGACTATGAAATTTGCCATCCAAAGCAGAC ATTGCTTTAGAGCAAAGCCCCAGCGCTGGCAAATGTAACAGGCTGCATGGGTGTGCTT TTTCCTCCAATGAGCAGATCGTGTGACTGGAAGCATTTCTCTGTGCGTGTGTAAGTATT TATCTGTGCATTAAGCATAGAGGAGATAAAAGGGCCATATGTGTTTCCTCAGGTAGAT AATGCCCTCCCATGTGAGAAGCATTATTCATCACTCCAGAAAAATAAAAAAAAGCATT ACATGTTAGAATTAGACTTTGCTTACTACCTGGGTCATAGAAAGTTAAAGACATCTGT TTTCTGAATGTACATTACATGTTGTGAAACCAGGTGAAGGTTGTAATGAAAGGCCCTG TATGTTGTACTTTAATTTTGTTTATTTGTTAAAAAGGTTATTTTACACACACACACACA CACACGCACAGACACACACACAGATTTTAAAGCTTCTCTTTAAGGTACGCTTTTCCAG GGGATCCATGCATTTATCGTCTTCTTATAATCGTCCTTTACTGATTTCTGACTTTCTTCA TGTTCTGCTCATTCCACGGAACTTTACAGAGTTGGTGGGGCCTACCAAAATGATCGAT TCTAGTTCTTTCATTTGAAGGTGAAAAAAAGAATCTTTGTATACATTTATTAAAGTTAT AATATAACAAATTCTTAATATTATTGTCCTTTTATTAAATATATTGAAAGAATATTTTT TGAGCACCTGGAACGTATCGTACAGCTATAGACCAGAATAGGCATTTTCAAACATACT ATTTCGTTTAACCTTCACAGTGACGCTATGAAGTCCACAGAATACATGCAATAATTTAT GTATATTTTCACTTCTGAAGAGAATTGCATAAGAAATGTAGTGAGAGATAGACCAGGG ACCCTTCTATCACACACACACACACACACACACACACACACACACACACACACACGC ATGAGGTACCCTGACTATAAACTTATTTTTTGACTATATGCTTTATTCATAAAAAATTG TTTCTTATTTTATAAAACCATAATTTTTGGTATCTGGTTATTGTATCTTTATACTAGTTA TCAGGAATAACTGGGCTTAAACATTTTTAAATTAGGAAACATGCACATTTTTATTATTT TAACACATCAATTATTTTTATCGTCTGCATTTTATAGTCTATATTTCCTACATAATTGAA AATAATACGGAATATATACTATAATATTTTTTGTTTTGACTTATACAATAAGGATTTTT CCTATTTCTAAGTATTTTTCATATATCTGTATTAATTTATCTAACAATTGTTTTAAATGG TTATTTCCATTCTCTTTGCTATAATACAACATGCAAAAGTTTTGCACAGAACTCTTTTA TTTCTGTGAAATTATATATTCAATATAAAATTCATATAGTGGAATATCTGAGCTAGGG AGAAGAAACATCTTCATCACCCTTGCTTCCGACTGCCATATTGTTTTCAAAATGAGTTA TACATGCAATCAAAAATGTGGTGTACCGGTTCTCCACATTCTTGCTTGCATGTTATTTT TAAAGTGTATTTTGACTAGTTTAGTAGTTGTAAAACAATATCTCACATTTATTTTGATG TGTTGCTTGTTTACTAATATGAATAAACTTTCTGCATATTTTGATTATTTATAATTTTAT CTTTTGCTAATTTTTATTTATAACTGTCTCCACTTGTCTGTCCCATGTTTTTATAATTTTG GATAAGCTCTTCCTAATTAGACATATTGATAATTGATCAAAATTTTGATGTAAATATTT TAACAGTTTTGCTTCTTTTTTTACTTGAACATTTTGCATTTCTCTATAGTAAAGTGATAA TCTTTAAAAAATTTTCCCTAATATTAAAGCTAAAAATACATTTGTTCATGTTTTCTTAA GTAGTTGACTCCCTGCCACTTTGACTTTTTCATAGTTGAGTGTTTTGTTTTAACTCATTA GTCCTTCTGTTGTTTATTTTGATGAATCATCTCACATTGGCTTTAACTTCCCCCTCTCTC TTTTTTCCTTTCTAACTGGTATCTCAACCAAATGTATTAAATAGTTCTTTTTAACTCCTT GGTGTTGAAAAGCTTACTGTGTTTTATTAAGTTCCTCATAAGAGTTGAATCTATTTGAG ACTCTTTTTTTTAATTGATTATTCTATTTATATGCTTTAAAGAATATTTTTAAGGTAATT TGTATTATAAGAGGCTTCAATAACTAGTAGGGTCAGGATCCTTCAATCTCCTTAACCTT CACTGCTAATATCCCCGTTTCTAAATATTAGTTTTAAAAATAAACTTTAACTTTACAAT TAAAAAAAAAGATGTAGACTCATTTCAGCAGATTTAAGAAGAAAAGAATAATAGAGT AGGAAAGAAATAACTTCTTGGGTCACATTTTCCCAAAATTCTCCTATTAATACTTTTAT GTATTTGTGTTTTAATGGCATCCAGGAATAGTATACTGATGAGAATCTTTCACCAAATA ATTTGCAATTTGTAGATTCTAACAAAGTGAAAAAAAATTTGCCCAGATTTCCACAGCC CAGAAGTAGCTACTATTATTATTTCATGGTTTGCCCTAGACTTTTTAATAAACCTTAAT ACAGTGTGCATATAGGTATATATTGCACACAGTTGAGCCTTGAACAACACAAGTTTTA ACAGCATGGATACACTTACAGGTGGATTTTTTTTTTCAATAAACCTATTGGAAAATTAT CTGTAGATTTGTGATAATTTGAAAAAACTCATGGAAGAACTGTGTATCTTTGAAATGT TGAAAATATTAAGATTAATTAGCCATGTCATGAATGTATAAAATATATGTAGATACTG GTCTATTTTCTTATTACTATCATAAAATATACACAAAAGTTAAAAATTCTCAAAACATA TGCATACAAACAGACTGTACATAGCGCCCTTTGTAGTCTAGAGAAATGGAAACAAAC ATAAACATGCAGTATTAAGTCATCACTGCATAAAATTAACTGTGGTACATACTGTACT ACTGTAATAATTTCATAGCCACCTCCTGTTGCTACTGCAGTGAGCTCAAGTGCTGTGAG TATCTGCTTAAAACACCATGTGATGCTAATCATCTCTGCATGAGCCAGTTGTATCTCCA ATCAGTTGGATATTGCAGTAAAAATGATTTCTCATGATTTGTGTGTATTTTTCTTCTTGT GTAATGCAATATCATAAACCTTGAATAACACCATGAGACCTATAGAAAATGCGATAGT GATGCTGGAAATGCTCCCAGGAAGCAAAGAAGAGTCATGACATTATAGTTGACCCTTG

	AACAACACAGGTTTGAACCGCGAGGGTCCCCTTGTATGTGGATTTTCTTCCACTTTCCA CCCTTGAGATAGCAAGACCAACGCCTCCTTTCCCTCCTCCCCCTTAGCTTACTCAATGT GAAGAATGAAGAACTCTATAATGATCCACTTCCACTTAATGAATAGTAAATGCATTTT CTCTTCCTTATGATTTTTTAAAATAACATTTTCTTTTCTCTAGCTTATTTTATTGTAAGA ATACACTACATAATACATATAATTTATGAAATGCGTATTGATTGAGTTTTTGTTATCAG AAAGGCTTCTGGTCAACAGTGGGCTGTTAGTAATTAAGATTTGGGAGTCAAAAGTTAA GCACAAAGTTTTGACTGCATGGGGTCAGTGACCCTAATTCCTGTGTTGTTCAAGGATC AACTGTATTTGTTCATATACATATGAACAATACATATGAACAATACATATATGAACAA ATACATATATTTATACAAATATATGTACAAATATATACACATACAAATATATATATAT ATACATATATATACATACATAGTGTGCATATGTGTTATGTGTATATATTCAAATAGGAC ATAGTATACACACTCATAACTTTCACAAATCCAAGGTGGAAGATTTGAAGATAAGAAT CTTAATGACATCATGTCTACTATTCCTTGTTAATAAAATTAGGAAATTCATTTGAATGT TGTTCTAGATACTATTCTTTGGTGGAGGGAAAGTTTATTTTATTTAGCATACTCCAAAA TTAATGTTTATATTCCCAAAAAAGTTGTCTGTAACACAAGGACGTTTTTTAGTAGGAAT TTTTTGGCATTGAGAAAATTCTATGCAGCTTTCTTTGATTTTTGTTTTCATTCAAGTTCT GATTTATTTTCAGTAAGACTCAAAACCTTAAGTTGTCCTTTTTACTTTTAAAGTGTTTAT TTATGTTCATATTTATTAATTGTCTACATGTTTTAGAACCAAGTATTTTTATTGGAACTT CACACAAACTGTAGAAGAAGGGAGGGGAATTACCATCAGCCAACATGTCCCAATGAT ACTCTCTTCCAGGCATCCCATGGGTAAACAGTGGTTTTACTTAATGTTTTAATTTTAGA ATTTAGTACTTTGGCTTTAGTTTTGTTTTTCTTAATTACTTTGTGTTTCAAACCAAAATC TCATTAAGCTTAATGTATTTCATAATATCATTTTTGATTGTAGTATAATAAACAGAAAT GTGGGGAAATCCAGGATTAAAAAATTGCCAAATAGCTCATATTAGCCAAAAATTCACT TTTAAGCCCGTAACTGTGTTTGGAGATATTCCCAATTTAAAAATTAACTAAAACAATA TGGCTTTGAAAATATTACGTAATAAAATTTATTTACAAATGGAATCATGAAGATCCAC ATTTTGAACATCACTTAACTATAATTTTATTAATTTTAAGAACCTAAAGATGAATGTCT TTAGAGTCTATCAAGAAAGTGAATTCTTTCAAATGGGTATCACTGACCTAAAAAGGTT CATTGTTAAAATTAGGTAACCATTGTATTTTCTTTCCTGTTAATTAATAACTATTAGAA ATTTATGTGTTTTAGGATACAGAAAGACAAAATTATTTTTATTGATAATGTTTATTATA ATTGTCTCAATTTTAATAATAAAATAATAGTAAAAATATGGACAATTCAAAGTAATGT AAAGCAAGAATAGAAAAAATTGTCCGTATTTCACCTTCCAAATAATTATCATGAGATT TTTGGTCAATCTACTTTAAGGTATATTTTTCTTCATTTTTAAGTGAGCTTGGGATTGTTT AAGAATTACACACAGCTTGCAAAGAATACAGTGTGTTGGCATGTACCCCTATCCAGCT TCCCTAATACTAACATCTTATATGAACATGGTATTTCATTACAAAAAGGAAACCAACA TTAAGACTTAACTATTAGCTAAATTCTAGACTTAATTTGAATTTCACGAGTTTTTCTAC TAATGATTTTATGTTTTAGGATCCATCAGGATATCACATTGTATTTAACATTTTTTAAA TTAAAATTTTGAATGTAGCATATATAAACACCAAATATTATACCTTAAGTTTTCTATCG GATAAACCTTTCTAATTGCTAAAAGTGAAGATATCAATACTATTTTTGAGTCTTCTTTT TTGAAATCCAAAGTCCAACTCCTTTGCAAGGAAAGATGAGATGTTTGACAAGTCTGTA ATGTCCAGTCTTTGCCCGGTTGGCATTTCTGGCTTAGCTGTGAGTTCCAGGCTGTAACA TGAGTGTTGGAAGCGTGCAATGTAGAACTTGACCATCCAGCCCTTATCAAAATTAGGC TGACTTGAGCCTCTTACCCAGCAAGGGTGTGTTCCTTCGTGGAACAGAACCAGCTGGC TGCTGCTTAGGCGATCTTTGACCAGAGCTTTCCCTGAGAGTTATTTTTTCTTTCCCCCTG CTTCAATAGTGAGACTTTTCTTCAGTGTTGCAAGAACTGGCTTCTGTTCAACTTCTGGA AAAGCATTTAAAATTGAAAACGTTGACCTTCCAACCAAATCTTTGACCTGTTCTTGTTA AGCTTGAGATTTTGGGAAACGGAAGAGCTAGGAAACAAATCAGTCAACACAGCCAAA TGTGATATTGTGTCTCTTTTACACAATCTTACATTATCGTGAGTTGAAGAGAAACAGAA AAATGATAGTACATATAGTTAATTAGCAAATTAAAATACAAAAAAATGGTAAATATGT TGAAAAAGTGAAAAGGTTAGGGCAGGTGAATGAGTATCAGGAATGTGAAGGGTGAGG AAGGGAAAGAAATGCGTTTTCATTTTGAATGGAGAGGCCAGGTTCATTAAGCCTTTTT ATCTTTTCTTGAAAGCTCAATAATTCTTTATACTTTTGACTATTTTTTTTAACATTGCAG ACATGGGTAGGTGATTTTTAAAATAAATTCAAAATGTTTATACCTGTGTTGTTTTTATT AGTAATTCCATATGAATGGAAAATGTTAGTTTTAATGCTTATTCTTTTTATAGATCAAC TCCTACTTAAAAGAACTGCATTGAGCAGCTGCATTTTTGTTGTGGTGATATTTTTTTTTT AAAAGACATTCCCATTTCTGAAGAGTTAGAGAAACAGAAGGTTTCTCTTCAAATAGAT TTATCACCCACTGTTTCTGCAAATATCTGAGGTAGGCACTCCATAATATACAGAGAAG AGGACAGCGAAGCTAACAATTATCAGGCGTGTTTCATGTGCAAACACTGTGTTGGGCT CTGGGAATGTATATCATTTACTTTCTCAACAACTCTGTTAGTTGGGCATTATTGTTTTC ATTTTAGATGAGAAAGCTGCAACCCAGAGAATCAATTGCCTCTCTCAGCAAGCTAATT ATTTAATAGTTGGAGAAGTTAAGCCAAATTGATGCAAAATTTAAAAGAACAATAAAA TAGACAAGTTATTTACAATTCATAAAACACATCTAAATGATGACTTCAATCTATTTTCG CAGCAGTATGAAATGGATATTGCTATTCCCATTGTTACAGGACCCAACACTCACCCAA AGTTAACCTTTGGGTCGGGGGTTTCTGTACTATATTCCCTTCTGTGGTCGCCAGAGAAA

	TGTTACAGGAAAGGAGTCCCGATCCAGACCCCCGGAGAGGGTTCTTGGATCTGACGCC AGAAAAAATTCGGGGCGAATCCACAGGGTAAAGTGAAAGCAAGTTTATTAGGAAAGT AAAGGAGTAAAAGAATGCCGAAACCATAGACAGAGCAGCCCTCAGGGCTGCTAGTTG CCCATTTTTATGGCTATTTCTTGATGATATGCTAAACAAGGGGTGGATTATTCATGCCT CCCCTTTTTAGACCATATAGTGTAACTTCCTGACATTGCCATGGCATCATGACGCTGGC GGGAGTGTAGCAGTGAGAACCACCAGAGGTCACTCCTCGCCATCTTGGTTTTGGTGGG TTTTGGCTGGCTTCTTTACTGCAGTCTGTTTTGTCAGCAACGCCTTTGTGACCTGTATTT TGTGCTGATCTCCTATCCCATCCTGTGACTTAGAATGCCTTAACCATCTGGGAATACAG CCCAGTAGGTCTCAGTTATTTTACCCAGCTCCTATCCAAGATGGAGGTTCTCTGGTTCA CCTGCCTCTGACATCATTATACAGATTTAAAATGCTTCAAAATTAAGTGTCAAACTCAT GGTTTGACAACTAATTGATAGGAGAGGTAAGGTTTGAATTCATTATCTATTGATTATA AATTCTGATTTTTTTCAATGATAATGGCTGTACATGCTTAATTTTCAAGTGTGCCACCA GATTTGAGAAAAAATATTGGGTCTGACAAGGCCCAGGGTATTACGATTAATGCCAGTG AGAGAGACATCAAGTTAAGGAATCAGAGAATGTTGTTAGTGGTAGAGATCACAGACT GCGAGATTATCTAGACAGTGGTCAAGAGAGCTGAAGTGGGTTTGAAGATGGAGCAGA CTTGGGTAAGAGGACAGAATAACTGAGGTTATGAGGACAAGGTAGAAATAGGAAACA GAAATAATTCAAGAAAAGGCCTTGTTTTAGTAGGCATAGAGGCTTATCCCATACAAAC ATCTTTATATTATCCCTTTCCTCTTCTAAATTTGTAAATTTTTGCAAGTGCTGATCTGTT GAAGTGTTTTTGCAAATGCAAGCTTTCTTCCTACCCCCTCCTCTCCTCCTCCTCCCCTTC TCTTCCTCCTCCTCCCCTTCTCTTCCTCCTCCTCCCTTTCCTCCTCCTCCACTTCTCTTTC TCCTCCTCCTCTCCTCCTCTCCTCCTTTCCTCCTCCTCTTCCTCCTCCTCCCCTTCTCTTC CTCCTCCTCCTCCTTCTGATCAGGTTATTTGAGACAGGGAAGGGTAAGAGAAAAGGGA ATAACTGCGCTGTGACAGCTCCTGACAGCAGCTATGAAGTCTCACTTTCAGGCCTTTTT CTCTTCTATCTGCCCCACTGGAGCCTCTGGAAATTACAAAATAAGACATTTTAGGAAA ATGGTGCACAACTACTTACTTTAAAAATATTATAGAGTGCTACACTTCTGTGGATAGA GATTCAAAAATGTATTATTAAGGTTTTCTCTTGAGGAAAATGTTTCCTATATAACTGAG GGTTCAAAGCCTATTATGAGAGAGTCCACAATTCATGGAAATTGTTTTGTTTTATGGA ACCCCTTTTCCCTCAAGCAATGACTTGATTTAACACATTTCATAAAGCTGGATTTAGTG ACTGGTTTTTAAGAATTGTTTGGAAAAGTTGAGTGCTATTTTTTATGTAAATTGTTTCA TATATTATTCCACGGATTTTTTTTTAAGTCTGCTGTAAATCAGACACTGAAAATTTGTG AATGGTTGTCCTTAATATCAAGTGATTCACAATCTAGGGAGAGAAACAGTTACAGAAA CAATTGCGTGTATAGTAACATGTATTTCAATAGATGATATGCAAAGTATAGTGGGATC AAATATTTTGCTAGAAGTATTGTAGAAAAAGTTTGTATTTGATTTCAGTACTGAAGGA TGAATGGAGTTCCACTGGATAGAAGGTAAAGTATATTTAGTAGGAGGGAACAGCAGA CATACAGTCATGGAAGCATGGAAGATGACCTCTCATTCTGAGATGTGTTTAAGTACAA CTGGGTTTGGGTGGGTGACACGCATGAGACTGTGAATGTTGGCTGGGCCGGGGCATGG AGGAACTGTTTTGTATTCCAGGGAGATGCAGTGAGTGAATTGTAAGCATTAGAATGAG AAGAACAAATTTGCACTTAGAAAGATAATTCAGGAGGAAATGCAAATGATGGGCTAG GAATTGTGAAAAAGAGGCACAACTTGGTAGGCTAATGGAATTGTCAAGAATGGTGAG GTAGGGATTCGAATTTAGGCTGCTATGCTCCTCATCTTCCTTCCTCTCTCTCTGTGTCCC TCCCAACATCACCCTCTGCATAGATTCATGAGCTGTTAATTTTGTCCGTGATGCTCCTA TTGCTCCTCTTTTTTTCTGATTTTAGTTGAAGTGTCACCTCCCAGAGAAGCCTTCCTGAT TGGATCAAATGCCCGGCCCGGGCACCAAGAATTAAAGTTGAAACTTTAATTCTGTCCG TGTGATGTTGAGTAATACCCATTTCTTCCACTGGATTGTAAACTCCCTGGGGGCAGGG ATGGCGTCTGCTTTTTTTTTTTTTTTTTTGCTGTTCTTAGCACAACACCTGACGTAGATT AAGTCCTTAGTAAATTTGTTAAAATGAAATGAATGAGAGATGGAATCTAAATTGAAAA AAAGTTAAAAATTTAAACCATTCGAACTTGATTATTAGTTGAACTCCAAGATTGAGAA GGCAGAAATCAGGAATGTTTATAAAGTTTGTAGCTTGGGCAACTCAGAGGATAGTTAT ATATCCACTCAGAGAGAAAATAAGTATGCATGAGAAAGATAAAGCATTATATTTGAG ACATGTTGAATCTGAAGTATCACTAAGGCATCCAAATGGAAAGGTCCAAGGGGAAAG TGAAGATTTAATTGCTGATTGGGGAATTCATTAGTAACTTCATACATTCAACTGTTTTT CTATTTTTGGCTTTATCTTCCTTGACATCAGGTTGGTTTACACGTGATATTGTGAAGCT ACTGTTCTTCACTGGCAAGCTCCTGATATTCAGTGCGTTCCAAGAATATATTATTAATA AATTGAAATATTCTAACATAATTCAGTGAAGTCATGGAGAAACACAGATGATGATTCA AGTATAAAATTATCAATTTAAAATTAAAATATTAGATGAATAGTAAACTGAAGCAACA TTAAGTCATGATAATGCTTTTTTTTTTTTTACTCTTAGTGCCTATGAGGCAATACAAAA GGCTTGCAATTTTACATCTCCTATATTGCTTTAAGCACAAAACATAGTTAAAATATGAG TGGATATGTGACAATGATCAATTAGTGCTTAAGATTCTGTCTATACAAACACACACAC ACGCAAGTTACAGAAAATTATCATTTGAGGCCGGGCGTGGTACCTCGGCCTCTAATGC CGAGGTATTTAGAGGTATTAGAGGTATTAGAGGTAATTAGAGGTAGCTCACACCTCTA ATGCCAGCACTTCAGGAGGCTGAGGTAGGTGGATCACCTGAGGTCAGGAGTTCGAGA CCAGCCTGACCAACACAGAGAAACCCTGTCTCTACTAAAAATACAAAATTAGCCAGGT

	GTGGTGGCACATGCCTGTAATCCCAGCTACTCAGAAGGCTGGGAGAATCATGTGAACC TGGGAGGCCGAGTTTGCAATGAGCCAAGATTGTGCCATTGCACTCCAGCCTGGGCAAT AAGAGTAGAACTCTGTCTCAAAAAAAAAGAAAAAGAAAGAAAAGAAAATTATCATTT GAAGTATTTGTCATCATTCCATCAGCTGTGGTTTTTTCTATTCTATCAACTCCTTTCCAA CACCCGCTTCCAAAAAATACCCAGCACCCCTTTCTTACTTTCTCAGGAACACTATAGTG CTATTATCTTTCTGAATTCTCCAAAATTAAAAACTATTGGTCACGACTTCAATTTTTCTT CACAATGTATCTTAGATGCTGCATTTACATAACTGCATTTGAGACCAAACCATCCTCAC CCTATGTCTTTTCCCAGTAGATCACTGAGACCTTTGCTGCCACCCTCCCTTTACAGGAG CTCGCTTCACACACAGACAGGAACATGATTTTCCTCAAGTACAAGGTCTGTCAGGCAG ACCCCTCCCAAGATTGAGAACTCTACTTATAAGAATTTCTAGTAGGCCAATATGTACTT CTCGATCTAGTTTTCTCAAAATTCAAAGTTCTCGACTTTTATTACTTTTTTAAGTAAGCA ACCAAAGCAAACTGCTTATCGTTGGTCAACCTTATAAACTAGCTTCCCTCCTCTAAATT CATGTGTTTTAATTTCAGTGAAAATGTTAATTCAATACCATGCTTTCCCCATTTTCTTCA TAAGTCTTTGTCAAATATTAGGTCAATATTGAGATCTTTAAGTGTTTTTTTTTTCTAGTT AACATTTTTCTGCCACTGATTATTTATTCAAAGCTAGTTCAAGAAAAATTAAACAGCTA CATTTGTCATAACTTACGTTTACCAAATGATAAGTTTTGCAGAAATGAAAGTGAGGCA TTGCCGTCCAAGATCCTCCTTCTTTAAAAACATATGGTGCAATAAATAAGATGACAGG AAAAAAACCACACAAAGAGATAAGGGAAGATGCAGGACTTACATCTCATCTGGAGGA GGCTTCTTGAATGAGATGAGTGAGAAGCACTATGAAGAATCTGTGGGTGCAGGTGAT ATGGATGGGATAATCGTAATGGGAATGCTCTGTGTGTAATGTTTTTCATGGGAGACAC ATATAATCTGCAGTAATTGCGTTATTTATGGTAGTTCATATTAGATTTAGCTTTGTTGA AATAATGAATAATAAACCAGTTTCAAGTTTTAATGGATTCAGTTCCAGTACAGAAAAT AGTATAACAGATATTACCAATTCTCTAAACTTTCAAATCACTTTTTCTGATTAAATGGT ATTTAGACATTATACTTCAAAAGGTGGCCTTTCAAACTGTAAAAATGTTTCCCATATGG TTAGTATTTAAATTACACTCTAATTGTGAAGTATTGAATTTTATTGTGTTAAATATTGA TCAATAGCAAATTATTTTTGTCCTTAAATTCTTATTTTGGTAATTTTATTTTGTAAACAT TTTGTGATCATTATAATATTTTGTTTTTAGAAATGTTTTATGTGAAGTTTATTATGATGA GTAAATTCTCTTATGCTGTAAAACGGCATTTTATAAGATTATGTATTTTACACATTATT ACATCATAATCCCCAGAAATGTATATTCAGAAATGTGTCTCCATAGGCTCGGAAGGGT TTTAATGTATATTATTGCCTTGCTTAGTTAAAAGAAAAAACAATAACAAACATAAAAA AAACTATTCTTAACCTCTTGTGTAATTCCTTTCAATTGTAGTAGAGGGAGAGATGTGTG AAAGGCATTTGAGAACCAAACAATAATCAATTAATATGATAATTACTATCAAATTGTG TTTCTTATATTAAACTACGCATTTTCAAAACTCTTGTGGTTAGATATCTGTGTTACTGG AAGATATTAAAAATAATATTGCCATTTTTGCTCCTCTCTTTGTGAGGCAAATCTCTAGC TGAGCACTAATCTCCAGCCTAAGACCAGATCTATGTTGAATGAGAAAGAAAGTCTTAA AAGGCTGAATAGGAGATAAGTTGAAATAGCTGAAATAGTTGAAATTCGATAATAGCT ATCAAATTTCCTAAAGCGAATTGCCTTGGAAAAGTCGAGTAACTTTGTCTGGAACAAG GACAATTATTCATTCTGCATCCCTAGGCAATTTCACCATTGTGCAAACATCAGAGCAT ACTTACACAACTTCAGTGGCTGTAATTTAAACCTCATTATTGAAACATCAATTTTATAT CTTATTTTCTCTTCTGAAGAACAGTTCTTGAAAGAAACTTTTCTCTTTAAAGCACATTTT CTGCTAAATGTTAGATTTCTGCTACTACATGAGAGAATAGACCACTGTTTTTCAATGTG TAGGTTGTGACTAAGTTTTAATTGGGCTGTGGAGACTAAAAAGGAGACATATTCATGG TGTCAAGTCATTACTTATTAGGTAAACTTCTCTCTGACTACATAGAACATCTAAATCTG CCTTAGTTCATTCAAGGCTGTTATAACAAAATACCATAGACTGAGTGGCTTGTAAACA ACAGAGACTTATTTCTCCCAGTTCAGGGGGCCGGAAGTCCAAGACCAAGATGCCTAAA GATTTCGGTATCTGATGAGGACTTGCTTCCTGGCTTGTAGATGATGCCTCCTCACTGGG TTCTCACGTGGGGAAAATAGGGCAAGCTAGCCCTTTGGGATCTCTTTTATAAGGATAC TAATTCCATTCATGAGTGCTCTGCCCTCATGGCATAATCACCTCCCCAAAGTCTTCCTA ATAGCATCACCTCAGCAGTTAGGTTTCAACATAGGAATTTGGGGGCAACACAGACATT CAGACCATAGCCGTCTCCTACTGAAGTTTTTGGGAAACAGAGAAAGGGTGACTTGAAA TAGGAAGTCATGGCCGGGCGCAGTGGCTCACGTCTGTAATCCCAGCACTTTGGGAGGC GAGGTGGGCGGTTCACGAGGTCAGGAGATCGAGACCATCCTGGCTAACACGATGAAA GCCCGTCTCTATTAAAAATACAAAGAATTAGCCAGGCATGGTGGCGGGCACCTGTAGT CCCAGCTACTCGGGAGGCTGAGGCAGGAGAATGGCGTGAGCGCGGGAGGCGGAGCTT GCAGTGAGCTGAGATCGCGCCACTGCACTCCAGCCTGGGCGACAGAGCGAGACTCCG TCTCAAAAAATAAATAAATAAATAAATAAATGAATAAATAAACAAACAAACAAACAA ACAAACAATAAAAAAAGACAAAAGAAATAGGAAGTCATACATTCTGTATTTCTTTAG CCTTTATCAGCTGCAGTTGGGCAGCATGTTTCCACGGTGTCCTTCCATGATGTTTTCTA AGTTATTTGCCTTGATATTATTAAGAACAATAATGCTAACACCACTACTGATACAAAT AGTCAAGATTTATTTATTTTGCAGGTGTTATGCACTGAGTATAGCGCAAAGTGCTTCCC ATGCATTGTGTCATTTACTCTTTACAATATACGTATAACAAAGGAAAGATGCAAAGTT TAAAAATCTGACTTTGACGTTCATCAACATCCTCCCTTGTTTTTGATGTGGAGGAAAGA

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	CCATTTGTCTACATTATCTAATTTGTTGGAGTACAATTATTATAAATAATAAAAAGGTA
	TAGACATTTTATTTCCAATGGGCCATTAATAATACCTCCATTTTCTTTAATGATTTTATT
	AATTGGAGTATTTTCTCTTTTATTGGTCAATGTAGCTCAATGATTGTCATTTTTGTTCAT
	ATTTTTCAAAAAACCAGTTTTCAGTGTTATTGTTTCGTCTTTTTCTGTTCTTTTTTTGAG
	ATGGAGTCTCCGTCACCCAGCCTGGAGTGCAATGGTGCGATCTCGGCTCACTGCAACC
	TTTGCCTCCCAGGTTCAGGCGATTCTCCTGCCTCAGCCTCCCAAGTAGCTGGGACTACA
	GGCATGTGCCACCAAGCCTAGCTATTTTTATTTATTTATTTATTTTTTGTATTTTTAGTA
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	ACCCGCCTTGGCCTCTCAAAATGCTGGGATTGCATGTGAGCCACCGCACCCAGTCCTT
	TTTGTACTCTTTATTCCATCTACCTTCTTTATTATTACCTTCTTTATTATATTATCTGATC
	TTTATTATTTTCTTCCTTCTGTCAATTTTGGGCTTAGTTTCTTCTTCTATTTCTATTTCCT
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	ACATTTCTTTCTGAGTGCTACTTTCACTGCTTCCTATGAATATTGCTATGCTGTGTTTTT ATTTTCAATCATCTCAAAGTATTTTCTATTTTCTTCTAGGATTTATTTATAGATCAATTT GTTGTTTAAGAATTTGTTCAATTTTCACTTATTTGTGAGTTTTCCAATTTTCCTTATGTT ATTGAAGGTAGCTAAAATGAATGCTTAATAGAGAGCCATTTCAGATTGAAAAACATA AACAGGTTTCAAGGTCAAAGGATGAAAAACATATCTTTTTAAAATACAAGATATTTGT GGAATTCAAATATTTTAAAATTTAATGAGAATTATTTTGTTGCATAACATGGTCTATCT TGGTCGATGTTCATGTGCATTTGAAAATATGTGTTCTGCTGATTTTAGGTGGAGTGTTT TCTATGTGTCTGTTAGGTTCAGTTAGTTTACAGTGTTGTTCAAGTTCACTATTGCCTTAT TGATCTCTTACCTAGATGGTCTAGCTATTATTTCAGGTGAGATACTGAAATCTTCAGCT GTTACTATAGAAATGTCTATTTCTCCTTTCGGTTCAGCCAATATCTGCTTATATCTTGA GGTTCTGTTGAGTGATGTTTATAATTATTAGGTATTCTTGATACATTGACTCTGTTATC AATATTTAATACTCTCTTTGTTTCATAAAAATTTTTGGCTTAACATGTATTTATTCTGAT ATCAGTATTAGCCATCCCTGTTATCTTTGGCTGCTATTTGCAAGGAGGCATATTTGTCA TCCTTTAATCTTGAAACCTTGAAACACAAAAACCTGTTTGTGTTTTTGAATCTGAAGTG AGTCTCTGGTAGGCAGAATATAATTAGATCATGAGTTTGGGCTTTTAAAAAAATTATT TTACCAATCTCTGTATTTTAATTGCCAAATTTAAATTTAGCTCATTTATATTTAAAGTG ATTACTGATAAGGAAAGAATTACTTATGTTGCTGTTTGTTCTTTTATAAGTTTTGTTCCT CAATTCCTTTATTACCTCTTTATTTTGTTTTTAATAGACTTTTATAAGTACATCATTTTG TTTTTCTCTTAATTTCTTTTTGTGCATTTTTAAAAGTCATTATCATAGTTGTTATTCTGGT GATCACAATAAACATCCTAAATTTATAACAATGTGGTTTGAATTGATAACAACTTAGC TTCTCTCTTATGTTGTTATTGTCACAAAATATACGCTTATACATTGTAAGCCCTTAACA TAAATTAATAATTATTATTTTATGTATTTGCCTTTTAAATAGTATAGGAAACAAAAGGA GAAGTTAAAAACTAAAAATACACTTACAATGGCTTTTATATTTGCCTATGTATGTACCT TTACTTGTATTCTTTATTTCTTCATATGTCTTTCAATTCTCACTTAGTGCTTTTTGTTTTA TTTCTATCTCCTTTAGCATTTCTCACAGGGTAAGTCTGCTACCAATGAACTCTCTCAGT TTTTCTTTATTTGAGAACATCTTAATTTTTCTTCACATTTTAAGGATATTTTCCCACATA TAGAATACATGGTAGACAGTGTTTTTCATTCAGTACTTTAAATATGTAATTCCCCTGGC TTCTGGCCTCCATGGTTTTTGATGACAAATCAGCTATTAATCTTATTCAGCATATTTTAT ATTTGATGAATTGCCTCTCTTTCTGCTTTCAAGATCTCCTCCTTGTCATTATCTTTTAAT AGCTTGATTTTAAGAAGTCTTGGTAGGAATCTTTTGTGTTTACCCTTCTTGGAGTTTAC TGAATTTTCTTAGATGTGTACATTCATGACTTTCTTCAGCGTTGGAAAGAGTTTGGCCA TTATTTCTCCAAATATTCTTTTTTCAAATTTTCTCTCTCTTCTCCTTCTGTAACTCTCATA ATGCCTATGTTCATCTGCTTAATGTATCCTGGGGGTCTCTTATAATCTGTTCACTTTTCT TTTTTCTTTTTTATTTTAACTTTATTTTTAGAGCCATTTTAGATTCACAGAAAAATTGAA AGGAAGGTACAGAGATATCTCATAGACCTCATATTCCCTACGGATGCATATCCTCCCC CATTATCAAAATCCCCCACCAGAGTGATACATTTGTTACAACTGATAAACCTACACTA ATATATCATTATCATCCAGAGTCCACAGTTTACATTAGGGTTCACCTTAATGTTTTACT TTCTATAGGTTAGCACAAATGCATAATGGCATGTATCCACCATTGTAGTATTAGAGTA TTTTCACTGTCCTAAAAATTCTCTGTGCTTCACTCCAACTACCTTTCCCTTTCCACTGCT TATCCCCTGGAAATGGCATTTTTTAAATGTCTCTGTAGTTTTAACTTTGTTCCAGAGTG CCATGTTGTTGGAATTGCACAGTATGTAACATTTTTATTTTCACTTCTTTTTTTTAGTAA TAGCAATTTAAGTTTCCTTCATGATATATCAGTGTAGGTTTATCAATTGTAATAAATGT ATCACTCTGGTGGGGGATTTTGATAATGGGAGAGTATCTGTAGGGAGTATGAGGTCTA TGAGATATCACTGTACCTTCCTCTCAGTTTTTCTGTGAATCTAAAATGGCTCTAAAAAT GAAGTTAAAAAAGAATAACGAAAAGTGAACAGATTATAAGAGACCCCCCAGGATACA TTAAACTGATGAACATATGCATTATGAGAGTCACAGAAGGAGAAGAGAGTTAAAATC TGAATAAATAATATTTGGAGAAATAATGGCCAAACTCTTTCCAATGTTGAAGAAAGTC ATAAATTTACATATCTAAAAAGTTCAGTAAACTTCAAGGAGGGTAAAGACAAAAAGA TTCCAAATCTTATTAAAATCAATTATAGTAAGTCTTGAAGTAGAGTAGTGTTAGTTCTC CCATTTTGTTCTTATCCTTTAATATTATGTTGGCATTTCTGTGTCTTTTGCTTCTCTATAT ATTCTTTAGACTCAGTTTGTTGATATTCAACTTGCTTTGATTTTGATTAAGATTGCATTG AGTCACCTGGGCACGGTAGCTCATGCCTGTAATCCCAGCACTTTGGGAGGCCAAGGCA GGATCACAAGGTCGGGAGTTTGAGACCAGCCTGGCCAATATGGTGAAACCCCTCTCTA CTAAAAATACAAAACTTAGCCCGGCGTAGTGGCACTTGCCTGTAGTCGCAGCTACTCG GGAGGCTGAGGCAGGAGAATCACTCGAACCCCAGAGGCAGAGGTTGCAGTAAGCCAA GATGGCACCCCTGTCTCCAGCCTGGGCGACAGAGCAAGACTTGGGAAAAACAAACAA ACAAACAAACAAAAAACAAACAAACAAACAAAACATTGCATTGAATCTACAGGAAG AACTGACATCTTGACAATATTGAGTCTTCCTATTCATAAACATGGAATAGCTCTCCATT TATTTAGTTCTTTAAATCTTTTACATATTTTGTTGGATTATTCCTCAGTATTTCATTTTTT GAGGTAATAATCTCAATGCCATTATGTTTTTAATTTCAAATTCCACTTGTTTATTACTG GTAGAAAAGTGTTAGATCACTGGTAGAAAAGTGATTCGCTATTGAGTATTAATCTTGT AATAATGACTTTATTCTTTTGGTCCGCTGAGTAGTTCATAATTTTCTCTTTCTTTGTATG

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	GAAATAGCCGAAATATAGACCAATAAAGGGAAAACCCAGACATTCATATAAAGGGTT AGCTCTCAGGTTCTTGTATCTGATATATTAACCCAGGTTAACATATAAGTGATGGCAA AGAATCCAGTGCAGTAATGTGACTTGTATTCCTTTTTCCTTTTTTTTCTTTCTTTCTTTCT TTTTTTTTTAGGATGGAATTATCTTCTAAGTTTCAGAGGTAGCTTAACAACTAAATGGA GGTGAAAACTGCTTTTCTTGGTTTCTTTCCTTATAAATGATTCTCTTCATTGCAGGATCT TACACATTTGTTCCATGGCTTCTCAGCTTTAAAAGGGGAAGTGCCCTAGAAGAAAAAG AGAATAAAATATTGGTCAAAGAAACTGGTTACTTTTTTATATATGGTCAGGTAGGTTG AAACCCTAATTCTGGTTTTACTGTTCAAAGCCTCCCATTTTGTGTTCATTTCTGACACA GTTTTTTGGTTTGTTTCTTAGGTTTTATATACTGATAAGACCTACGCCATGGGACATCT AATTCAGAGGAAGAAGGTCCATGTCTTTGGGGATGAATTGAGTCTGGTGACTTTGTTT CGATGTATTCAAAATATGCCTGAAACACTACCCAATAATTCCTGCTATTCAGCTGGTA AATATTAGTTCTCACACCCTGCTAATTGTGAAATGAAGAGACTTTGACGAAAAATCTG AGCTGCAAAATGCAAAAATGAAAGGATGGTGCCCTAAAATACAAATAGACAGAAAGA CATTCCTCAATATATTGTGTTTTTTAAATCTTGAATAATAAGCTAGTCTGTTTTAATTGA GAAAGATGGAATTATTACTAATAGTTTTACCATTTTTATATACATTTAGAAAGGGTAGT AATTTCATAGCAACTTCTACCTTGTACATAATACATGGTACATAGTACTTCTACATAGT AACTTCTACATTGAGAAAAAATTCTAATGTATTTTCTTCAACACTTAATAACAACAATA ATAATATCTGACAAGGATAGAGTGATTACCACTTGCCAGGCACTCTTTTCTGCATGTTA TATATGCTTGCTTATTTAATCTTCGCATTTAAGGGAGTTAGGATCTAGGCACAGAGAA GTAACATAACTTGTCCCAGGTTACACAGCTAATTTTTAGACTTGGTTTAAACCAGCCA GTCTGGCTCCGCACCGGGAGCAACCAAAACTCTTCTTGCATGCTGTGGAAGAAATGCC CCTGGCCAGGCTTGAGGGTAAGGGAAAGTTGTACAATGGCTTCTTTCTAAATACAGGT GACATCTTGTGTCAGTGGACACCAGACAGGAGAAATGCCCCTGGCCAGGTTTGAGGGT AAGGGAAAGTTGTACAATGGCTTCTTTCTAAATAGCCACAAGTATTGACAATTCAGAT GACATCTTGTGTCAGTGGACACCAGACAGGTGACTTAGGAATGCGAAAGTGTAGGCG CAAACCTACCTTTGCACCCAGGAGCAGTGAGAGGCAGAGAGCACGGCAGATCTTGTA AACTTTAGGTCTGTTTCAGCTGTAATTGCCAACATTTCCTTCATTTTATTTTTCAAGGGT GATTTAAAATTAATCCAGGCTGGTTTTGCAGAAAAATATTTACCTTAAACACATTTATT TTCTCTGTTGATTTTGTAAAAATCCAGAACCCTGAGGAATGGCTTCAGTTCCAGATGGT TACCGTGAATGACCGTGTGACACACAGGAACGGAGGCTGGCTATGCATTTTGAAAAA CTGTATTTCAAAGGCATTTACAAACAAATGCCCAATAAGTCAGTTAGAAACTAAGGAA AATAGTTTCTAATAATGGAAATGATGTCATTCTGGATCTGCAGCCACAGATAGCATTG GTGGGGAGATGAGGAAGTTTATAAAATTAGAATTCCCTAACTTTCATAAAGAGATGTT TCCCTTCACCCAGTGCTGACTAGTAGTTTGGAGTTGCAAAATATTTATAAATGGTGAG ACTACTCCAATCTGTTATTTATTTATATTTATTAGTACTAAAAATTTTACAAGTAACTCT TTAAAACGTTTTTCTAATCATCTGCTCCTCTAACACTTACTTGCTGTTAGAGGACTCTG CTAGATTTCTTAAGGTGTCTTACTTTTTAAGAATAATTCACCGGACTTTAAAAATATTT TTCATTACTAGTAGCTTACTGTTGTATATGAGTACCATCCTCTAGTAAGTTTCAGGTTT GCAATTTTAATCTGTTTTAGGGCAAATTTATTTAAAGCCATTTAAAACCACACATTAGA GTATATATAAGTACATAAAATGTTTCCATAGCAACCTGAAAAGATGTAAATGGCCAAC TTAAGAAACCCAACATAATACCAAAGAACCACTTATATACCTAAAGCTGAATCTTATT ATTTATTGTATTAATAAAATGTTTATTAGAAAAATTATACCTGATTGCTGTAATCTGGA AGAATTGAAGTAGCCGATAATTTAGTGTTAAAATGTTAAATGGACTCTATAGTTGTTC ACACCCACCTAATCCTTAGAGTTAATATTACTTAATGCTTTGTGAGCTATGGTCTTTGT CAAAATGTTAGGTCATTTCCAATCTCTATGAAAATGACAAGTCTGTTCAACAAATAAA TCTCAATCTTTTTATTCTTACTACTTAAGGTAGTCCTCAAAGGCTTTGTCAATTCTAGA AAGTGTACACATAACCTTTAATAAGTCCTGAAAAACTTTCTTTTGCTTGTATTCTGTCT TTGCCCATTACAAAAAAGCATACCCAGTGGGGATGGAAATTCTGTCATCCTTGATCAC TACTGTGTGTTTGTCTAGAAGGGTGGCTGGTACATAGTAAATGTTCAATAAATAAACT CCCCCTGGCTGCTGCCTGAGCAAATTTGCATGCTTTGGGCTTTAGGTTAGAATAGACAT GAACATACATGTGTTTATGTAGGTACATTTTCACTATGCTAATGAAACAATGAAACTA TTCTAAAAATAGCCACAAGTATTGACAATTCAGATGACAGTTTTAATGTTTGTTAGTTT CTTTATTTCTTCTCTTCCCCCATTTCCTCCTCTTTCTTCTTCATATTTTTGTTTTGAAGTG GGGTAAATAATTACCTGATACATTGAGTGTAGTCCCTGAATGTATTTTGTATTACTAAT TCACAGATGCATTTGTCCTTGTAAATTAGTTGCACACAGATTTATTAGTCATTTTTGAA GAGTTAATTACACTGTTGTTTTTGATTATAAAGACAAACATGGTCATCTAAGAAAACA AAATATAAGAGGTTGTGAAAAGTAATCCAGATAATGCTTAAATCCATAGTCGGGACTC TCAAGAAAAACTATATTAATGAATGTGGTATGTTAAGAAATGGTGTTTTCTTCAGTTTT TAATATTTATGCTTTTCATTTGTATGTTTAAAACTATAATTAGGAATATCTAGTATATA TATGTGTGTGTAATTTTTCACATTTTTATTTAACATTATTATAAAAACTTTCCCTGTCAA CAAAATTAAACAAAACTCATCACTAATAATTTAATATTCTATCAAGGGATGTTCCATG ATTTACCTAATTGTTTAAAAAGTTATATATTGGGCTTCTTTTGGGGAAGTCCATTTTTT

	AATGAGTAGGTGATAAATGCATACATATCTGTTGTAACTCCTTTTGCTTATTTCTTCTA AATTTTTTTTTAGGCTAAGATAATTGCAATGGTTTAGAAGTCCGTTGGTGTATTTTGAA GTGTGAATGCCTATGTTAACATTTTTTTTTTACAGAACAAAATAGTTTTATTTAAGATT CTTTTCTTTTCTGTTGTATAACCACTTATAGTTCTTGTAAATCATTTTTTCCCAGGCATT GCAAAACTGGAAGAAGGAGATGAACTCCAACTTGCAATACCAAGAGAAAATGCACAA ATATCACTGGATGGAGATGTCACATTTTTTGGTGCATTGAAACTGCTGTGACCTACTTA CACCATGTCTGTAGCTATTTTCCTCCCTTTCTCTGTACCTCTAAGAAGAAAGAATCTAA CTGAAAATACCAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAGTAGTTACCATTGC CTTTTCTGTGAGCTATTTGTTTTGGTTTGCTGAAACTAGTCCAAAACAGGAAATTTAAC AGACAGCCACAGCCAAAGAGTGTCATGTGAATTACAAGAAATAGAGCCCATTTAGGG AAAGATAGAACTAGAAAGGCTTTTCATTATAATTCCATGTTGAACAATTGAGTCATAG CTTCTTATCTTGGAGGAAGGACACAATTCAAAGGGGCAGTAAGGATTTTGTAAAACGT GGCATCCATAATTTACTATGGAGCAAGTGCCCACATCTCTAGGACATTAAGACATTTA TGAGAAATCTCAGGATTCATCTTCTGTTTTTATGTTAAATGCACTCCCTCCTTTTCAGTT AACATTATAAAAAGTAAAAAATGAAAATTTTAGAAATCTTGCATTAGACACATGAAA AAATAACTAAAAGTTTAAATTTAAATATGAAACAATTTTGCTGAAAATAGTATCCATA TACTATTTAAGTCTTTTATGGTTATTTCAAGTATACAATTTCTATCTGTAATGTAATATA TTACCCACACATTTTTTTCACAGGAGAGAGAGAATATCCTCATTTGTTTATGCTCATGT GTATTTTCTATAGTGAATTTCAGAAACTTTTAATATCAGGTAATTTCAATTTATGCCTA TAAAGCATTGATTGAAAAATAACTAGAATTGTGCATATATAACACATAATCTCCAACA GAAGTTACTGAATACATTCATACTAATGTAATGTAATTTCCCTTTATTTCTTGCTCTTCT GTTTCAAACTGCTGCTATTGTAGTTTACATATCCCAACCTTTAAAAATATTCCTCTTATT AGCTTTATATTCACTTTATAGAAGTTGAGTTTTAATTAAAATTCTTGGCATCCTGAAGT ATGTCACATAGCATGTGCTCCTTATAAATATGTTGATATCTCAGAAGACAGCATCCCG GTTTTCATTTTATAAAGTACCATACTTAAGAATGCTGTAATACTTATCTTTTATAACAT GTTTCCTTCGCTTTGCTTGTCTTTTATGTCATCAGTTTTAACTGTTTACTTCATTTAACA GTTTACATCATTCAACAGTTTACTTCATTAAACAGTAGGTGGAAAAATAGATGCCAGT CTATGAAAATCTTCCCATCTATATCAAAATACTTTTCAAGGATATACTTTTCAAAACAA ACGATTTAAATTTTATGTTTAAAATATAAACTTTAGATTTAAACTTTATTTAAATATCT GGTTCCTATGATTTTGACTTCAGTAAGTTCAAATAAAATATATTTTGCAATTCATTTTT ACATTATAATTTAAAAAGAAGAAGCGATAAGTGGAGTCAGTTTCAATGCTAGGTGGG GTGGTTAATGATTTTTCTGGTGTTGCTGCTAATGTGGATTAACAAATAAAAACATTCAT TGCCTTTTGCCTCAT

[0135] A checkpoint inhibitor may comprise an antibody, a small molecule, a protein, a peptide, an aptamer, an enzyme, or any combination thereof. A checkpoint inhibitor or a salt thereof may be a PD-1 inhibitor or a salt thereof. The PD-1 inhibitor or a salt thereof may comprise nivolumab (Opdivo®, CAS number 946414-94-4), pembrolizumab (Keytruda ®, CAS number 1374853-91-4), pidilizumab (CT-011, CAS number 1036730-42-3), BGB-A31, MEDI0680 (AMP-514), a salt of any one thereof, or any combination thereof. The PD-1 inhibitor or a salt thereof may be selected from the group consisting of nivolumab (Opdivo®, CAS number 946414-94-4), pembrolizumab (Keytruda ®, CAS number 1374853-91-4), pidilizumab (CT-011, CAS number 1036730-42-3), BGB-A31, MEDI0680 (AMP-514), a salt of any one thereof, and any combination thereof. The PD-1 inhibitor may be nivolumab or a salt thereof. The PD-1 inhibitor may be pembrolizumab (Keytruda ®, CAS number 1374853-91-4) or a salt thereof. The PD-1 inhibitor may be pidilizumab (CT-011, CAS number 1036730-42-3) or a salt thereof. The PD-1 inhibitor may be BGB-A31 or a salt thereof. The PD-1 inhibitor may be MEDI0680 (AMP-514) or a salt thereof. In some embodiments, the PD-1 inhibitor can be an immunoadhesin (*e.g.*, an immunoadhesin comprising an extracellular or PD-1 binding portion of

PD-Ll or PD-L2 fused to a constant region (*e.g.*, an Fc region of an immunoglobulin sequence). In some embodiments, the PD-1 inhibitor can be AMP-224. In some embodiments, the PD-Ll inhibitor can be anti-PD-Ll antibody. In some embodiments, the anti-PD-Ll binding antagonist can be YW243.55.S70, MPDL3280A, MEDI-4736, MSB-0010718C, or MDX-1105. MDX-1105, also known as BMS-936559, can be an anti-PD-Ll antibody described in US2009/0055944A1. Antibody YW243.55.S70 (heavy and light chain variable region sequences shown in SEQ ID Nos. 20 and 21, respectively) can be an anti-PD-Ll described in US 2010/0203056.

[0136] MDX-1106, also known as MDX-1106-04, Nivolumab, ONO-4538 or BMS-936558, is an anti-PD-1 antibody described in US 2009/0217401. Merck 3745, also known as MK-3475 or SCH-900475, Lambrolizumab, or Pembrolizumab, can be an anti-PD-1 antibody described in US 2011/0008369. Pidilizumab (CT-011; Cure Tech) can be a humanized IgGlk monoclonal antibody that binds to PD-1. Pidilizumab and other humanized anti-PD-1 monoclonal antibodies are disclosed in US 2011/0117085. In other embodiments, the anti-PD-1 antibody can be pembrolizumab. AMP-224 (B7-DCIg; Amplimmune; *e.g.*, disclosed in US 2011/0223188 and US 2013/0017199), can be a PD-L2 Fc fusion soluble receptor that blocks the interaction between PD-1 and B7-H1. Other anti-PD-1 antibodies include AMP 514.

[0137] Nivolumab (clone 5C4) and other human monoclonal antibodies that specifically bind to PD-1 are disclosed in US 8,008,449 and US 2009/0217401. Pembrolizumab or Lambrolizumab (also referred to as MK-3475; Merck) can be a humanized IgG4 monoclonal antibody that binds to PD-1. Pembrolizumab and other humanized anti-PD-1 antibodies are disclosed in US 8,354,509 and US 2011/0008369.

[0001] MDPL3280A (Genentech / Roche) can be a human Fc optimized IgGl monoclonal antibody that binds to PD-Ll. MDPL3280A and other human monoclonal antibodies to PD-Ll are disclosed in U.S. Patent No.: 7,943,743 and U.S Publication No.: 2012/0039906. Other anti-PD-Ll binding inhibitors can include YW243.55.S70 (described in US 2010/0203056) and MDX-1105 (also referred to as BMS-936559, and, *e.g.*, anti- PD-Ll binding agents disclosed in US 2009/0055944).

[0138] In some embodiments, the PD-1 or PD-L1 inhibitor may have the sequence of SEQ ID NO: 17, SEQ ID NO: 18, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 165, SEQ ID NO: 166, SEQ ID NO: 167, SEQ ID NO: 168, SEQ ID NO: 169, SEQ ID NO: 170, SEQ ID NO: 171, SEQ ID NO: 172, SEQ ID NO: 173, SEQ ID NO: 174, a fragment of any of these, a sequence having at least about: 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, 99% or more sequence homology to any of these, or any combination thereof. (**Table 3B**). The PD-1 or PD-L1 inhibitor may be a biosimilar, wherein the biosimilar may be truncated and may have less than 100%

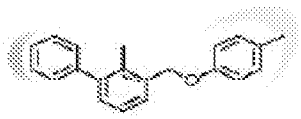
length of the reference compound. In some embodiments, the biosimilar that is less than 100% length of the reference compound may still have a remaining sequence that is at least about 90% or more matching the corresponding part of the original reference sequence.

[0139] Table 3B

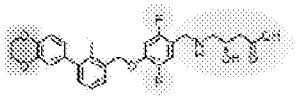
SEQ ID NO:	Sequence
17: exemplary Heavy Chain Sequence	QVQLVQSGVEVKKPGASVKVSCKASGYTFTNYYMYWVRQAPGQGLEWMGGINPSNG GTNFNEKFKNRVTLTTDSSTTTAYMELKSLQFDDTAVYYCARRDYRFDMGFDYWGQG TTVTVSSASTKGPSVFPLAPCSRSTSESTAALGCLVKDYFPEPVTVSWNSGALTSGVHTF PAVLQSSGLYSLSSVVTVPSSSLGTKTYTCNVDHKPSNTKVDKRVESKYGPPCPPCPAPE FLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSQEDPEVQFNWYVDGVEVHNAKTKP REEQFNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKGLPSSIEKTISKAKGQPREPQVYT LPPSQEEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSR LTVDKSRWQEGNVFSCSVMHEALHNHYTQKSLSLSLGK
18: exemplary Light Chain amino acid Sequence	EIVLTQSPATLSLSPGERATLSCRASKGVSTSGYSYLHWYQQKPGQAPRLLIYLASYLES GVPARFSGSGSGTDFTLTISSLEPEDFAVYYCQHSRDLPLTFGGGTKVEIKRTVAAPSVFI FPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQDSKDSTYSL SSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC
19: exemplary Heavy Chain amino acid Sequence	QVQLVESGGGVVQPGRSLRLDCKASGITFSNSGMHWVRQAPGKGLEWVAVIWYDGSK RYYADSVKGRFTISRDNSKNTLFLQMNSLRAEDTAVYYCATNDDYWGQGTLVTVSSA STKGPSVFPLAPCSRSTSESTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSSG LYSLSSVVTVPSSSLGTKTYTCNVDHKPSNTKVDKRVESKYGPPCPPCPAPEFLGGPSVF LFPPKPKDTLMISRTPEVTCVVVDVSQEDPEVQFNWYVDGVEVHNAKTKPREEQFNST YRVVSVLTVLHQDWLNGKEYKCKVSNKGLPSSIEKTISKAKGQPREPQVYTLPPSQEEM TKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSRLTVDKSRW QEGNVFSCSVMHEALHNHYTQKSLSLSLGK
20: exemplary amino acid Light Chain Sequence	EIVLTQSPATLSLSPGERATLSCRASQSVSSYLAWYQQKPGQAPRLLIYDASNRATGIPA RFSGSGSGTDFTLTISSLEPEDFAVYYCQQSSNWPRTFGQGTKVEIKRTVAAPSVFIFPPS DEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQDSKDSTYSLSSTL TLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC
165: exemplary Heavy Chain amino acid sequence	EVQLVESGGG LVQPGGSLRL SCAASGFTFS DSWIHWVRQA PGKGLEWVAW ISPYGGSTYY ADSVKGRFTI SADTSKNTAY LQMNSLRAED TAVYYCARRH WPGGFDYWGQ GTLVTVSSAS TKGPSVFPLA PSSKSTSGGT AALGCLVKDY FPEPVTVSWN SGALTSGVHT FPAVLQSSGL YSLSSVVTVP SSSLGTQTYI CNVNHKPSNT KVDKKVEPKS CDKTHTCPPC PAPELLGGPS VFLFPPKPKD TLMISRTPEV TCVVVDVSHE DPEVKFNWYV DGVEVHNAKT KPREEQYAST YRVVSVLTVL HQDWLNGKEY KCKVSNKALP APIEKTISKA KGQPREPQVY TLPPSREEMT KNQVSLTCLV KGFYPSDIAV EWESNGQPEN NYKTTPPVLD SDGSFFLYSK LTVDKSRWQQ GNVFSCSVMH EALHNHYTQK SLSLSPGK
166: exemplary Light Chain amino acid sequence	DIQMTQSPSS LSASVGDRVT ITCRASQDVS TAVAWYQQKP GKAPKLLIYS ASFLYSGVPS RFSGSGSGTD FTLTISSLQP EDFATYYCQQ YLYHPATFGQ GTKVEIKRTV AAPSVFIFPP SDEQLKSGTA SVVCLLNNFY PREAKVQWKV DNALQSGNSQ ESVTEQDSKD STYSLSSTLT LSKADYEKHK VYACEVTHQG LSSPVTKSFN RGEC
167: exemplary Heavy Chain amino acid sequence	QVQLVESGGG VVQPGRSLRL DCKASGITFS NSGMHWVRQA PGKGLEWVAV IWYDGSKRYY ADSVKGRFTI SRDNSKNTLF LQMNSLRAED TAVYYCATND DYWGQGTLVT VSSASTKGPS VFPLAPCSRS TSESTAALGC LVKDYFPEPV TVSWNSGALT SGVHTFPAVL QSSGLYSLSS VVTVPSSSLG TKTYTCNVDH KPSNTKVDKR VESKYGPPCP PCPAPEFLGG PSVFLFPPKP KDTLMISRTP EVTCVVVDVS QEDPEVQFNW YVDGVEVHNA KTKPREEQFN STYRVVSVLT VLHQDWLNGK EYKCKVSNKG LPSSIEKTIS KAKGQPREPQ VYTLPPSQEE MTKNQVSLTC LVKGFYPSDI AVEWESNGQP ENNYKTTPPV LDSDGSFFLY SRLTVDKSRW QEGNVFSCSV MHEALHNHYT QKSLSLSLGK
168: exemplary Light Chain	EIVLTQSPAT LSLSPGERAT LSCRASQSVS SYLAWYQQKP GQAPRLLIYD ASNRATGIPA RFSGSGSGTD FTLTISSLEP EDFAVYYCQQ SSNWPRTFGQ

amino acid sequence	GTKVEIKRTV AAPSVFIFPP SDEQLKSGTA SVVCLLNNFY PREAKVQWKV DNALQSGNSQ ESVTEQDSKD STYSLSSTLT LSKADYEKHK VYACEVTHQG LSSPVTKSFN RGEC
169: exemplary Heavy Chain amino acid sequence	EVQLLESGGG LVQPGGSLRL SCAASGFTFS SYIMMWVRQA PGKGLEWVSS IYPSGGITFY ADTVKGRFTI SRDNSKNTLY LQMNSLRAED TAVYYCARIK LGTVTTVDYW GQGTLVTVSS ASTKGPSVFP LAPSSKSTSG GTAALGCLVK DYFPEPVTVS WNSGALTSGV HTFPAVLQSS GLYSLSSVVT VPSSSLGTQT YICNVNHKPS NTKVDKKVEP KSCDKTHTCP PCPAPELLGG PSVFLFPPKP KDTLMISRTP EVTCVVVDVS HEDPEVKFNW YVDGVEVHNA KTKPREEQYN STYRVVSVLT VLHQDWLNGK EYKCKVSNKA LPAPIEKTIS KAKGQPREPQ VYTLPPSRDE LTKNQVSLTC LVKGFYPSDI AVEWESNGQP ENNYKTTPPV LDSDGSFFLY SKLTVDKSRW QQGNVFSCSV MHEALHNHYT QKSLSLSPGK
170: exemplary Light Chain amino acid sequence	QSALTQPASV SGSPGQSITI SCTGTSSDVG GYNYVSWYQQ HPGKAPKLMI YDVSNRPSGV SNRFSGSKSG NTASLTISGL QAEDEADYYC SSYTSSSTRV FGTGTKVTVL GQPKANPTVT LFPPSSEELQ ANKATLVCLI SDFYPGAVTV AWKADGSPVK AGVETTKPSK QSNNKYAASS YLSLTPEQWK SHRSYSCQVT HEGSTVEKTV APTECS
171: exemplary Heavy Chain amino acid sequence	EVQLVESGGG LVQPGGSLRL SCAASGFTFS RYWMSWVRQA PGKGLEWVAN IKQDGSEKYY VDSVKGRFTI SRDNAKNSLY LQMNSLRAED TAVYYCAREG GWFGELAFDY WGQGTLVTVS SASTKGPSVF PLAPSSKSTS GGTAALGCLV KDYFPEPVTV SWNSGALTSG VHTFPAVLQS SGLYSLSSVV TVPSSSLGTQ TYICNVNHKP SNTKVDKRVE PKSCDKTHTC PPCPAPEFEG GPSVFLFPPK PKDTLMISRT PEVTCVVVDV SHEDPEVKFN WYVDGVEVHN AKTKPREEQY NSTYRVVSVL TVLHQDWLNG KEYKCKVSNK ALPASIEKTI SKAKGQPREP QVYTLPPSRE EMTKNQVSLT CLVKGFYPSD IAVEWESNGQ PENNYKTTPP VLDSDGSFFL YSKLTVDKSR WQQGNVFSCS VMHEALHNHY TQKSLSLSPG K
172: exemplary Light Chain amino acid sequence	EIVLTQSPGT LSLSPGERAT LSCRASQRVS SSYLAWYQQK PGQAPRLLIY DASSRATGIP DRFSGSGSGT DFTLTISRLE PEDFAVYYCQ QYGSLPWTFG QGTKVEIKRT VAAPSVFIFP PSDEQLKSGT ASVVCLLNNF YPREAKVQWK VDNALQSGNS QESVTEQDSK DSTYSLSSTL TLSKADYEKH KVYACEVTHQ GLSSPVTKSF NRGEC
173: exemplary Heavy Chain amino acid sequence	EVQLLESGGV LVQPGGSLRL SCAASGFTFS NFGMTWVRQA PGKGLEWVSG ISGGGRDTYF ADSVKGRFTI SRDNSKNTLY LQMNSLKGED TAVYYCVKWG NIYFDYWGQG TLVTVSSAST KGPSVFPLAP CSRSTSESTA ALGCLVKDYF PEPVTVSWNS GALTSGVHTF PAVLQSSGLY SLSSVVTVPS SSLGTKTYTC NVDHKPSNTK VDKRVESKYG PPCPPCPAPE FLGGPSVFLF PPKPKDTLMI SRTPEVTCVV VDVSQEDPEV QFNWYVDGVE VHNAKTKPRE EQFNSTYRVV SVLTVLHQDW LNGKEYKCKV SNKGLPSSIE KTISKAKGQP REPQVYTLPP SQEEMTKNQV SLTCLVKGFY PSDIAVEWES NGQPENNYKT TPPVLDSDGS FFLYSRLTVD KSRWQEGNVF SCSVMHEALH NHYTQKSLSL SLGK
174: exemplary Light Chain amino acid sequence	DIQMTQSPSS LSASVGDSIT ITCRASLSIN TFLNWYQQKP GKAPNLLIYA ASSLHGGVPS RFSGSGSGTD FTLTIRTLQP EDFATYYCQQ SSNTPFTFGP GTVVDFRRTV AAPSVFIFPP SDEQLKSGTA SVVCLLNNFY PREAKVQWKV DNALQSGNSQ ESVTEQDSKD STYSLSSTLT LSKADYEKHK VYACEVTHQG LSSPVTKSFN RGEC

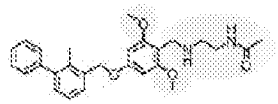
[0140] In some embodiments, the PD1 or PD-L1 inhibitor or a pharmaceutically acceptable salt thereof can comprise a structure, formula, analogs or derivatives of any one of structures 1-7.



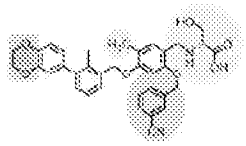
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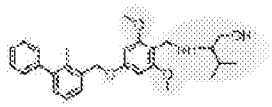
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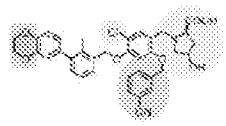
Structure 3.



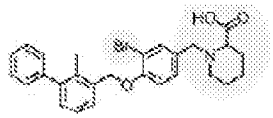
Structure 4.



Structure 5.



Structure 6.



Structure 7.

[0141] In some embodiments, a biosimilar may comprise less than 100% length, less than about 90% length, less than about 80% length, less than about 70% length, less than about 60% length, or less than about 50% length to the reference compound. In some embodiment, the biosimilar may comprise a sequence that is at least about 50%, at least about 60%, at least about 70%, at least about 80%, at least about 90%, or 100% identity to the corresponding part of the original reference sequence.

[0142] In some embodiments, the checkpoint inhibitor or a salt thereof may be a PD-L1 inhibitor or a salt thereof. The PD-L1 inhibitor or a salt thereof may be selected from the group consisting of atezolizumab (Tecentriq®, CAS number 1380723-44-3), avelumab (Bavencio®, CAS number 1537032-82-8), durvalumab (Imfinzi®, CAS number 1428935-60-7), MDX-1105, MSB0010718C, a salt of any one thereof, and any combination thereof. The PD-L1 inhibitor may be atezolizumab (Tecentriq®, CAS number 1380723-44-3) or a salt thereof. The PD-L1 inhibitor may be avelumab (Bavencio®, CAS number 1537032-82-8) or a salt thereof. The PD-L1 inhibitor may be durvalumab (Imfinzi®, CAS number 1428935-60-7) or a salt thereof. The

PD-L1 inhibitor may be MDX-1105 or a salt thereof. The PD-L1 inhibitor may be MSB0010718C or a salt thereof.

[0143] In some embodiments, the checkpoint inhibitor may be a CTLA4 inhibitor or a salt thereof. The CTLA4 inhibitor or a salt thereof may be selected from the group consisting of ipilimumab (Yervoy®, CAS number 477202-00-9), tremelimumab (ticilimumab, CAS number 745013-59-6), AGEN1884, a salt of any one thereof, and any combination thereof. The CTLA4 inhibitor may be ipilimumab (Yervoy®, CAS number 477202-00-9) or a salt thereof. The CTLA4 inhibitor may be tremelimumab (ticilimumab, CAS number 745013-59-6) or a salt thereof. The CTLA4 inhibitor may be AGEN1884 or a salt thereof.

[0144] In some embodiments, the checkpoint inhibitor or a salt thereof may be a LAG3 inhibitor or a salt thereof. The LAG3 inhibitor may be BMS-986016 or a salt thereof. The checkpoint inhibitor or a salt thereof may be a TIM3 inhibitor or a salt thereof. The TIM3 inhibitor or a salt thereof may be selected from the group consisting of MBG453, TSR-022, a salt of any one thereof, and any combination thereof. The TIM3 inhibitor may be MBG453 or a salt thereof. The TIM3 inhibitor may be TSR-022 or a salt thereof.

[0145] Another aspect of the current disclosure provides a method of treating a subject in need thereof. The method may comprise administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof to the subject; and administering at least one immune agonist agent or a salt thereof to the subject. In some embodiments, the immune agonist agent or a salt thereof may be selected from the group consisting of an agent that binds to glucocorticoid-induced tumor necrosis factor receptor-related protein (GITR), cluster of differentiation 134 (OX40), cluster of differentiation 137 (CD137), cluster of differentiation 40 (CD40), Toll-like receptor (TLR), a salt of any one thereof, and any combination thereof.

[0146] In some embodiments, the immune agonist agent may be a GITR agonist or a salt thereof. The GITR agonist or a salt thereof may be selected from the group consisting of an agent that binds to TRX518, GWN323, MEDI1873, INCAGN01876, a salt of any one thereof, and any combination thereof. The GITR agonist may be TRX518 or a salt thereof. The GITR agonist may be GWN323 or a salt thereof. The GITR agonist may be MEDI1873 or a salt thereof. The GITR agonist may be INCAGN01876 or a salt thereof.

[0147] In some embodiments, the immune agonist agent may be an OX40 agonist or a salt thereof. The OX40 agonist may be selected from the group consisting of GSK3174998, PF-04518600, MEDI6469, INCAGN01949, a salt of any one thereof, and any combination thereof. The OX40 agonist may be GSK3174998 or a salt thereof. The OX40 agonist may be PF-

04518600 or a salt thereof. The OX40 agonist may be MEDI6469 or a salt thereof. The OX40 agonist may be INCAGN01949 or a salt thereof.

[0148] In some embodiments, the immune agonist agent may be a cluster of differentiation 137 (4-1BB) agonist or a salt thereof. The 4-1BB agonist may be urelumab, utomilumab, or a salt of any one thereof. The 4-1BB agonist may be isurelumab or a salt thereof. The 4-1BB agonist may be isutomilumab or a salt thereof.

[0149] In some embodiments, the immune agonist agent may be a CD40 agonist or a salt thereof. The CD40 agonist may be APX005M, CP870893, or a salt thereof. The CD40 may be APX005M or a salt thereof. The CD40 may be CP870893 or a salt thereof.

[0150] In some embodiments, the immune agonist agent may be a TLR agonist or a salt thereof. The TLR agonist may be selected from the group consisting of an agent that binds to TLR-1, TLR-2, TLR-3, TLR-4, TLR-5, TLR-6, TLR-7, TLR-8, TLR-9, TLR-13, a salt or any one thereof, and any combination thereof.

[0151] In some embodiments, the immune agonist agent may be a KIR agonist or a salt thereof. The KIR agonist may be antibody 1-7F9, or a salt thereof.

[0152] Yet another aspect of the current disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one vaccine agent or a salt thereof. The vaccine agent may be selected from the group consisting of: MAGE-3, NY-ESO-1, TRAG-3, p53, at least one or more α-actinin-4 and malic enzymes, carcinoembryonic antigen, HER2, MUC1, survivin, WT-1, PRAME, Survivin-2b, Bacillus Calmette-Guerin, MVAX, at least one or more heat shock proteins, keyhole limpet hemocyanin, interleukin–2, QS21, montanide ISA-51, granulocyte monocyte-colony stimulating factor, GVAX, GI-4000, CDX-1307, IMA910, TroVAX, CRS-207, CA-9, a salt of any one thereof, and any combination thereof.

[0153] An aspect of the current disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one oncolytic viral based agent or a salt thereof. The oncolytic viral based agent may be selected from the group consisting of: enadenotucirev, talimogene laherparepvec, reolysin, CG0070, Pexastimogene devacirepvec, cavatak, oncolytic vesicular stomatitis virus, ONCOS-102, a salt of any one thereof, and any combination thereof.

[0154] An aspect of the current disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least

one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one cell-based therapy, any cell derivative thereof, or a salt of any one thereof. The cell-based therapy may be selected from the group consisting of: at least one or more autologous lymphocytes; at least one or more genetically engineered autologous lymphocytes; at least one or more chimeric antigen receptor cells; at least one or more chimeric antigen receptor T-cells; at least one or more dendritic cell based vaccines; a salt of any one thereof; and any combination thereof.

[0155] Another aspect of the current disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one chemotherapeutic agent or a salt thereof. The chemotherapeutic agent may be an alkylating agent, an antimetabolite agent, a plant alkaloid agent, an antitumor antibiotic, a salt of any one thereof, and any combination thereof.

[0156] One aspect of the current disclosure provides for a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of at least one BAFF and/or BAFF-R inhibitor or a salt thereof; and administering at least one targeted therapeutic agent or a salt thereof. The targeted therapeutic agent may be an agent that inhibits signal transduction, angiogenesis, hormone expression, or any combination thereof. The BAFF inhibitor and/or BAFF-R inhibitor may prevent binding of BAFF or a BAFF-induced ligand to a BAFF-R; may be a partial antagonist of a BAFF; may be a partial agonist of a BAFF; may be a competitive antagonist of a BAFF-R; may be a non-competitive antagonist of a BAFF-R receptor; or any combination thereof. The BAFF inhibitor may be an antibody, antigen binding fragment, a bispecific antibody, or a recombinant fusion protein.

[0157] In some embodiments, the BAFF inhibitor antibody may be human, humanized, chimeric, composite, polyclonal or monoclonal. The BAFF antibody or antigen binding fragment may block interaction of molecules to BAFF. The BAFF inhibitor may be selected from the group consisting of: tabalumab (CAS number 1143503-67-7), atacicept (CAS number 845264-92-8), RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod (A-623, CAS number 1236126-45-6), belimumab (Benlystra®, CAS number 356547-88-1), a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be selected from the group consisting of: MEDI-700, NOV-5, rGel/BLyS, a salt of any one thereof, and any combination thereof. The BAFF inhibitor may be tabalumab (CAS number 1143503-67-7) or a salt thereof. The BAFF inhibitor may be blisibimod (A-623, CAS number 1236126-45-6) or a

salt thereof. The BAFF inhibitor may be belimumab (Benlystra®, CAS number 356547-88-1) or a salt thereof. The BAFF inhibitor may be atacicept (CAS number 845264-92-8).

[0158] One aspect of the current disclosure provides a method of treating a subject in need thereof. The method may comprise: administering a therapeutically effective amount of an immunotherapeutic agent or a salt thereof, wherein the immunotherapeutic agent or a salt thereof may inhibit a biological cascade selected from the group consisting of: a B-cell activating factor receptor cascade, a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor cascade, a B-cell maturation antigen receptor cascade, and any combination thereof; wherein the immunotherapeutic agent may be co-administered with a checkpoint inhibitor.

[0159] In some embodiments, the subject may have been diagnosed with a cancer or a tumor. The method may be a method of treating a cancer or a tumor in the subject. The subject may have previously or may be currently undergoing treatment for the cancer or the tumor. The subject may have been previously treated with a checkpoint inhibitor, and the cancer or the tumor may have been at least partially refractive to the checkpoint inhibitor. In some embodiments, a method may comprise administering a therapeutically effective amount of the checkpoint inhibitor.

[0160] In some embodiments, the checkpoint inhibitor may be a salt. The checkpoint inhibitor may be selected from the group consisting of: an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, a salt of any of these, and any combination thereof.

[0161] In some embodiments, vemurafenib (Zelboraf®, CAS number 918504-65-1) or erlotinib (Tarceva®, CAS number 183321-74-6) may be administered. In some embodiments, a method described herein may comprise administering the anti-programmed cell death protein 1 agent or a salt thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be selected from the group consisting of docetaxel (Taxotere®, CAS number 114977-28-5), nivolumab (Opdivo®, CAS number 946414-94-4), pembrolizumab (Keytruda ®, CAS number 1374853-91-4), a salt of any of these, and any combination thereof. In some embodiments, an agent or a salt thereof may be vemurafenib (Zelboraf®, CAS number 918504-65-1) or erlotinib (Tarceva®, CAS number 183321-74-6). The anti-programmed cell death protein 1 agent or a salt thereof may be pembrolizumab (Keytruda ®, CAS number 1374853-91-4). In some embodiments, a method may comprise administering the anti-programmed death ligand 1 agent or a salt thereof.

[0162] In some embodiments, the anti-programmed death ligand 1 agent or a salt thereof may be selected from the group consisting of atezolizumab (Tecentriq®, CAS number 1380723-44-3), avelumab (Bavencio®, CAS number 1537032-82-8), durvalumab (Imfinzi®, CAS number 1428935-60-7), a salt of any of these, and any combination thereof. The immunotherapeutic agent or a salt thereof at least partially may prevent binding of a ligand to a B-cell activating factor receptor; may be a partial antagonist of a B-cell activating factor receptor; may be a partial agonist of a B-cell activating factor receptor; may be a competitive antagonist of a B-cell activating factor receptor; may be a non-competitive antagonist of a B-cell activating factor receptor; or any combination thereof. In some embodiments, the immunotherapeutic agent or a salt thereof at least partially may prevent ligand binding to a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; may be a partial antagonist of a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; may be a partial agonist of a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; or any combination thereof.

[0163] In some embodiments, the immunotherapeutic agent or a salt thereof at least partially may prevent ligand binding to a B-cell maturation antigen receptor; may be a partial antagonist of a B-cell maturation antigen receptor; may be a partial agonist of a B-cell maturation antigen receptor; or any combination thereof. The immunotherapeutic agent may be an antibody or a salt thereof. The immunotherapeutic agent may be a human or humanized monoclonal antibody or a salt thereof. The immunotherapeutic agent or a salt thereof may be selected from the group consisting of ardenermin, briobacept, blisibimod (A-623, CAS number 1236126-45-6), belimumab (Benlystra®, CAS number 356547-88-1), atransmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, tabalumab (CAS number 1143503-67-7), atacicept, RCT-18, a salt of any of these, and any combination thereof.

[0164] In some embodiments, the immunotherapeutic agent or a salt thereof may be selected from the group consisting of MEDI-700, NOV-5, rGel/BLyS, a salt of any of these, and any combination thereof. The immunotherapeutic agent may be tabalumab (CAS number 1143503-67-7) or a salt thereof. The immunotherapeutic agent may be blisibimod (A-623, CAS number 1236126-45-6) or a salt thereof. The immunotherapeutic agent may be belimumab (Benlystra®, CAS number 356547-88-1) or a salt thereof. The immunotherapeutic agent may be atacicept (CAS number 845264-92-8) or a salt thereof.

[0165] In some embodiments, a method described herein may further comprise, before the administering: determining a count of cluster of differentiation 8 (CD8) protein, and at least one selected from the group consisting of: cluster of differentiation 19 (CD19) protein, cluster of

differentiation 20 protein (CD20), cluster of differentiation 138 (CD138) protein, B-cell activating factor protein, B-cell activating factor receptor protein, paired box Pax-5 (PAX5) protein, and any combination thereof, in a cancer or a tumor or a cancer sample or a tumor sample of a subject.

[0166] In some embodiments, the at least one of: CD19, CD20, CD138, B-cell activating factor, B-cell activating factor-R, and PAX5 may be present in the cancer or the tumor or the cancer sample or the tumor sample of the subject. The at least one of: CD19, CD20, CD138, B-cell activating factor, B-cell activating factor-R, and PAX5 may be individually present in the cancer or the tumor or the cancer sample or the tumor sample of the subject in an amount ranging from about 1 protein to at least about 10,000,000 proteins.

[0167] In some embodiments, a method described herein may further comprise monitoring the treatment after the administering. The treatment may maintain at least partial remission of the cancer or the tumor, wherein a period of the remission may be at least about: 1 month, 2 months, 3 months, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 6 years, 7 years, 8 years, 9 years, or 10 years. The treatment may comprise, after administering, delaying progression of the cancer or the tumor in the subject. The treatment may comprise, after administering, regression of the cancer or the tumor.

[0168] In some embodiments, the regression may be a reduction in mass of the cancer or the tumor, a reduction in volume of the cancer or the tumor, or both. The treatment may comprise prolonging the subject's life. The subject may have previously shown at least partial refraction to a monotherapy for the cancer or the tumor. The subject may have shown refraction to a monotherapy for the cancer or the tumor. The cancer may have metastasized from a first location of the subject to a second location of the subject. The cancer at the first location of the body may be less than fully responsive to the monotherapy, and wherein the cancer at the second location of the body may be responsive to the treatment. The checkpoint inhibitor and the immunotherapeutic agent may be synergistic. The synergy on the cancer or the tumor may be at least about 10% more than an additive effect.

[0169] In some embodiments, a heatmap of a cancer sample or a tumor sample of the subject may show a profile substantially similar to that of FIG. 8.

[0170] In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and the immunotherapeutic agent or a salt thereof may be administered concurrently. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or

any combination thereof, and the immunotherapeutic agent or a salt thereof may be administered sequentially. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and the immunotherapeutic agent or a salt thereof may be administered in different formulations within a same treatment schedule.

[0171] In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered at least once a week. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered at least once a day. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered at least once during a treatment schedule.

[0172] In some embodiments, the immunotherapeutic agent or a salt thereof may be administered at least once a week. In some embodiments, the immunotherapeutic agent or a salt thereof may be administered at least once a day. In some embodiments, the immunotherapeutic agent or a salt thereof may be administered at least once during a treatment schedule. In some embodiments, the immunotherapeutic agent or a salt thereof may be administered in an amount from about 0.1 mg to about 1,000 mg per kg body weight. In some embodiments, the immunotherapeutic agent or a salt thereof may be administered in an amount from about 0.1 mg to about 100 mg per kg body weight. In some embodiments, the immunotherapeutic agent or a salt thereof may be administered in an amount from about 1 mg to about 50 mg per kg body weight.

[0173] In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered in an amount from about 0.1 mg to about 1,000 mg per kg body weight. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, may be administered in an amount from about 1 mg to about 100 mg per kg body weight. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, may be individually present as a

pharmaceutical formulation. The pharmaceutical formulation may be in unit dose form. The pharmaceutical formulation may further comprise a pharmaceutically-acceptable excipient.

[0174] In some cases, a method may comprise treating the cancer, wherein the cancer may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, melanoma, multiple myeloma, Hodgkin's lymphoma, ovarian cancer, or any combination thereof.

[0175] In one aspect, the present disclosure provides a method of selecting a therapeutic regimen. The method may comprise: determining the presence or absence of cluster of differentiation 8 (CD8) protein, and at least one of: B-cell activating factor (BAFF) protein, B-cell activating factor receptor (BAFF -R) protein, and paired box Pax-5 (PAX5) protein in a cancer or a tumor of a subject or a cancer sample or a tumor sample of the subject; if CD8 protein and at least one of B-cell activating factor, B-cell activating factor-R, and PAX5 may be present in the cancer or the tumor or the cancer sample or the tumor sample, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof; if CD8 protein and at least one of B-cell activating factor, B-cell activating factor-R, and PAX5 is not present in the cancer or the tumor or the cancer sample or the tumor sample, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof.

[0176] In some embodiments, the method may further comprise determining whether cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 (CD20) protein, cluster of differentiation 138 (CD138) protein, or any combination thereof may be present. The method may further comprise treating the subject.

[0177] In some embodiments, the treating may comprise: administering a therapeutically effective amount of an immunotherapeutic agent or a salt thereof, wherein the immunotherapeutic agent or a salt thereof may inhibit a biological cascade selected from the group consisting of a B-cell activating factor receptor cascade, a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor cascade, a B-cell maturation antigen receptor cascade, and any combination thereof; wherein the immunotherapeutic agent may be co-administered with a checkpoint inhibitor.

[0178] In some embodiments, the subject may have been diagnosed with a cancer or a tumor. The subject may have previously or may be currently undergoing treatment for the cancer or the

tumor. The method may further comprise administering a therapeutically effective amount of the checkpoint inhibitor.

[0179] In some embodiments, the checkpoint inhibitor may be selected from the group consisting of an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, a salt of any of these, and any combination thereof. The method may further comprise administering the anti-programmed cell death protein 1 agent of a salt thereof.

[0180] In some embodiments, the anti-programmed cell death protein 1 agent or a salt thereof may be selected from the group consisting of: docetaxel (Taxotere®, CAS number 114977-28-5), nivolumab (Opdivo®, CAS number 946414-94-4), pembrolizumab (Keytruda ®, CAS number 1374853-91-4), a salt of any of these, and any combination thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be pembrolizumab (Keytruda ®, CAS number 1374853-91-4). The immunotherapeutic agent may be tabalumab (CAS number 1143503-67-7) or a salt thereof. The immunotherapeutic agent may be belimumab (Benlystra®, CAS number 356547-88-1) or a salt thereof. The immunotherapeutic agent may be atacicept (CAS number 845264-92-8) or a salt thereof. In some embodiments, the cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof. The cancer or the tumor may contact or be substantially adjacent to a blood vessel. In some embodiments, the cancer or the tumor may be present in the interior of a blood vessel.

[0181] In one aspect, the present disclosure provides a method of selecting a therapeutic regimen. The method may comprise: determining a count of B cells, T cells, and plasma cells in a cancer or a tumor of a subject or a cancer sample or a tumor sample of the subject; if a count of T cells in the cancer or the tumor or the cancer sample or the tumor sample may be greater than about 500 cells/mm^2 and/or a count of B cells may be less than about 150 cells/mm^2, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof; if a count of T cells in the cancer or the tumor or the cancer sample or the tumor sample may be greater than about 300 cells/mm^2 and/or a count of B cells, a count of plasma cells, or a combination of B cells and plasma cells may be greater than about 100 cells/mm^2, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof.

[0182] In some embodiments, a method further may comprise conveying a result via a communication medium.

[0183] In one aspect, the current disclosure provides a method of treating or maintaining remission of a cancer or a tumor in a subject. The method may comprise: administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, if a percentage of T cells in a cancer sample or a tumor sample of a subject may be greater than about 10% and/or a percentage of B cells may be less than about 5%, or administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof if a percentage of T cells in a cancer or a tumor sample of the subject may be less than about 10% and a percentage of B cells, a percentage of plasma cells, or a combination of the percentage of B cells and/or the percentage of plasma cells may be greater than about 10% in the cancer sample of the subject.

[0184] In some embodiments, after the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a percentage of T cells, a percentage of B cells, and a percentage of plasma cells. The cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof.

[0185] In some embodiments, a sample may be obtained from a human from the peripheral blood, peripheral venous blood, peripheral arterial blood, peripheral whole blood monocytes, peripheral mononuclear cell enriched monocytes, red blood cell lysate of whole peripheral blood, serum, plasma, tears, hair, sputum, bronchoalveoli, cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, synovial fluid, vaginal fluid, urethral fluid, pericarditis fluid, pleural effusion fluid, ascites fluid, saliva, sweat, tumor, lymph, lymphatic vessels, lymph node tissue, adenoid tissue, spleen, spleen cells, cancer tissue, or any combination thereof.

[0186] A sample may comprise cells that may be intact, cells that may be dissociated, extracellular products that may be cell-derived, or any combination thereof.

[0187] Extracellular products may be derived from cells that may be dissociated from cells and extracellular in form and may comprise nucleic acids, proteins, lipids, carbohydrates, nanovesicles, microvesicles, glycated end-products, enzymes, chemical products of metabolism, chemical by-products of metabolism, cations, and anions.

Diagnostic Methods

[0188] In some embodiments, a method of the current disclosure may comprise selecting a therapeutic regimen. A method of selecting a therapeutic regimen may comprise: determining the presence or absence of cluster of differentiation 8 (CD8) protein, and at least one of: B-cell activating factor (BAFF) protein, B-cell activating factor receptor (BAFF -R) protein, and paired box Pax-5 (PAX5) protein in a cancer or a tumor of a subject or a cancer sample or a tumor sample of the subject; if CD8 protein and at least one of B-cell activating factor, B-cell activating factor-R, and PAX5 may be present in the cancer or the tumor or the cancer sample or the tumor sample, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof; if CD8 protein and at least one of B-cell activating factor, B-cell activating factor-R, and PAX5 is not present in the cancer or the tumor or the cancer sample or the tumor sample, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof.

[0189] The method may further comprise determining the presence or absence of a number of proteins, or cell-surface proteins, wherein the proteins may be, but may be not limited to, cluster of differentiation 19 (CD19) protein, cluster of differentiation 20 (CD20) protein, cluster of differentiation 138 (CD138) protein, or any combination thereof.

[0190] The method may be a method of treatment, wherein the treatment may comprise: administering a therapeutically effective amount of an immunotherapeutic agent or a salt thereof, wherein the immunotherapeutic agent or a salt thereof inhibits a biological cascade selected from the group consisting of a B-cell activating factor receptor cascade, a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor cascade, a B-cell maturation antigen receptor cascade, and any combination thereof; wherein the immunotherapeutic agent may be co-administered with a checkpoint inhibitor.

[0191] In some embodiments, the checkpoint inhibitor may be selected from the group consisting of an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, a salt of any of these, and any combination thereof. The method may comprise administering the anti-programmed cell death protein 1 agent of a salt thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be selected from the group consisting of docetaxel (Taxotere®, CAS number 114977-28-5), nivolumab (Opdivo®, CAS number 946414-94-4), pembrolizumab (Keytruda ®, CAS number 1374853-91-

4), a salt of any of these, and any combination thereof. The anti-programmed cell death protein 1 agent or a salt thereof may be pembrolizumab (Keytruda ®, CAS number 1374853-91-4). The immunotherapeutic agent may be tabalumab (CAS number 1143503-67-7) or a salt thereof. The immunotherapeutic agent may be belimumab (Benlystra®, CAS number 356547-88-1) or a salt thereof. The immunotherapeutic agent may be atacicept (CAS number 845264-92-8) or a salt thereof.

[0192] In some embodiments, a method of the current disclosure is a method of selecting a therapeutic regimen. The method may comprise: determining a count of B cells, T cells, and plasma cells in a cancer or a tumor of a subject or a cancer sample or a tumor sample of the subject; if a count of T cells in the cancer or the tumor or the cancer sample or the tumor sample may be greater than about 500 cells/mm^2 and/or a count of B cells is less than about 150 cells/mm^2, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof; if a count of T cells in the cancer or the tumor or the cancer sample or the tumor sample may be greater than about 300 cells/mm^2 and/or a count of B cells, a count of plasma cells, or a combination of B cells and plasma cells may be greater than about 100 cells/mm^2, selecting a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof. In some embodiments, a method of the current disclosure may comprise conveying a result via a communication medium.

[0193] In another aspect, the current disclosure provides a method of treating or maintaining remission of a cancer or a tumor in a subject. The method may comprise: administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, if a percentage of T cells in a cancer sample or a tumor sample of a subject may be greater than about 10% and/or a percentage of B cells may be less than about 5%, or administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof if a percentage of T cells in a cancer or a tumor sample of the subject may be less than about 10% and/or a percentage of B cells, a percentage of plasma cells, or a combination of the percentage of B cells and the percentage of plasma cells may be greater than about 10% in the cancer sample of the subject.

[0194] In some embodiments, after the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a percentage of T cells, a percentage of B cells, and a percentage of plasma cells. The cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof.

[0195] In another aspect, the current disclosure provides a method of assessing a likelihood of a subject having a cancer or a tumor exhibiting a clinically beneficial response to treatment. The method may comprise: assessing a count of T cells, B cells, and plasma cells in a cancer or a tumor sample of a subject; and calculating, using a computer system, a probability of treatment responsiveness based on (1) a ratio between the count of T cells and a reference count of T cells, (2) a ratio between the count of B cells and a reference count of B cells, and/or (3) a ratio between the count of plasma cells and a reference count of plasma cells. The method may further comprise designating the subject as having a high probability of exhibiting a clinically beneficial response to treatment if the ratio between the count of B cells and the reference count of B cells is less than 1. The method may further comprise designating the subject as having a high probability of exhibiting a clinically beneficial response to treatment if the ratio between the count of plasma cells and the reference count of plasma cells is less than 1. After the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a count of T cells, a count of B cells, and a count of plasma cells.

[0196] In some embodiments, a method may comprise surgery, radiation therapy, or administering a pharmaceutical agent, wherein the pharmaceutical agent may be an immunotherapeutic agent, a chemotherapeutic agent, a targeted therapeutic agent, a hormonal therapy agent, cell-based therapy agent, radiation therapy agent, or any salt thereof, or any combination thereof.

[0197] In some embodiments, a method may determine a count of cluster of differentiation 8 (CD8) protein, a count of cluster of differentiation 19 (CD19) protein, a count of cluster of differentiation 20 protein (CD20), a count of cluster of differentiation 138 (CD138) protein, a count of B-cell activating factor protein, a count of B-cell activating factor receptor protein, a count of paired box Pax-5 (PAX5) protein, or any combination thereof, in a cancer or a tumor or a cancer sample or a tumor sample of a subject.

[0198] In some embodiments, at least one of a count of cluster of differentiation 19 (CD19) protein, a count of cluster of differentiation 20 protein (CD20), a count of cluster of differentiation 138 (CD138) protein, a count of B-cell activating factor protein, a count of B-cell activating factor receptor protein, a count of paired box Pax-5 (PAX5) protein, or any combination thereof, may be present in a cancer or a tumor or a cancer sample or a tumor sample of a subject. At least one of CD19, CD20, CD138, B-cell activating factor, B-cell activating factor-R, and PAX5 may be individually present in a cancer or a tumor or a cancer sample or a tumor sample of a subject in an amount ranging from about 1 protein to at least about 10,000,000 proteins. An amount of protein in a cancer or a tumor or a cancer sample or a tumor sample may range between about 1 protein to about 100,000,000 proteins.

[0199] In one aspect, the current disclosure may provide a method of assessing a likelihood of a subject having a cancer or a tumor exhibiting a clinically beneficial response to treatment. The method may comprise: assessing a count of T cells, B cells, and plasma cells in a cancer or a tumor sample of a subject; and calculating, using a computer system, a probability of treatment responsiveness based on (1) a ratio between the count of T cells and a reference count of T cells, (2) a ratio between the count of B cells and a reference count of B cells, and/or (3) a ratio between the count of plasma cells and a reference count of plasma cells.

[0200] In some embodiments, the method further may comprise designating the subject as having a high probability of exhibiting a clinically beneficial response to treatment if the ratio between the count of B cells and the reference count of B cells may be less than 1. The method may further comprise designating the subject as having a high probability of exhibiting a clinically beneficial response to treatment if the ratio between the count of plasma cells and the reference count of plasma cells may be less than about 1.

[0201] In some embodiments, after the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a count of T cells, a count of B cells, and a count of plasma cells. The cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof. The method may further comprise surgery, radiation therapy, or administering a pharmaceutical agent, wherein the pharmaceutical agent may be an immunotherapeutic agent, a chemotherapeutic agent, a targeted therapeutic agent, a hormonal therapy agent, cell-based therapy agent, radiation therapy agent, any salt thereof, or any combination thereof.

[0202] In another aspect, the current disclosure provides a method of treating a cancer or a tumor in a subject. The method may comprise: administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, if a cancer or a tumor sample of a subject contains at least one cell contains a cluster of differentiation 8 (CD8) protein and no cell contains a cluster of differentiation 19 (CD19) protein or a cluster of differentiation 138 (CD138) protein; or administering an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof if a cancer or a tumor sample of a subject contains at least one cell contains a CD8 protein and at least one cell contains a CD19 or CD138 protein.

[0203] In some embodiments, after the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a count of T cells, a count of B cells, and a count of plasma cells. After the administration of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof, a decrease in at least one of the following may be observed when compared to a count prior to treatment: a count of T cells, a count of B cells, and a count of plasma cells.

[0204] In some embodiments, a decrease in a count of T cells, a decrease in a count of B cells, a decrease in a count of plasma cells, or any combination thereof, may be observed. The method may be a method of treating a cancer or a tumor in the subject. The cancer or the tumor may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, or any combination thereof.

[0205] In one aspect, the current disclosure provides a method of treating a cancer or a tumor in a subject. The method may comprise administering a therapeutically effective amount of a pharmaceutical agent and an immunotherapeutic agent. The presence of the CD8 protein, the CD19 protein, the CD20 protein, the CD139 protein, the B-cell activating factor protein, the B-cell activating factor-R protein, and the PAX5 protein may be determined by staining, imaging after staining, microscopy, or any combination thereof. The staining may comprise binding of an antibody to the protein. The staining may further comprise binding of a second antibody to a first antibody, wherein the second antibody may contain a fluorescence marker.

[0206] In some embodiments, the method may be repeated after administration of the therapeutic. The cancer sample or the tumor sample may comprise at least one cell comprising a CD8 protein and at least one cell comprising a CD19 protein, wherein the CD8 protein and the CD19 protein may have a distance apart of at most about 100 microns. The cancer sample or the tumor sample may comprise at least one cell comprising a CD8 protein and at least one cell comprising a CD19 protein, wherein the CD8 protein-containing cell and the CD19 protein-containing cell may have a distance apart of at most about 100 microns.

[0207] In some embodiments, a method described herein may comprise determining the number of aggregates of cells within a tumor sample or cancer sample of a subject. An aggregate of cells may be a cluster of cells. An aggregate may comprise at least about: 1, 2, 3, 4, 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 10,000, 100,000, 1,000,000 or more cells. In some embodiments, an aggregate of cells may comprise from about 1 cell to about 100 cells; from about 10 cells to about 50 cells; or from about 20 cells to about 40 cells.

[0208] In some embodiments, an aggregate of cells may be an aggregate of T-cells. In some embodiments, an aggregate of cells may be an aggregate of B-cells. In some embodiments, an aggregate of cells may comprise T-cells, B-cells, or a combination thereof. In some embodiments, a type of cell, or a cell type, may refer to a B-cell. In some embodiments, a type of cell, or a cell type, may refer to a T-cell.

[0209] In some embodiments, an aggregate may comprise a cell of hematopoietic lineage. An aggregate may comprise myeloid-derived cells, monocytes, macrophages, dendritic cells, mast cells, granulocytes, neutrophils, eosinophils, basophils, megakaryocytes, lymphoid-derived cells, NK-cells, T-cells, CD4, CD8, Gamma/delta T-cells, B-cells, plasma cells, or any combination thereof.

[0210] In some embodiments, the number of aggregates may be determined by: immunoassays, polymerase chain reaction, sequencing, including next generation sequencing, flow cytometry, or any combination thereof. The number of aggregates may be determined by: immunohistochemistry – chromogenic based, quantitative-based on the cellular level, quantitative-based on the single pixel level, immunohistochemistry – fluorescence-based , quantitative-based on the cellular level, quantitative-based on the single pixel level, RNA in situ hybridization – chromogenic based, quantitative-based on the dot level, quantitative-based on the single pixel level, RNA in situ hybridization – fluorescent based, quantitative-based on the dot level, quantitative-based on the single pixel level, multiplexed ion beam based imaging methods,

or any combination thereof. Assays may be performed in single or multiplex formats. An aggregate may be detected using a nuclear counterstain.

[0211] Assay reagents may include: antibody-based reagents, primary antibody+ secondary antibody, detectable label: enzymatic, chromogenic-based, detectable label: enzymatic, fluorescent-based, primary antibody+oligonucleotide, detectable label: complementary hybridization + PCR amplification, detectable label: complementary hybridization without PCR amplification, RNA-based, DNA-based reagents, or any combination thereof.

[0212] Proximity of cells may be defined as the closest distance between an edge of a first cell and an edge of a second cell. Proximity of cells may be defined as at least about: 0.01 micrometer (μm), 0.1, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, or more in distance. A first cell may be proximal in distance to a second cell, wherein the distance may be from about 0.01 μm to about 10 μm; from about 0.1 μm to about 7 μm; or from about 1 μm to about 5 μm. In some embodiments, a first cell may be proximal in distance to a second cell, wherein the distance between the two cells may be less than about: 1 μm, 0.1 μm, or 0.01 μm. In some cases, the distance between the two cells may be small such that the cell walls may be in contact with each other.

[0213] In some embodiments, a tumor or cancer may be classified as a Type I resistant tumor or cancer or a Type II resistant tumor or cancer. A Type I resistant tumor or cancer may possess low counts of CD8 when imaged both before and during anti-PDL1 single agent treatment. A Type II resistant tumor or cancer may possess high counts of CD8 when imaged both before and during anti-PDL1 single agent treatment.

[0214] If a tumor or cancer is classified as a Type II resistant tumor or cancer, then a single agent treatment may not be as therapeutically effective as desired. If a tumor or cancer may be classified as a Type II resistant tumor or cancer, then a combination therapy, or a therapeutic regimen comprising more than one active agent, may be administered. A Type II resistant tumor or cancer may be administered a therapeutic regimen comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and an immunotherapeutic agent or a salt thereof.

[0215] One embodiment provides a diagnostic method wherein a subject is identified as resistant to an immunotherapy comprising a single agent, such as an immune checkpoint protein inhibitor, by determining expression levels of one or more genes that code for proteins associated with a T-cell inflamed phenotype of a tumor microenvironment and correlating said expression with that of a gene coding for BAFF protein or a BAFF-receptor protein. One embodiment

provides a diagnostic method wherein a subject is identified as resistant or responsive to an immunotherapy comprising a single agent, such as an immune checkpoint protein inhibitor, by determining expression levels of a gene that code for BAFF protein or a BAFF-receptor protein, or a variant thereof. In some embodiments, a diagnostic method is provided wherein a subject is identified as responsive to a combination therapy comprising an agent that regulates activity of BAFF protein or a BAFF receptor, such as a BAFF inhibitor, a BAFF-receptor (BAFF-R) inhibitor, or a salt thereof, or any combination thereof. Non-limiting examples of such BAFF or BAFF-R inhibitors are provided in various embodiments of this disclosure. In some embodiments, a monitoring method can be provided wherein a subject may be identified as a suitable candidate for continuing treatment with an immunotherapy comprising a single agent or with a combination therapy comprising an immunotherapy and an agent that regulates activity of a BAFF protein or a BAFF-receptor protein. In some embodiment, a method described herein can be repeated multiple times to monitor a subject.

[0216] The above mentioned expression levels can be in some instances determined in a biological sample isolated from said patient. The biological sample, in some example, may be from a tumor microenvironment of a subject. Exemplary genes that can be representatives of a T cell inflamed phenotype are listed in Table 4. In some embodiments, exemplary genes that can be representative of a T cell inflamed signature can comprise any 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 or more genes listed in Table 4. In some cases, a method described herein can further comprise measuring expression levels of one or more genes listed in Table 5, (housekeeping genes). This disclosure contemplates variants, fragments, truncated, alternatively spliced, or mutated versions of the genes listed in Table 4 (see also sequences in Table 7) and Table 5 and the proteins encoded therefrom. One or more genes listed in Table 4 can be used to assess an inflammation status of a tumor, such as a T-cell inflamed signature. In some cases, one or more genes listed in Table 4 and a gene that codes for a BAFF protein, a BAFF-receptor protein, or a variant thereof can be used to assess a tumor signature, such as a T-cell inflamed signature. In various examples, a tumor's inflamed status, as determined by said T-cell inflamed signature, can further be used to determine a suitable therapeutic regimen for treating said tumor.

[0217] **Table 4**

Gene name	TCGA RNASeq Identifier
IL2RG	ENSG00000147168.11
CXCR6	ENSG00000172215.5
CD3D	ENSG00000167286.8
CD2	ENSG00000116824.4
ITGAL	ENSG00000005844.16

TAGAP	ENSG00000164691.15
CIITA	ENSG00000179583.16
HLA-DRA	ENSG00000204287.12
PTPRC	ENSG00000081237.17
CXCL9	ENSG00000138755.5
CCL5	ENSG00000271503.4
NKG_7	ENSG00000105374.8
GZMA	ENSG00000145649.7
PRF1	ENSG00000180644.6
CCR5	ENSG00000160791.13
CD3E	ENSG00000198851.8
GZMK	ENSG00000113088.5
IFNG	ENSG00000111537.4
HLA-E	ENSG00000204592.8
GZMB	ENSG00000100453.11
PDCD1	ENSG00000188389.9
SLAMF6	ENSG00000162739.12
CXCL13	ENSG00000156234.7
CXCL10	ENSG00000169245.5
IDO1	ENSG00000131203.11
LAG3	ENSG00000089692.7
STAT1	ENSG00000115415.17
CXCL11	ENSG00000169248.11
CD8A	ENSG00000153563.14
CCL2	ENSG00000108691.8
CCL3	ENSG00000277632.1
CCL4	ENSG00000275302.1
ICOS	ENSG00000163600.11
IRF1	ENSG00000125347.12
HLA-DMA	ENSG00000204257.13
HLA-DMB	ENSG00000242574.7
HLA-DOA	ENSG00000204252.11
HLA-DOB	ENSG00000241106.5

[0218] Table 5

Gene name	TCGA RNASeq Identifier
FAU	ENSG00000149806.9
IMP3	ENSG00000177971.8
MRPL1	ENSG00000169288.16

MRPL20	ENSG00000242485.4
MRPS2	ENSG00000122140.9
MRPS30	ENSG00000112996.8
MRTO4	ENSG00000053372.4
NHP2	ENSG00000145912.7
NSA2	ENSG00000164346.8
RPL10	ENSG00000147403.15
RPL22L1	ENSG00000163584.16
RPLP0	ENSG00000089157.14
RPP38	ENSG00000152464.13
RPS10	ENSG00000124614.12
RPS27L	ENSG00000185088.11
RSL1D1	ENSG00000171490.11
SNU13	ENSG00000100138.12
UBA52	ENSG00000221983.6
POLR1A	ENSG00000068654.14
POLR2A	ENSG00000181222.13
POLR3A	ENSG00000148606.11
TWISTNB	ENSG00000105849.5
ACLY	ENSG00000131473.15
ACO1	ENSG00000122729.17
CS	ENSG00000062485.17
DLAT	ENSG00000150768.14
DLD	ENSG00000091140.11
DLST	ENSG00000119689.13
FH	ENSG00000091483.6
IDH1	ENSG00000138413.12
MDH1	ENSG00000014641.16
OGDH	ENSG00000105953.13
PC	ENSG00000173599.12
PDHA1	ENSG00000131828.12
SDHA	ENSG00000073578.15
SUCLA	ENSG00000136143.12

[0219] The expression levels can be determined using any sequencing based techniques, including but not limited to RNA-seq, methods that utilize bisulfite conversion (such as MethylC-seq8 and Reduced Representation Bisulfite Sequencing, or RRBS9), methods that utilize enrichment of methylated DNA (Methylated DNA Immunoprecipitation sequencing, or MeDIP-seq10, 11 and Methylated DNA Binding Domain sequencing, or MBD-seq12), qPCR

was performed using the Fluidigm Biomark system, serial analysis gene expression technology, targeted RNA sequencing, mRNA sequencing, total RNA-seq. Any other appropriate method can be used to determine expression levels, such as, for example, immunohistochemistry, immunofluorescence, multiplexed ion beam imaging based methods. MIBI can be a mass spectrometry based imaging platform wherein secondary ion mass spectrometry can be used to image antibodies tagged with isotopically pure elemental metal reporters, instead of antibodies tagged with fluorophores or enzyme reporters that generate colored pigments.

[0220] Following determination of expression levels of genes that are associated with T cell inflamed phenotype of a tumor microenvironment, and that of BAFF or BAFF-receptor coding genes, said expression levels can be correlated using a correlation technique, such as a t-test, a paired t-test, an analysis of variance (ANOVA), a repeated measures ANOVA, a simple linear regression, a nonlinear regression, a multiple linear regression, a multiple nonlinear regression, a Wilcoxon signed-rank test, a MannWhitney test, a Kruskal-Wallis test, a Friedman test, a Spearman rank order correlation coefficient, a Kendall Tau analysis, or a nonparametric based test, such as a regression test. In some embodiments, where BAFF gene expression and T cell inflamed signature in a tumor microenvironment positively correlates, a subject may benefit from a therapeutic method disclosed herein. For example, a treatment comprising a BAFF inhibitor or a BAFF receptor inhibitor.

Pharmaceutical Compositions

[0221] Provided herein, in some embodiments, may be compositions comprising a therapeutically effective amount of an immunotherapeutic agent and a checkpoint inhibitor.

[0222] In some embodiments, an inhibitor may refer to an agent or a therapy that may be an agonist, an antagonist, a partial agonist, a partial antagonist, or any combination thereof.

[0223] In some embodiments, an immunotherapeutic agent or a salt thereof may inhibit a biological cascade selected from the group consisting of: a B-cell activating factor receptor cascade, a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor cascade, a B-cell maturation antigen receptor cascade, and any combination thereof.

[0224] A checkpoint inhibitor may be an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, a salt of any of these, and any combination thereof.

[0225] An anti-programmed cell death protein 1 (PD-1) agent may be an agent that inhibits or at least partially inhibits the binding of the PD-1 cell surface receptor to a ligand, wherein the ligand may be anti-programmed death ligand 1 (PD-L1) or anti-programmed death ligand 2 (PD-

L2). While not wishing to be bound by theory, inhibition of the binding of the PD-1 receptor to a ligand may activate an immune response.

[0226] An immunotherapeutic agent may be an agent that at least partially blocks a B-cell activating factor (BAFF) receptor cascade.

[0227] In some embodiments, the immunotherapeutic agent or salt thereof may inhibit a B-cell activating factor receptor (BAFF) cascade, a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor (TACI) cascade, a B-cell maturation antigen receptor (BCMA) cascade, or any combination thereof.

[0228] In some embodiments, an immunotherapeutic agent or a salt thereof at least partially may prevent binding of a ligand to a B-cell activating factor receptor; may be a partial antagonist of a B-cell activating factor receptor; may be a partial agonist of a B-cell activating factor receptor; may be a competitive antagonist of a B-cell activating factor receptor; may be a non-competitive antagonist of a B-cell activating factor receptor; or any combination thereof. In some embodiments, immunotherapeutic agent or a salt thereof at least partially may prevent ligand binding to a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; may be a partial antagonist of a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; may be a partial agonist of a transmembrane activator and calcium-modulator and cyclophilin ligand interactor receptor; or any combination thereof. In some embodiments, an immunotherapeutic agent or a salt thereof at least partially may prevent ligand binding to a B-cell maturation antigen receptor; may be a partial antagonist of a B-cell maturation antigen receptor; may be a partial agonist of a B-cell maturation antigen receptor; or any combination thereof.

[0229] An immunotherapeutic agent may be a small molecule, an antibody, a partial antibody, or any combination thereof. An immunotherapeutic agent may be an antibody or a salt thereof. The immunotherapeutic agent may be a human antibody, a humanized monoclonal antibody, or a salt thereof.

[0230] In some embodiments, the immunotherapeutic agent or a salt thereof may be ardenermin, briobacept, blisibimod (A-623, CAS number 1236126-45-6), belimumab (Benlystra®, CAS number 356547-88-1), a transmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, MEDI-0700, NOV-5, rGel/BLyS, tabalumab (CAS number 1143503-67-7), atacicept (CAS number 845264-92-8), RCT-18, a salt of any of these, and any combination thereof. An immunotherapeutic agent or a salt thereof may be selected from the group consisting of: MEDI-700, NOV-5, rGel/BLyS, a salt of any of these, and any combination thereof. The immunotherapeutic agent may be tabalumab (CAS number 1143503-67-7) or a salt

thereof. The immunotherapeutic agent may be LY_2127399 or a salt thereof. The immunotherapeutic agent may be atacicept (CAS number 845264-92-8) or a salt thereof. The immunotherapeutic agent may be blisibimod (A-623, CAS number 1236126-45-6) or a salt thereof. The immunotherapeutic agent may be belimumab (Benlystra®, CAS number 356547-88-1) or a salt thereof. A BAFF/BAFF-R inhibitor may be combined with avelumab (Bavencio®, CAS number 1537032-82-8). A BAFF/BAFF-R inhibitor may be combined with pembrolizumab (Keytruda ®, CAS number 1374853-91-4).

[0231] In some embodiments, a PD-L1 inhibitor may be avelumab (Bavencio®, CAS number 1537032-82-8). In some embodiments, a PD-L1 inhibitor may be Bavencio. In some embodiments, a PD-L1 inhibitor may be atezoluzumab. In some embodiments, a PD-L1 inhibitor may be tecentriq. In some embodiments, a PD-1 inhibitor may be pembrolizumab (Keytruda ®, CAS number 1374853-91-4). In some embodiments, a PD-1 inhibitor may be keytruda. In some embodiments, a PD-1 inhibitor may be MK_3475. In some embodiments, a PD-1 inhibitor may be lambrolizumab. In some embodiments, a PD-1 inhibitor may be nivolumab (Opdivo®, CAS number 946414-94-4). In some embodiments, a PD-1 inhibitor may be opdivo. In some embodiments, a PD-1 inhibitor may be ONO_4538. In some embodiments, a PD-1 inhibitor may be BMS_936558. In some embodiments, a PD-1 inhibitor may be MDX_1106.

[0232] An immunotherapeutic agent may be an antibody. An immunotherapeutic agent may be a human monoclonal antibody. An immunotherapeutic agent may be a humanized monoclonal antibody, chimeric antibody, or an isolated or purified version of any of the above. An immunotherapeutic agent may be tabalumab (CAS number 1143503-67-7) or a fragment or a salt thereof. Any compound, molecule, protein, antibody, antibody fragment, or salt of any thereof, described herein may be isolated and purified.

[0233] An immunotherapeutic agent may be a checkpoint inhibitor, an immune agonist, a vaccine, a virus, or a T-cell.

[0234] Compositions may comprise a therapeutically effective amount of a pharmaceutical agent and an immunotherapeutic agent. Compositions may comprise a therapeutically effective amount of a pharmaceutical agent and an immunotherapeutic agent, wherein the immunotherapeutic agent may be tabalumab (CAS number 1143503-67-7) or a fragment or a salt thereof.

[0235] Compositions may comprise a therapeutically effective amount of a pharmaceutical agent and an immunotherapeutic agent, wherein the immunotherapeutic agent may be briobacept, rGel/BLyS, BLyS radiolabeled, Xencor, NOV-5, ardenermin, anti-BR3, blisibimod (A-623, CAS

number 1236126-45-6), belimumab (Benlystra®, CAS number 356547-88-1), IL-17-bispecific antibody, anti-BLyS/APRIL antibody fusion protein, or a fragment or a salt thereof.

[0236] Compositions may comprise a therapeutically effective amount of a pharmaceutical agent and an immunotherapeutic agent, wherein the immunotherapeutic agent may be florbetapir, solanezumab, scyllo-inositol, gantenerumab, flutafuranol F18, cromolyn sodium + ibuprofen, AZTherapies, crenezumab, CAD-106, aducanumab, UB-311, GSK-933776A, BAN-2401, ACI-24, VM-100, SAR-228810, NGP-555, MRZ-99030, MEDI-1814, LY-3002813, Lu-AF-20513, HSRx 888 + donepezil hydrochloride, Exebryl-1, bisnorcymserine, anti-amyloid beta antibody, Kyowa Hakko Kirin, ALZ-801, Affitope AD-03, AAB-003, (+)-phenserine, TRV-101, RV-03, P-8, NPT440-1, MRK-560, KAL-ABP, IN-N01-OX2, IN-N01, CB-301, C12, Pharma Bio, CT-01344, BAN-2502, AZP-2006, anti-beta amyloid, Aerie, anti-amyloid beta programme, anti-amyloid beta antibody-2, anti-amyloid beta antibody, ALZT-Patch, ALZ-201, AGT-160, ADx, ACU-193, ACI-812, ACI-260, ZT-331, ACC-001, tramiprosate, SIB-1281, ponezumab, PF-4382923, GT3001, GT2501, GT2342, bapineuzumab, AN-1792, ACU-244, V-950, U-101033E, CHF-5022, SeV-2-0401, SEN-1576, SEN-1500, SEN-1269, SEN-1176, RV-02, RV-01, RS-0406, PX-106, PTI-L07665, PTI-48579, PTI-3001, PTI-2001, PTI-00703, protease nexin-1, SIBIA, phenserine(-)-eseroline phenylcarbamate(-)-phenserine, Pharmaprojects No. 5550, Pharmaprojects No. 4246, DP-74, NU-700, NP-0361, , MPI-442690, MPI-423948MPI-127585, MK-3328, MER-5101, KMS-88009KMS-88016, INM-176, ESBA-212, EDN-OL1, DP-68, DLX-212, DBT-1339, Cymserine, N1-phenethylnorcymserine, CLR-01, CaprospinolSP-233, BAN-2203AD-2203, AZD-2995, AZD-2184, ARC-031, amyloid inhibiting peptides, amyloid beta modulator, AMDL receptor antagonist, ALZT-OP2, SPI-008SPI-0090, SPI-019, AGT-3100, AGT-100, Affitope AD-02, Affitope AD-01, ACU-CD0061, ACU-5A5, ACU-347, ACU-193, ABP-102, DRM-106, or a fragment or a salt of any of these.

[0237] A pharmaceutical agent may be an immunotherapeutic agent, a chemotherapeutic agent, a targeted therapeutic agent, a hormonal therapy agent, cell-based therapy agent, or radiation therapy agent.

[0238] In some embodiments, a composition may comprise a pharmaceutical agent and an immunotherapeutic agent, wherein the immunotherapeutic agent may be a B-cell activating factor inhibitor and at least partially may block the BAFF receptor cascade.

[0239] Pharmaceutical compositions may be formulated using one or more physiologically acceptable carriers including excipients and auxiliaries that may facilitate processing of the pharmaceutical composition into preparations that may be used pharmaceutically. Proper formulation may be dependent upon the route of administration chosen. A summary of

pharmaceutical compositions may be found, for example, in 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; Liberman, 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).

[0240] The compositions and methods of the present disclosure may be utilized to treat an individual in need thereof. The individual may be a mammal such as a human, or a non-human mammal. A subject may be a human. The human may be an adult male, an adult female, a female child, or a male child. When administered to an animal, such as a human, the composition or the pharmaceutical composition, may be administered as a pharmaceutical composition comprising, for example, a therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent and a pharmaceutically acceptable carrier or excipient. Pharmaceutically acceptable carriers may include, for example, aqueous solutions such as water or physiologically buffered saline or other solvents or vehicles such as glycols, glycerol, oils such as olive oil, or injectable organic esters. In an embodiment, when such pharmaceutical compositions may be for human administration, particularly for invasive routes of administration, *e.g.*, routes, such as injection or implantation, that circumvent transport or diffusion through an epithelial barrier, the aqueous solution may be pyrogen-free, or substantially pyrogen-free. The excipients may be chosen, for example, to affect delayed release of an agent or to selectively target one or more cells, tissues or organs. The pharmaceutical composition may be in dosage unit form such as tablet, capsule, granule, lyophile for reconstitution, powder, solution, syrup, suppository, injection or the like. The composition may also be present in a transdermal delivery system, *e.g.*, a skin patch. The composition may also be present in a solution suitable for topical administration, such as an eye drop.

[0241] A pharmaceutically acceptable excipient may contain physiologically acceptable agents that act, for example, to stabilize, increase solubility or to increase the absorption of a composition such as a therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent. Such physiologically acceptable agents can include, for example, carbohydrates, such as glucose, sucrose or dextrans, antioxidants, such as ascorbic acid or glutathione, chelating agents, low molecular weight proteins or other stabilizers or excipients. The choice of a pharmaceutically acceptable excipient, including a physiologically acceptable agent, may depend, for example, on the route of administration of the composition. The preparation or pharmaceutical composition may be a self-emulsifying drug delivery system or a

self-micro emulsifying drug delivery system. The pharmaceutical composition (preparation) also may be a liposome or other polymer matrix, which may have incorporated therein, for example, a therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent. Liposomes, for example, which may comprise phospholipids or other lipids, may be nontoxic, physiologically acceptable and metabolizable carriers that may be relatively simple to make and administer.

[0242] In some embodiments, the immunotherapeutic agent or a salt thereof may be administered in a pharmaceutical composition.

[0243] In one aspect, the current disclosure may provide a composition comprising an anti-programmed cell death protein 1 agent, an anti-programmed death ligand 1 agent, an anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and an immunotherapeutic agent or a salt thereof.

[0244] In some embodiments, the composition may be a pharmaceutical composition. The pharmaceutical composition may be in unit dose form. The immunotherapeutic agent or a salt thereof may be an antibody or a salt thereof. The immunotherapeutic agent or a salt thereof may be a human or humanized monoclonal antibody or a salt thereof. The immunotherapeutic agent or a salt thereof may be selected from the group consisting of: ardenermin, briobacept, blisibimod (A-623, CAS number 1236126-45-6), belimumab (Benlystra®, CAS number 356547-88-1), atransmembrane activator and calcium-modulator and cyclophilin ligand interactorcept, MEDI-0700, NOV-5, rGel/BLyS, tabalumab (CAS number 1143503-67-7), atacicept (CAS number 845264-92-8), RCT-18, a salt of any of these, and any combination thereof. The immunotherapeutic agent or a salt thereof may be tabalumab (CAS number 1143503-67-7) or a salt thereof. A composition may further comprise a pharmaceutically acceptable excipient.

[0245] In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and the immunotherapeutic agent or a salt thereof may be independently administered in an amount from about 0.1 mg to about 10 g. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and the immunotherapeutic agent or a salt thereof may be independently from about 0.001% to about 99% by weight of the composition. In some embodiments, the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and

the immunotherapeutic agent or a salt thereof may be independently administered in an amount of from about 0.1 mg to about 100 mg per kg body weight.

[0246] In some embodiments, the composition may be in a form of a tablet, a capsule, a gel, or a liquid formulation.

[0247] In one aspect, the present disclosure provides for a kit comprising a composition of any one of the preceding claims. In some embodiments, the kit may contain instructions for use.

[0248] In one aspect, the present disclosure provides a method of making a kit disclosed herein. The method may comprise contacting or combining the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof, and the immunotherapeutic agent or a salt thereof. In some embodiments, the composition may be in a form of a tablet, a capsule, a gel, or a liquid formulation.

[0249] In one aspect, the present disclosure may provide a method of making a composition of any one of the preceding claims. the method may comprise contacting or combining the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt thereof or any combination thereof, and the immunotherapeutic agent or a salt thereof.

Routes of Administration

[0250] A pharmaceutical composition may be administered to a subject by any of a number of routes of administration including, for example, orally, for example, drenches as in aqueous or non-aqueous solutions or suspensions, tablets, capsules, including sprinkle capsules and gelatin capsules, boluses, powders, granules, pastes for application to the tongue; absorption through the oral mucosa, *e.g.*, sublingually; anally, rectally or vaginally, for example, as a pessary, cream or foam; parenterally, including intramuscularly, intravenously, subcutaneously or intrathecal as, for example, a sterile solution or suspension; nasally; intraperitoneally; subcutaneously; transdermal, for example, as a patch applied to the skin; and topically, for example, as a cream, ointment or spray applied to the skin, as an eye drop, or any combination thereof. The pharmaceutical composition may also be formulated for inhalation. A therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent may be simply dissolved or suspended in sterile water. A composition may be administered directly to a cancer or a tumor. Administration of a composition may be to a different location of the body than where the cancer or tumor may be detected or present.

[0251] A pharmaceutical composition may be a sterile aqueous or non-aqueous solution, suspension or emulsion, *e.g.,* a microemulsion. The excipients described herein may be examples

and are in no way limiting. An effective amount or therapeutically effective amount may refer to an amount of the one or more pharmaceutical compositions administered to a subject, either as a single dose or as part of a series of doses, which is effective to produce a desired therapeutic effect.

[0252] Subjects may generally be monitored for therapeutic effectiveness using assays and diagnostic methods suitable for the condition being treated. Pharmacokinetics of a therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent, or one or more metabolites thereof, that may be administered to a subject may be monitored by determining the level of the pharmaceutical composition or metabolite in a biological fluid, for example, in the blood, blood fraction, *e.g.,* serum, and/or in the urine, and/or other biological sample or biological tissue from the subject.

[0253] The dose of a therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent described herein for treating a cancer may depend upon the subject's condition, that is, stage of the disease, severity of symptoms caused by the disease, general health status, as well as age, gender, and weight, and other factors apparent to a person skilled in the medical art. A subject may have been previously diagnosed with a cancer or a tumor. A subject may have previously undergone treatment for a cancer or a tumor. A subject may be currently undergoing treatment for a cancer or a tumor. The current treatment of the subject may be less than therapeutically effective. The subject may have been previously treated with a checkpoint inhibitor, and the cancer or the tumor may have been at least partially refractive. The cancer or tumor may be considered partially refractive if the mass or volume of the cancer or tumor continues to grow at a constant rate, or if the mass or volume of the cancer or tumor may not substantially change or decrease.

[0254] Pharmaceutical compositions may be administered in a manner appropriate to the disease to be treated as determined by persons skilled in the medical arts. In addition to the factors described herein and above related to use of pharmaceutical composition for treating a cancer, suitable duration and frequency of administration of the pharmaceutical composition may also be determined or adjusted by such factors such as the condition of the subject, the type and severity of the subject's disease, the particular form of the active ingredient, and the method of administration. Optimal doses of an agent may generally be determined using experimental models and/or clinical trials. The optimal dose may depend upon the body mass, weight, or blood volume of the subject. Design and execution of pre-clinical and clinical studies for a pharmaceutical composition, including when administered for prophylactic benefit, described herein may be within the skill of a person skilled in the relevant art.

[0255] When two or more pharmaceutical compositions may be administered to treat a cancer, the optimal dose of each pharmaceutical composition may be different, such as less than when either agent may be administered alone as a single agent therapy. Two pharmaceutical compositions in combination may act synergistically, and either agent may be used in a lesser amount than if administered alone. Administration of a checkpoint inhibitor and an immunotherapeutic agent may act synergistically or more than additively, when compared to either agent administered alone. A composition comprising a checkpoint inhibitor and an immunotherapeutic agent may produce a more than additive effect on a tumor or a cancer. The synergy of a combination of the current disclosure may be at least about: 1%, 2%, 3%, 5%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, or more greater than the additive effect.

[0256] In some embodiments, a composition of the disclosure comprising an anti-programmed cell death protein 1 agent and an immunotherapeutic agent may be more effective as compared to the corresponding additive effect of the anti-programmed cell death protein 1 agent and an immunotherapeutic agent. A composition of the disclosure may be at least about: 15% more effective, 20% more effective, 25% more effective, 30% more effective, 35% more effective, 40% more effective, 45% more effective, 50% more effective, 55% more effective, 60% more effective, 65% more effective, 70% more effective, 75% more effective, 80% more effective, 85% more effective, 95% more effective, or 100% more effective than the effect of a monotherapy comprising an anti-programmed cell death protein 1 agent, and/or the effect of a monotherapy comprising an immunotherapeutic agent.

[0257] A composition of the disclosure may be at least about: 1% more effective, 5% more effective, 10% more effective, 15% more effective, 20% more effective, 25% more effective, 30% more effective, 35% more effective, 40% more effective, 45% more effective, 50% more effective, 55% more effective, 60% more effective, 65% more effective, 70% more effective, 75% more effective, 80% more effective, 85% more effective, 95% more effective, or 100% more effective than the corresponding additive effect of the anti-programmed cell death protein 1 agent and an immunotherapeutic agent.

[0258] An amount of a pharmaceutical composition or active therein that may be administered per day may be, for example, from, between about 0.01 mg/kg and about 100 mg/kg, *e.g.*, from between about 0.1 to about 1 mg/kg, from between about 1 to about 10 mg/kg, from between about 10mg/kg and about 50 mg/kg, from between about 50mg/kg to about 100 mg/kg body weight. In other embodiments, the amount of a pharmaceutical composition that may be administered per day may be from between about 0.01 mg/kg and about 1000 mg/kg, from between about 100mg/kg and about500 mg/kg, or from between about 500 mg/kg and about

1000 mg/kg body weight. The optimal dose, per day or per course of treatment, may be different for the cancer or tumor to be treated and may also vary with the administrative route and therapeutic regimen.

[0259] Pharmaceutical compositions comprising a pharmaceutical composition may be formulated in a manner appropriate for the delivery method by using techniques routinely practiced in the art. The composition may be in the form of a solid, *e.g.,* tablet, capsule, semi-solid, *e.g.,* gel, liquid, or gas, *e.g.*, aerosol. The pharmaceutical composition may be administered as a bolus infusion.

[0260] Exemplary pharmaceutically acceptable excipients may include sterile saline and phosphate buffered saline at physiological pH. Preservatives, stabilizers, dyes, buffers, and the like may be provided in the pharmaceutical composition. In addition, antioxidants and suspending agents may also be used. The type of excipient selected may be based on the mode of administration, as well as the chemical composition of the pharmaceutical composition. Alternatively, compositions described herein may be formulated as a lyophilizate. A composition described herein may be lyophilized or otherwise formulated as a lyophilized product using one or more appropriate excipient solutions for solubilizing and/or diluting the pharmaceutical composition of the composition upon administration. In other embodiments, the pharmaceutical composition may be encapsulated within liposomes. Pharmaceutical compositions may be formulated for any appropriate manner of administration described herein and in the art.

[0261] A pharmaceutical composition, which may be combined with at least one pharmaceutically acceptable excipient to form a pharmaceutical composition, is administered directly to the target tissue or organ comprising tumor cells that contribute to manifestation of the disease or disorder.

[0262] A pharmaceutical composition, *e.g.,* for oral administration or for injection, infusion, subcutaneous delivery, intramuscular delivery, intraperitoneal delivery or other method, may be in the form of a liquid. A liquid pharmaceutical composition may include, for example, one or more of the following: a sterile diluent such as water, saline solution, physiological saline solution, Ringer's solution, isotonic sodium chloride, fixed oils that may serve as the solvent or suspending medium, polyethylene glycols, glycerin, propylene glycol or other solvents; antibacterial agents; antioxidants; chelating agents; buffers and agents for the adjustment of tonicity such as sodium chloride or dextrose. A parenteral composition may be enclosed in ampoules, disposable syringes or multiple dose vials made of glass or plastic. The use of physiological saline may be used, and an injectable pharmaceutical composition may be sterile. In another embodiment, for treatment of an ophthalmological condition or disease, a liquid

pharmaceutical composition may be applied to the eye in the form of eye drops. A liquid pharmaceutical composition may be delivered orally.

[0263] For oral formulations, at least one of the pharmaceutical compositions described herein may be used alone or in combination with appropriate additives to make tablets, powders, granules or capsules, and if desired, with diluents, buffering agents, moistening agents, preservatives, coloring agents, and flavoring agents. The pharmaceutical compositions may be formulated with a buffering agent to provide for protection of the pharmaceutical composition from low pH of the gastric environment and/or an enteric coating. A pharmaceutical composition included in a pharmaceutical composition may be formulated for oral delivery with a flavoring agent, *e.g.*, in a liquid, solid or semi-solid formulation and/or with an enteric coating.

[0264] A pharmaceutical composition comprising any one of the pharmaceutical compositions described herein may be formulated for sustained release, slow release, timed release, or controlled release. Such compositions may generally be prepared and administered by, for example, oral, rectal, intradermal, or subcutaneous implantation, or by implantation at the desired target site. Sustained-release formulations may contain the pharmaceutical composition dispersed in a carrier matrix and/or contained within a reservoir surrounded by a rate controlling membrane. Excipients for use within such formulations may be biocompatible, and may also be biodegradable. The amount of pharmaceutical composition contained within a sustained release formulation depends upon the site of implantation, the rate and expected duration of release, and the nature of the condition, disease or disorder to be treated or prevented.

[0265] The pharmaceutical compositions comprising a pharmaceutical composition may be formulated for transdermal, intradermal, or topical administration. The compositions may be administered using a syringe, bandage, transdermal patch, insert, or syringe-like applicator, as a powder/talc or other solid, liquid, spray, aerosol, ointment, foam, cream, gel, paste. The active compositions may also be delivered via iontophoresis. Preservatives may be used to prevent the growth of fungi and other microorganisms. Suitable preservatives may include, but are not limited to, benzoic acid, butylparaben, ethyl paraben, methyl paraben, propylparaben, sodium benzoate, sodium propionate, benzalkonium chloride, benzethonium chloride, benzyl alcohol, cetypyridinium chloride, chlorobutanol, phenol, phenylethyl alcohol, thimerosal, or any combination thereof.

[0266] Pharmaceutical compositions may be formulated as emulsions for topical application. The pharmaceutical composition described herein may be formulated as in inhalant. Inhaled methods may deliver medication directly to the airway. The pharmaceutical composition may be

formulated with oleaginous bases or ointments to form a semisolid composition with a desired shape.

[0267] Controlled or sustained release transdermal or topical formulations may be achieved by the addition of time-release additives, such as polymeric structures, and matrices. For example, the compositions may be administered through use of hot-melt extrusion articles, such as bioadhesive hot-melt extruded film. The formulation may comprise a cross-linked polycarboxylic acid polymer formulation. A cross-linking agent may be present in an amount that provides adequate adhesion to allow the system to remain attached to target epithelial or endothelial cell surfaces for a sufficient time to allow the desired release of the pharmaceutical composition.

[0268] A polymer formulation may also be utilized to provide controlled or sustained release. Bioadhesive polymers may be used. By way of example, a sustained-release gel and the pharmaceutical composition may be incorporated in a polymeric matrix, such as a hydrophobic polymer matrix. Examples of a polymeric matrix may include a microparticle. The microparticles may be microspheres, and the core may be of a different material than the polymeric shell. Alternatively, the polymer may be cast as a thin slab or film, a powder produced by grinding or other standard techniques, or a gel such as a hydrogel. The polymer may also be in the form of a coating or part of a bandage, stent, catheter, vascular graft, or other device to facilitate delivery of the pharmaceutical composition. The matrices may be formed by solvent evaporation, spray drying, or solvent extraction.

[0269] Kits with unit doses of one or more of the agents described herein, usually in oral or injectable doses, may be provided. Such kits may include a container containing the unit dose, an informational package insert describing the use and attendant benefits of the drugs in treating a tumor or cancer, instructions for use, and optionally an appliance or device for delivery of the composition.

Dosing and Treatment Regimens

[0270] The pharmaceutical compositions described herein may be used in the preparation of medicaments for the prevention or treatment of a cancer. In addition, a method for treating any of the diseases or conditions described herein in a subject in need of such treatment, involves administration of pharmaceutical compositions containing at least a therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent, or a pharmaceutically acceptable salt, pharmaceutically acceptable prodrug, or pharmaceutically acceptable solvate thereof, in therapeutically effective amounts to the subject.

[0271] In some embodiments, the present disclosure may provide a method for treating any of the diseases or conditions described herein in a subject in need of such treatment, wherein the treatment may involve administration of pharmaceutical composition containing at least a therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent, wherein the immunotherapeutic agent may be tabalumab (CAS number 1143503-67-7) or a fragment or a salt thereof.

[0272] A count of B cells, or a component thereof, or plasma cells, or a component thereof, may be observed in a sample of whole blood, blood serum, blood plasma, tumor, saliva, sweat, or urine of a subject. A specific treatment method for each individual subject may be determined based on a count of B cells or plasma cells or T cells, or any combination thereof.

[0273] In some embodiments, the present disclosure may provide a method of administering an anti-programmed cell death protein 1 agent or a salt thereof or an anti-PD-L1 agent or a salt thereof if a count of T cells in a cancer or a tumor sample of a subject is greater than about: 10 cells/mm^2, 100 cells/mm^2, 200 cells/mm^2, 300 cells/mm^2, 400 cells/mm^2, 500 cells/mm^2, 600 cells/mm^2, 700 cells/mm^2, 800 cells/mm^2, 900 cells/mm^2, or 1000 cells/mm^2, and a count of B cells is less than 1000 cells/mm^2, 900 cells/mm^2, 800 cells/mm^2, 700 cells/mm^2, 600 cells/mm^2, 500 cells/mm^2, 400 cells/mm^2, 300 cells/mm^2, 200 cells/mm^2, 150 cells/mm^2, 100 cells/mm^2, 90 cells/mm^2, or 75 cells/mm^2.

[0274] In some embodiments, the present disclosure may provide a method of administering an anti-programmed cell death protein 1 agent or a salt thereof or an anti-PD-L1 agent or a salt thereof, and an immunotherapeutic agent at a salt thereof if a count of T cells in a cancer or a tumor sample of a subject may be greater than about: 10 cells/mm^2, 100 cells/mm^2, 200 cells/mm^2, 300 cells/mm^2, 400 cells/mm^2, 500 cells/mm^2, 600 cells/mm^2, 700 cells/mm^2, 800 cells/mm^2, 900 cells/mm^2, or 1000 cells/mm^2 and a count of B cells, a count of plasma cells, or a combination of B cells and plasma cells may be greater than about: 10 cells/mm^2, 100 cells/mm^2, 200 cells/mm^2, 300 cells/mm^2, 400 cells/mm^2, 500 cells/mm^2, 600 cells/mm^2, 700 cells/mm^2, 800 cells/mm^2, 900 cells/mm^2, or 1000 cells/mm^2 in a cancer or a tumor sample of a subject.

[0275] In some embodiments, the present disclosure may provide a method of administering an anti-programmed cell death protein 1 agent or a salt thereof or an anti-PD-L1 agent or a salt thereof if a percentage of T cells in a cancer sample or a tumor sample of a subject may be greater than about: 5%, 10%, 15%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, or more, and a percentage of B cells may be less than about: 50%, 40%, 30%, 20%, 15%, 10%, 5%, or less.

[0276] In some embodiments, the present disclosure may provide a method of administering an anti-programmed cell death protein 1 agent or a salt thereof or an anti-PD-L1 agent or a salt

thereof, and an immunotherapeutic agent or a salt thereof if a percentage of T cells in a cancer or a tumor sample of a subject may be less than about: 50%, 40%, 30%, 20%, 15%, 10%, 5%, or less, and a percentage of B cells, a percentage of plasma cells, or a combination of a percentage of B cells and a percentage of plasma cells may be greater than about: 5%, 10%, 15%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, or 90% in a cancer sample of a subject.

[0277] The compositions containing the pharmaceutical compositions described herein may be administered for prophylactic and/or therapeutic treatments. In therapeutic applications, the compositions may be administered to a subject already suffering from a disease or condition, in an amount sufficient to cure or at least partially arrest the symptoms of the disease or condition. Amounts effective for this use may depend on the severity and course of the disease or condition, previous therapy, the subject's health status, weight, and response to the drugs, and the judgment of the treating physician.

[0278] In the case wherein the subject's condition does not improve, upon the doctor's discretion the administration of the pharmaceutical composition may be administered chronically, that is, for an extended period of time, including throughout the duration of the subject's life in order to ameliorate or otherwise control or limit the symptoms of the subject's disease or condition.

[0279] In the case wherein the subject's status does improve, upon the doctor's discretion the administration of the pharmaceutical composition may be given continuously; alternatively, the dose of drug being administered may be temporarily reduced or temporarily suspended for a length of time (i.e., a "drug holiday"). The length of the drug holiday may vary from between about 2 days and about 1 year, including by way of example only about: 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 may be from about 10% to about 100%, including, by way of example, about 10%, about 15%, about 20%, about 25%, about 30%, about 35%, about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 95%, or about 100% relative to a dosage administered before or after the drug holiday.

[0280] In some cases, the administration of the pharmaceutical composition may be given indefinitely.

[0281] In the cases, a subject may exhibit a desired response to an anti-programmed cell death protein 1 therapy. In some cases, a subject may exhibit a partial desired response to an anti-programmed cell death protein 1 therapy. In some cases, a subject may have been previously

treated with a monotherapy. In some cases, a subject may become resistant to a monotherapy. A subject may become resistant, or show signs of resistance, after about: 1 day, 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, 400 days, 500 days, 600 days, 700 days, 800 days, 900 days, or more after treatment of a monotherapy.

[0282] In some embodiments, the current disclosure provides a method of treating a patient in need thereof comprising a treatment regimen of a monotherapy for a desired amount of time, followed by treatment of a combination therapy for a desired amount of time.

[0283] Once improvement of the subject's conditions may have occurred, a maintenance dose may be administered if necessary. Subsequently, the dosage or the frequency of administration, or both, may be reduced, as a function of the symptoms, to a level at which the improved disease, disorder or condition is retained. Subjects can, however, require intermittent treatment on a long-term basis upon any recurrence of symptoms.

[0284] The amount of a given agent that may correspond to such an amount may vary depending upon factors such as the particular pharmaceutical composition, disease or condition and its severity, the identity (*e.g.*, weight) of the subject or host in need of treatment, but may nevertheless be determined in a manner recognized in the field according to the particular circumstances surrounding the case, including, *e.g.*, the specific agent being administered, the route of administration, the condition being treated, and the subject or host being treated. In general, however, doses employed for adult human treatment may typically be in the range of about 0.02 - about 5000 mg per day, in some embodiments, about 1 – about 1500 mg per day. The desired dose may conveniently be 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.

[0285] The pharmaceutical composition described herein may be in unit dosage forms suitable for single administration of precise dosages. In unit dosage form, the formulation may be divided into unit doses containing appropriate quantities of one or more pharmaceutical compositions. The unit dosage may be in the form of a package containing discrete quantities of the formulation. Non-limiting examples may be packaged tablets or capsules, and powders in vials or ampoules. Aqueous suspension compositions may be packaged in single-dose non-reclosable containers. Alternatively, multiple-dose reclosable containers may be used, in which case it may be typical to include a preservative in the composition. By way of example only,

formulations for parenteral injection may be presented in unit dosage form, which include, but may be not limited to ampoules, or in multi-dose containers, with an added preservative.

[0286] The single dosages appropriate for the pharmaceutical compositions described herein may be from about 0.01 mg/kg to about 20 mg/kg. In one embodiment, the single dosage of a checkpoint inhibitor may be from about 0.1 mg/kg to about 10 mg/kg. In one embodiment, the single dosage of an anti-programmed cell death protein 1 agent, an anti-programed death ligand 1 agent, an anti-programmed death ligand 2 agent, a salt of any one thereof, or any combination thereof, may be from about 0.1 mg/kg to about 10 mg/kg. An indicated single dosage in the larger mammal, including, but not limited to, humans, may be in the range from about 0.5 mg to about 1000 mg, conveniently administered in a single dose or in divided doses, including, but not limited to, up to four times a day or in extended release form. Suitable unit dosage forms for administration may include from about 1 to about 500 mg active ingredient. In one embodiment, the unit dosage may be about 1 mg, about 5 mg, about, 10 mg, about 20 mg, about 50 mg, about 100 mg, about 200 mg, about 250 mg, about 400 mg, or about 500 mg. In some embodiments, the an anti-programmed cell death protein 1 agent, an anti-programed death ligand 1 agent, an anti-programmed death ligand 2 agent, a salt of any one thereof, or any combination thereof, may be 0.001% to 99% by weight of a pharmaceutical composition.

[0287] In one embodiment, a single dose of an immunotherapeutic agent may be from about 0.1 mg/kg to about 10 mg/kg. In one embodiment, a single dose of blisibimod (A-623, CAS number 1236126-45-6), belimumab (Benlystra®, CAS number 356547-88-1), tabalumab (CAS number 1143503-67-7), atacicept (CAS number 845264-92-8), or a salt of any one thereof, may be from about 0.1 mg/kg to about 10 mg/kg.

[0288] The foregoing ranges may be merely suggestive, as the number of variables in regard to an individual treatment regime may be large, and considerable excursions from these recommended values may be not uncommon. Such dosages may be altered depending on a number of variables, not limited to the activity of the pharmaceutical composition 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.

[0289] Toxicity and therapeutic efficacy of such therapeutic regimens may be determined by standard pharmaceutical procedures in cell cultures or experimental animals, including, but not limited to, the determination of the LD_{50} (the dose lethal to 50% of the population) and the ED_{50} (the dose therapeutically effective in 50% of the population). The dose ratio between the toxic and therapeutic effects may be the therapeutic index and it may be expressed as the ratio between

LD_{50} and ED_{50}. The data obtained from cell culture assays and animal studies may be used in formulating a range of dosage for use in human. The dosage may vary within this range depending upon the dosage form employed and the route of administration utilized.

[0290] The method used for cancer therapy with a pharmaceutical composition described herein may comprise one or more of a decreased single dose, decreased cumulative dose over a single therapeutic cycle, or decreased cumulative dose of the pharmaceutical composition over multiple therapeutic cycles compared with the amount required for cancer therapy.

[0291] The treatment regimen of the methods for cancer therapy comprises administering a pharmaceutical composition for a time sufficient and in an amount sufficient that kills tumor cells. The pharmaceutical composition may be administered within a treatment cycle, which treatment cycle may comprise a treatment course followed by a non-treatment interval. A treatment course of administration refers herein to a finite time frame over which one or more doses of the pharmaceutical composition on one or more days may be administered. The finite time frame may be also called herein a treatment window.

[0292] Ingredients of a pharmaceutical composition described herein may be administered concurrently (*e.g.*, simultaneously, essentially simultaneously or within the same treatment protocol) or sequentially. An immunotherapeutic agent and a checkpoint inhibitor may be administered concurrently. An immunotherapeutic agent and a checkpoint inhibitor may be administered sequentially. An immunotherapeutic agent and a checkpoint inhibitor may be administered within the same formulation. An immunotherapeutic agent and a checkpoint inhibitor may be administered in different formulations within a single treatment schedule, or the immunotherapeutic agent and a checkpoint inhibitor may be administered on different treatment schedules.

[0293] In some embodiments, a composition of the current disclosure may be made by contacting combining, mixing, adding, or any combination thereof, an anti-PD-1, an anti-PD-L1, an anti-PD-L2, or a salt of any one thereof, or any combination thereof, and an immunotherapeutic agent or a salt thereof. A kit of the current disclosure may be made by contacting combining, mixing, adding, or any combination thereof, an anti-PD-1, an anti-PD-L1, an anti-PD-L2, or a salt of any one thereof, or any combination thereof, and an immunotherapeutic agent or a salt thereof.

[0294] A method of the current disclosure may comprise administering the pharmaceutical composition in at least two treatment cycles. In a specific embodiment, the non-treatment interval may be at least about 2 weeks or between from at least about 0.5 to about 12 months, such as at least about one month, at least about 2 months, at least about 3 months, at least about 4

months, at least about 5 months, at least about 6 months, at least about 7 months, at least about 8 months, at least about 9 months, at least about 10 months, at least about 11 months, or at least about 12 months (*i.e.,* 1 year). The non-treatment interval may be between about 1 years to about 2 years or between about 1 years to about 3 years, or longer. Each treatment course may be no longer than about 1 month, no longer than about 2 months, or no longer than about 3 months; or is no longer than about: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 26, 27, 28, 29, 30, or 31 days.

[0295] The treatment window (*i.e.,* treatment course) may be only one day. A single treatment course may occur over no longer than about: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 26, 27, 28, 29, 30, or 31 days. During such treatment windows, the pharmaceutical composition may be administered at least on about two days (*i.e.,* two days or more) with a variable number of days on which the agent may be not administered between the at least two days of administration. Stated another way, within a treatment course when the pharmaceutical composition may be administered on two or more days, the treatment course may have one or more intervals of one or more days when the pharmaceutical composition, is not administered. By way of non-limiting example, when the pharmaceutical composition may be administered on 2 or more days during a treatment course not to exceed 21 days, the agent may be administered on any total number of days between from about: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 26, 27, 28, 29, 30, or 31 days. The pharmaceutical composition may be administered to a subject during a treatment course of 3 days or more, and the agent may be administered every 2nd day (*i.e.,* every other day). When the pharmaceutical composition may be administered to a subject for a treatment window of about 4 days or more, the pharmaceutical composition may be administered every about 3rd day. In one embodiment, the pharmaceutical composition may be administered on at least about two days during a treatment course that is at least about 2 days and no more than about 21 days (*i.e.,* from about 2 days to about 21 days); at least about 2 days and no longer than about 14 days (*i.e.,* from about 2 days to about 14 days); at least about 2 days and no longer than about 10 days (*i.e.,* from about 2 days to about 10 days); or at least about 2 days and no longer than about 9 days (*i.e.,* from about 2 days to about 9 days); or at least about 2 days and no longer than about 8 days (*i.e.,* from about 2 days to about 8 days). In other specific embodiments, the pharmaceutical composition may be administered on at least about two days (*i.e.,* about 2 days or more) during a treatment window may be at least about 2 days and no longer than about 7 days (*i.e.,* from about 2 days to about 7 days); at least about 2 days and no longer than about 6 days (*i.e.,* from about 2 days to about 6 days) or at least about 2 days and no more than about 5

days (*i.e.*, from about 2 days to about 5 days) or at least about 2 days and no longer than about 4 days (*i.e.*, from about 2 days to about 4 days). In yet another embodiment, the treatment window is at least about 2 days and no longer than about 3 days (*i.e.*, from about 2 days to about 3 days), or about 2 days. The treatment course may be no longer than about 3 days. The treatment course may be no longer than about 5 days. The treatment course may be no longer than about: 7 days, 10 days, or 14 days or 21 days. The pharmaceutical composition may be administered on at least about two days (*i.e.*, about 2 or more days) during a treatment window that may be at least about 2 days and no longer than about 11 days (*i.e.*, from about 2 days to about 11 days); or the pharmaceutical composition may be administered on at least about two days (*i.e.*, about 2 or more days) during a treatment window that is at least about 2 days and no longer than about 12 days (*i.e.*, from about 2 days to about 12 days); or the pharmaceutical composition may be administered on at least about two days (*i.e.*, about 2 or more days) during a treatment window that may be at least about 2 days and no more than about 13 days (*i.e.*, from about 2 days to about 13 days); or the pharmaceutical composition may be administered on at least about two days (*i.e.*, about 2 or more days) during a treatment course that may be at least about 2 days and no more than about 15 days (*i.e.*, from about 2 days to about 15 days); or the pharmaceutical composition may be administered on at least about two days (*i.e.*, about 2 or more days) during a treatment course that may be at least about 2 days and no longer than about: 16 days, 17 days, 18 days, 19 days, or 20 days (*i.e.*, 2-16, 2-17, 2-18, 2-19, 2-20 days, respectively). In other embodiments, the pharmaceutical composition may be administered on at least 3 days over a treatment course of at least about 3 days and no longer than any number of days between about 3 days and about 21 days; or may be administered on at least about 4 days over a treatment course of at least about 4 days and no longer than any number of days between about 4 days and about 21 days; or may be administered on at least about 5 days over a treatment course of at least about 5 days and no longer than any number of days between about 5 days and about 21 days; or may be administered on at least about 6 days over a treatment course of at least about 6 days and no longer than any number of days between about 6 and about 21 days; or may be administered at least about 7 days over a treatment course of at least about 7 days and no longer than any number of days between about 7 days and about 21 days; or may be administered at least about 8 days or about 9 days over a treatment course of at least about 8 days or about 9 days, respectively, and no longer than any number of days between about 8 days or about 9 days, respectively, and about 21 days; or may be administered at least about 10 days over a treatment course of at least about 10 days and no longer than any number of days between about 10 days and about 21 days; or is administered at least about 14 days over a treatment course of at least about 14 days and no

longer than any number of days between about 14 days and about 21 days; or may be administered at least about 11 days or about 12 days over a treatment course of at least about 11 days or about 12 days, respectively, and no longer than any number of days between about 11 days or about 12 days, respectively, and about 21 days; or may be administered at least about 15 days or about 16 days over a treatment course of at least about 15 days or about 16 days, respectively, and no longer than any number of days between about 15 days or about 16 days, respectively, and about 21 days. By way of additional example, when the treatment course may be no longer than about 14 days, a pharmaceutical composition may be administered on at least about: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 days over a treatment of window of at least about: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 days, respectively, and no longer than about 14 days. When the treatment course may be no longer than about 10 days, a pharmaceutical composition may be administered on at least about: 2, 3, 4, 5, 6, 7, 8, 9, or 10 days over a treatment of window of at least about: 2, 3, 4, 5, 6, 7, 8, 9, or 10 days, respectively, and no longer than about 10 days. Similarly, when the treatment course may be no longer than about 7 days, a pharmaceutical composition may be administered on at least about 2, 3, 4, 5, 6, or 7 days over a treatment window of at least about 2, 3, 4, 5, 6, or 7 days, respectively, and no longer than about 7 days. When the treatment course may be no longer than about 5 days, a pharmaceutical composition may be administered on at least about 2, 3, 4, or 5 days over a treatment of window of at least about 2, 3, 4, or 5 days, respectively, and no longer than about 5 days.

[0296] With respect to a treatment course of about three or more days, doses of the pharmaceutical composition may be administered for a lesser number of days than the total number of days within the particular treatment window. By way of non-limiting example, when a course of treatment may have a treatment course of no more than about: 7, 10, 14, or 21 days, the number of days on which the pharmaceutical composition may be administered may be any number of days between from about 2 days and about: 7, 10, 14, or 21 days, respectively, and at any interval appropriate for the particular disease being treated, the pharmaceutical composition being administered, the health status of the subject and other relevant factors, which are discussed in greater detail herein. A person may appreciate that when the pharmaceutical composition may be administered on about two or more days over a treatment window, the agent may be delivered on the minimum number days of the window, the maximum number of days of the window, or on any number of days between the minimum and the maximum.

[0297] A treatment course may be one day or the treatment course may be of a length not to exceed about: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14 days, which may be examples of a course wherein the pharmaceutical composition may be administered on two or more days over a

treatment course not to exceed (*i.e.,* no longer than) about: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14 days, respectively. The treatment course may be about 2 weeks (about 14 days or 0.5 months), about 3 weeks (about 21 days), about 4 weeks (about one month), about 5 weeks, about 6 weeks (about 1.5 months), about 2 months (or about 60 days), or about 3 months (or about 90 days). A treatment course may be a single daily dosing of the pharmaceutical composition. In other embodiments, with respect to any treatment course a daily dose of the pharmaceutical composition may be as a single administration or the dose may be divided into 2, 3, 4, or 5 separate administrations to provide the total daily dose of the agent.

[0298] As described herein, within a treatment window when the pharmaceutical composition may be administered on two or more days, the treatment course may have one or more intervals of one or more days when the pharmaceutical composition, may be not administered. Solely as a non-limiting example, when a treatment window may be between two and seven days, a first dose may be administered on the first day of the treatment window and a second dose may be administered on the third day of the course, and a third dose may be administered on the seventh day of the treatment window. A person may appreciate that varying dosing schedules may be used during a particular treatment window. In other specific embodiments, the pharmaceutical composition may be administered daily on each consecutive day for the duration of the treatment course. A daily dose may be administered as a single dose or the daily dose may be divided into 2, 3, or 4, or 5 separate administrations to provide the total daily dose of the pharmaceutical composition.

[0299] The treatment course comprises a length of time during which the pharmaceutical composition may be administered daily. The pharmaceutical composition may be administered daily for 2 days. The pharmaceutical composition may be administered daily for 3 days. The pharmaceutical composition may be administered daily for 4 days. The pharmaceutical composition may be administered daily for 5 days. The pharmaceutical composition may be administered daily for 6 days. The pharmaceutical composition may be administered daily for 7 days. The pharmaceutical composition may be administered daily for 8 days. The pharmaceutical composition may be administered daily for 9 days. The pharmaceutical composition may be administered daily for 10 days. The pharmaceutical composition may be administered daily for 11 days. The pharmaceutical composition may be administered daily for 12 days. The pharmaceutical composition may be administered daily for 13 days. The pharmaceutical composition may be administered daily for 14 days. The treatment window (*i.e.,* course) for each of the above examples may be no longer than about: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 days, respectively.

[0300] The pharmaceutical composition may be administered every 2nd day (*i.e.*, every other day) for 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14 days. The pharmaceutical composition may be administered every 3nd day (*i.e.*, one day receiving the agent followed by two days without receiving the agent) for 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14 days. The pharmaceutical composition may be administered on every 2nd – 3rd day during a treatment window of 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14 days. The pharmaceutical composition may be administered every 4th day during a treatment course of 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14 days; or every 5th day during a treatment course of 6, 7, 8, 9, 10, 11, 12, 13, or 14 days. A person may appreciate the minimum numbers of days in a treatment window when the pharmaceutical composition may be administered every 6th, 7th, etc. day over a treatment window of a finite number of days as described herein.

[0301] A pharmaceutical composition may be administered daily for a longer duration than 14 days and may be administered at least about: 15, 16, 17, 18, 19, 20, or at least 21 days. The pharmaceutical composition may be administered daily on each of the about: 15, 16, 17, 18, 19, 20, or 21 days. The pharmaceutical composition may be administered every second day during a treatment window of about: 15, 16, 17, 18, 19, 20, or 21 days. The pharmaceutical composition may be administered every third day during a treatment window of about: 15, 16, 17, 18, 19, 20, or 21 days. The pharmaceutical composition may be administered on every 2nd – 3rd day during a treatment window of about: 15, 16, 17, 18, 19, 20, or 21 days. The pharmaceutical composition may be administered every 4th day during a treatment course of about: 15, 16, 17, 18, 19, 20, or 21 days; or every 5th day during a treatment course of about: 15, 16, 17, 18, 19, 20, or 21 days. A person may readily appreciate the minimum numbers of days in a treatment window when the pharmaceutical composition may be administered every 6th, 7th, etc. day over a treatment window of a finite number of days as described herein.

[0302] A pharmaceutical composition may be administered daily for a longer duration than 14 days and may be administered at least about: 15, 16, 17, 18, 19, 20, or at least 21 days. The pharmaceutical composition may be administered daily on each of the about: 15, 16, 17, 18, 19, 20, or 21 days. The pharmaceutical composition may be administered every second day during a treatment window of about: 15, 16, 17, 18, 19, 20, or 21 days. The pharmaceutical composition may be administered every third day during a treatment window of about: 15, 16, 17, 18, 19, 20, or 21 days. The pharmaceutical composition may be administered on every 2nd – 3rd day during a treatment window of about: 15, 16, 17, 18, 19, 20, or 21 days. The pharmaceutical composition may be administered every 4th day during a treatment course of about: 15, 16, 17, 18, 19, 20, or 21 days; or every 5th day during a treatment course of about: 15, 16, 17, 18, 19, 20, or 21 days. A

person may readily appreciate the minimum numbers of days in a treatment window when the pharmaceutical composition is administered every 6th, 7th, etc. day over a treatment window of a finite number of days as described herein.

[0303] A pharmaceutical composition may be administered in a treatment course daily for a longer duration than about 14 days or about 21 days and may be administered in a treatment course of about one month, about two months, or about three months. The pharmaceutical composition may be administered daily on each of a one month, two month, or three month treatment course. The pharmaceutical composition may be administered every second day during a treatment course of about one month, about two months, or about three months. The pharmaceutical composition may be administered every third day during a treatment course of about one month, about two months, or about three months. The pharmaceutical composition may be administered on every 2nd – 3rd day during a treatment course of about one month, about two months, or about three months. The pharmaceutical composition may be administered every 4th day during a treatment course of about one month, about two months, or about three months; or every 5th day during a treatment course of about one month, about two months, or about three months s. A person may readily appreciate the minimum numbers of days in a treatment course when the pharmaceutical composition is administered every 6th, 7th, etc. day over a treatment window of a finite number of days as described herein.

[0304] By way of non-limiting example, a longer treatment window with a decreased dose per day may be a treatment option for a subject. By way of example, the stage or severity of the cancer or tumor may indicate that a longer term course may provide clinical benefit. The pharmaceutical composition may be administered daily, or optionally, every other day (every 2nd day) or every 3rd day, or greater interval (*i.e.*, every 4th day, 5th day, 6th day) during a treatment course of about 1-2 weeks (*e.g.*, about 5-14 days), about 1-3 weeks (*e.g.*, about 5-21 days), about 1-4 weeks (*e.g.*, about 5-28 days, about 5-36 days, or about 5-42 days, 7-14 days, 7-21 days, 7-28 days, 7-36 days, or 7-42 days; or 9-14 days, 9-21 days, 9-28 days, 9-36 days, or 9-42 days. The treatment course may be between about 1-3 months. The pharmaceutical composition may be administered daily for at least five days. The pharmaceutical composition may be administered daily for 5-14 days. The pharmaceutical composition may be administered for at least seven days, for example, for 7-14, 7-21, 7-28 days, 7-36 days, or 7-42 days. The pharmaceutical composition may be administered for at least nine days, for example, for 9-14 days, 9-21 days, 9-28 days, 9-36 days, or 9-42 days.

[0305] Even though as discussed herein and above, a treatment course comprising administering a pharmaceutical composition provides clinical benefit, a treatment course may be

repeated with a time interval between each treatment course when the pharmaceutical composition may not be administered (*i.e.*, non-treatment interval, off-drug treatment). A treatment cycle as described herein and in the art may comprise a treatment course followed by a non-treatment interval. A treatment cycle may be repeated as often as needed. For example, a treatment cycle may be repeated at least once, at least twice, at least three times, at least four times, at least five times, or more often as needed. A treatment cycle may be repeated once (*i.e.*, administration of the pharmaceutical composition comprises 2 treatment cycles). The treatment cycle may be repeated twice or repeated 3 or more times. Accordingly, one, two, three, four, five, six, seven, eight, nine, ten, or more treatment cycles of treatment with a pharmaceutical composition may be performed. A treatment course or a treatment cycle may be repeated, such as when the cancer or tumor recurs, or when symptoms or sequelae of the disease or disorder that were significantly diminished by one treatment course as described above may have increased or may be detectable, or when the symptoms or sequelae of the disease or disorder may be exacerbated, a treatment course may be repeated. In other embodiments when the pharmaceutical composition is administered to a subject to prevent (*i.e.*, reduce likelihood of occurrence or development) or to delay onset, progression, or severity of the cancer or tumor, a subject may receive the pharmaceutical composition over two or more treatment cycles. Accordingly, one cycle of treatment may be followed by a subsequent cycle of treatment. Each treatment course of a treatment cycle or each treatment course of two or more treatment cycles may be typically the same in duration and dosing of the pharmaceutical composition. In other embodiments, the duration and dosing of the pharmaceutical composition during each treatment course of a treatment cycle may be adjusted as determined by a person skilled in the medical art depending, for example, on the particular disease or disorder being treated, the pharmaceutical composition being administered, the health status of the subject and other relevant factors, which are discussed in greater detail herein. Accordingly, a treatment course of a second or any subsequent treatment cycle may be shortened or lengthened as deemed medically necessary or prudent. In other words, as may be appreciated by a person, each treatment course of two or more treatment cycles may be independent and the same or different; and each non-treatment interval of each treatment cycle may be independent and the same or different.

[0306] As described herein, each course of treatment in a treatment cycle may be separated by a time interval of days, weeks, or months without treatment with a pharmaceutical composition (*i.e.*, non-treatment time interval or off-drug interval; called non-treatment interval herein). The non-treatment interval (such as days, weeks, months) between one treatment course and a subsequent treatment course may be typically greater than the longest time interval (i.*e.*,

number of days) between any two days of administration in the treatment course. By way of example, if a treatment course may be no longer than 14 days and the agent may be administered every other day during this treatment course, the non-treatment interval between two treatment courses may be greater than 2 days, such as 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, or 14 days or about 3 weeks, about 4 weeks, about 6 weeks, or about 2 months or longer as described herein. The non-treatment interval between two treatment courses may be about 5 days, about 1 week, about 2 weeks, about 3 weeks, about 1 month, about 6 weeks, about 2 months (8 weeks), about 3 months, about 4 months, about 5 months, about 6 months, about 7 months, about 8 months, about 9 months, about 10 months, about 11 months, about 12 months (about 1 year), about 18 months (about 1.5 years), or longer. The non-treatment interval may be about 2 years or about 3 years. The non-treatment time interval may be at least about 14 days, at least about 21 days, at least about 1 month, at least about 2 months, at least about 3 months, at least about 4 months, at least about 5 months, at least about 6 months, or at least about 1 year. A course of treatment (whether daily, every other day, every 3rd day, or other interval between administrations within the treatment course as described above (*e.g.*, 1-14 days, 2-14 days, 2-21 days, or 1-21 days)) may be administered about every 14 days (*i.e.*, about every 2 weeks) (*i.e.*, 14 days without pharmaceutical composition treatment), about every 21 days (i.e., about every 3 weeks), about every 28 days (*i.e.*, about every 4 weeks), about every one month, about every 36 days, about every 42 days, about every 54 days, about every 60 days, or about every month (about every 30 days), about every two months (about every 60 days), about every quarter (about every 90 days), or about semi-annually (about every 180 days). A course of treatments (*e.g.*, by way of non-limiting example, administration on at least one day or on at least two days during a course for about 2-21 days, about 2-14, days, about 5-14 days, about 7-14 days, about 9-14 days, about 5-21 days, about 7-21 days, about 9-21 days) may be administered every 28 days, every 36 days, every 42 days, every 54 days, every 60 days, or every month (about every 30 days), every two months (about every 60 days), every quarter (about every 90 days), or semi-annually (about every 180 days), or about every year (about 12 months). In other embodiments, a course of treatment (such as by way of non-limiting examples, *e.g.*, for about 5-28 days, about 7-28 days, or about 9-28 days whether daily, every other day, every 3rd day, or other interval between administrations within the treatment course) may be administered every 36 days, 42 days, 54 days, 60 days, or every month (about every 30 days), every two months (about every 60 days), every quarter (about every 90 days), or semi-annually (about every 180 days). A course of treatment (*e.g.*, for about 5-36 days, 7-36 days, or 9-36 days whether daily, every other day, every 3rd day, or other interval between administrations within the treatment course) may be

administered every 42 days, 54 days, 60 days, or every month (about every 30 days), every two months (about every 60 days), every quarter (about every 90 days), or semi-annually (about every 180 days), or about every year (about 12 months).

[0307] The treatment course may be one day and the non-treatment interval may be at least about 14 days, about 21 days, about 1 month, about 2 months (8 weeks), about 3 months, about 4 months, about 5 months, about 6 months, about 7 months, about 8 months, about 9 months, about 10 months, about 11 months, about 12 months (about 1 year), about 18 months (about 1.5 years), or longer. The treatment course may be at least two days or may be at least 3 days and no longer than 10 days, and the non-treatment interval may be at least about 14 days, about 21 days, about 1 month, about 2 months (8 weeks), about 3 months, about 4 months, about 5 months, about 6 months, about 7 months, about 8 months, about 9 months, about 10 months, about 11 months, about 12 months (about 1 year), about 18 months (about 1.5 years), or longer. The treatment course may be at least three days and no longer than 10 days, no longer than 14 days, or no longer than 21 days, and the non-treatment interval may be at least about 14 days, about 21 days, about 1 month, about 2 months (8 weeks), about 3 months, about 4 months, about 5 months, about 6 months, about 7 months, about 8 months, about 9 months, about 10 months, about 11 months, about 12 months (about 1 year), about 18 months (about 1.5 years), or longer. A treatment course (*e.g.,* for about 5-42, 7-42, or 9-42 days whether daily, every other day, every 3rd day, or other interval between administrations within the treatment course) may be administered every 42 days, 60 days, or every month (about every 30 days), every two months (about every 60 days), every quarter (about every 90 days), or semi-annually (about every 180 days), or about every year (about 12 months). The pharmaceutical composition may be administered daily for 5-14 days every 14 days (about every 2 weeks), or every 21-42 days. The pharmaceutical composition may be administered daily for 5-14 days quarterly. The pharmaceutical composition may be administered daily for 7-14 days every 21-42 days. The pharmaceutical composition may be administered daily for 7-14 days quarterly. The pharmaceutical composition may be administered daily for 9-14 days every 21-42 days or every 9-14 days quarterly. The non-treatment interval may vary between treatment courses. By way of non-limiting example, the non-treatment interval may be 14 days after the first course of treatment and may be 21 days or longer after the second, third, or fourth (or more) course of treatment. The pharmaceutical composition may be administered to the subject in need thereof once every 0.5-12 months. The pharmaceutical composition may be administered to the subject in need once every 4-12 months.

[0308] A pharmaceutical composition may be administered to a subject to reduce the likelihood or the risk that the subject may develop a cancer. The pharmaceutical composition may be administered for one or more days (*e.g.,* any number of consecutives days between and including 2-3, -4, -5, -6, -7, -8, -9, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -20, and 2-21 days) every 3, 4, 5, 6, 7, 8, 9, 10, 11, or 12 months. The pharmaceutical composition may be administered for one or more days (*e.g.,* any number of consecutives days between and including 1-9 days) every 5 or 6 months.

[0309] The total daily dose of a pharmaceutical composition may be delivered as a single dose or as multiple doses on each day of administration. When multiple cycles of the pharmaceutical composition may be administered, the dose of a pharmaceutical composition administered on a single day may be less than the daily dose administered if only a single treatment course may be intended to be administered.

Combination Therapies

[0310] A composition comprising a therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent, may also be used in combination with other therapeutic agents that may be selected for their therapeutic value for the condition to be treated. In general, the compositions described herein and, in embodiments where combinational therapy may be employed, other agents do not have to be administered in the same pharmaceutical composition, and may, because of different physical and chemical characteristics, have to be administered by different routes. The determination of the mode of administration and the advisability of administration, where possible, in the same pharmaceutical composition, may be within the knowledge of the clinician. The initial administration may be made according to established protocols recognized in the field, and then, based upon the observed effects, the dosage, modes of administration and times of administration may be modified by the clinician.

[0311] In some embodiments, it may be appropriate to administer at least one pharmaceutical composition described herein in combination with another therapeutic agent. Or, by way of example only, the therapeutic effectiveness of one of the pharmaceutical compositions described herein may be enhanced by administration of an adjuvant, i.e., by itself the adjuvant may have minimal therapeutic benefit, but in combination with another therapeutic agent, the overall therapeutic benefit to the subject may be enhanced. Or, by way of example only, the benefit experienced by a subject may be increased by administering one of the pharmaceutical compositions described herein with another therapeutic agent, which also includes a therapeutic regimen that also has therapeutic benefit. In any case, regardless of the disease, disorder or

condition being treated, the overall benefit experienced by the subject may simply be additive of the two agents or the subject may experience a synergistic benefit.

[0312] The particular choice of pharmaceutical compositions used may depend upon the diagnosis of the attending physicians and their judgment of the condition of the subject and the appropriate treatment protocol. The pharmaceutical compositions may be administered concurrently (*e.g.*, simultaneously, essentially simultaneously or within the same treatment protocol) or sequentially, depending upon the nature of the disease, disorder, or condition, the condition of the subject, and the actual choice of pharmaceutical compositions used. The determination of the order of administration, and the number of repetitions of administration of each therapeutic agent during a treatment protocol, may be well within the knowledge of the physician after evaluation of the disease being treated and the condition of the subject.

[0313] Therapeutically-effective dosages may vary when the drugs may be used in treatment combinations. Methods for experimentally determining therapeutically-effective dosages of drugs and other agents for use in combination treatment regimens may be described in the literature. For example, the use of metronomic dosing, i.e., providing more frequent, lower doses in order to minimize toxic side effects, has been described extensively in the literature. Combination treatment further includes periodic treatments that start and stop at various times to assist with the clinical management of the subject.

[0314] For combination therapies described herein, dosages of the co-administered pharmaceutical compositions may vary depending on the type of co-drug employed, on the specific drug employed, on the disease or condition being treated and so forth. In addition, when co-administered with one or more biologically active agents, the pharmaceutical composition provided herein may be administered either simultaneously with the pharmaceutical composition, or sequentially. If administered sequentially, the attending physician may decide on the appropriate sequence of administering the pharmaceutical composition in combination with a biologically active agent(s).

[0315] In one embodiment, the composition comprising a therapeutic therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent may be administered in any order or even simultaneously. In one embodiment, the composition comprising a therapeutic therapeutically effective amount of an anti-programmed cell death protein 1 agent and an immunotherapeutic agent may be administered in any order or even simultaneously, wherein the immunotherapeutic agent may be tabalumab (CAS number 1143503-67-7) or a fragment or a salt thereof. If simultaneously, the multiple therapeutic agents may be provided in a single, unified form, or in multiple forms, by way of example only, either

as a single pill or as two separate pills. One of the therapeutic agents may be given in multiple doses, or both may be given as multiple doses. If not simultaneous, the timing between the multiple doses may vary from more than zero weeks to less than four weeks. In addition, the combination methods, compositions and formulations may be not to be limited to the use of only two agents; the use of multiple therapeutic combinations may be also envisioned.

[0316] It is understood that the dosage regimen to treat, prevent, or ameliorate the condition(s) for which relief is sought, may be modified in accordance with a variety of factors. These factors include the disorder or condition from which the subject suffers, as well as the age, weight, sex, diet, and medical condition of the subject. Thus, the dosage regimen actually employed may vary widely and therefore may deviate from the dosage regimens set forth herein.

[0317] The pharmaceutical compositions which make up the combination therapy disclosed herein may be a combined dosage form or in separate dosage forms intended for substantially simultaneous administration. The pharmaceutical compositions that make up the combination therapy may also be administered sequentially, with either pharmaceutical composition being administered by a regimen calling for two-step administration. The two-step administration regimen may call for sequential administration of the active agents or spaced-apart administration of the separate active agents. The time period between the multiple administration steps may range from, a few minutes to several hours, depending upon the properties of each pharmaceutical composition, such as potency, solubility, bioavailability, plasma half-life and kinetic profile of the pharmaceutical composition. Circadian variation of the target molecule concentration may also determine the optimal dose interval.

[0318] In addition, the pharmaceutical compositions described herein also may be used in combination with procedures that may provide additional or synergistic benefit to the subject. By way of example only, subjects may be expected to find therapeutic and/or prophylactic benefit in the methods described herein, wherein pharmaceutical composition of a pharmaceutical composition disclosed herein and /or combinations with other therapeutics may be combined with genetic testing to determine whether that individual may be a carrier of a mutant gene that may be known to be correlated with a disease or condition.

[0319] The pharmaceutical compositions described herein and combination therapies may be administered before, during or after the occurrence of a disease or condition, and the timing of administering the composition containing a pharmaceutical composition may vary. Thus, for example, the pharmaceutical composition may be used as a prophylactic and may be administered continuously to subjects with a propensity to develop conditions or diseases in order to prevent the occurrence of the disease or condition. The pharmaceutical compositions and

compositions may be administered to a subject during or as soon as possible after the onset of the symptoms. The administration of the pharmaceutical compositions may be initiated within the first 48 hours of the onset of the symptoms, such as within the first 48 hours of the onset of the symptoms, such as within the first 6 hours of the onset of the symptoms, such as within 3 hours of the onset of the symptoms. The initial administration may be via any route practical, such as, for example, an intravenous injection, a bolus injection, infusion over about 5 minutes to about 5 hours, a pill, a capsule, transdermal patch, buccal delivery, and the like, or combination thereof. A pharmaceutical composition may be administered as soon as may be practicable after the onset of a disease or condition may be detected or suspected, and for a length of time necessary for the treatment of the disease, such as, for example, from 1 day to about 3 months. The length of treatment may vary for each subject, and the length may be determined using the known criteria. For example, the pharmaceutical composition or a formulation containing the pharmaceutical composition may be administered for at least 2 weeks, such as about 1 month to about 5 years.

[0320] A pharmaceutical composition described herein may reduce the likelihood of a cancer in a subject in need thereof. The pharmaceutical composition described herein may be administered one or more days within a window of treatment. In some embodiments, the treatment window may be about: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, or 21 days. In some embodiments, a pharmaceutical composition described herein may be administered on two or more days within a treatment window of no longer than 7 days or 14 days; on 3 or more days within a treatment window of no longer than 7 days or 14 days; on 4 or more days within a treatment window of no longer than 7 days or 14 days; on 5 or more days within a treatment window of no longer than 7 days or 14 days; or on 6, 7, 8, 9, 10, 11, 12, 13, or 14 days within treatment window of no longer than 7 days or 14 days.

[0321] Chemotherapy and radiotherapy treatment regimens may comprise a finite number of cycles of on-drug therapy followed by off-drug therapy, or comprise a finite timeframe in which the chemotherapy or radiotherapy may be administered. The protocols may be determined by clinical trials, drug labels, and clinical staff in conjunction with the subject to be treated. The number of cycles of a chemotherapy or radiotherapy or the total length of time of a chemotherapy or radiotherapy regimen may vary depending on the subject's response to the cancer therapy. A pharmaceutical composition described herein may be administered after the treatment regimen of chemotherapy or radiotherapy has been completed.

Indications

[0322] In some embodiments, a method of the current disclosure may be used to treat a cancer or a tumor. The cancer or tumor may be malignant. The cancer or tumor may be present

in an organ. The cancer or tumor may be present in the head or neck region, the abdominal region, an upper limb, a lower limb, the skin, blood, the digestive tract, a germ cell, or the nervous system of a subject. The cancer or tumor may be present in at least one of: the blood, the lymph, or the cerebral spinal fluid.

[0323] In some embodiments, the tumor may be a solid tumor. The tumor may be a liquid tumor. Cancers that are liquid tumors may be those that occur, for example, in blood, bone marrow, and lymph nodes, and may include, for example, leukemia, myeloid leukemia, lymphocytic leukemia, lymphoma, Hodgkin's lymphoma, melanoma, and multiple myeloma. Leukemias include, for example, acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), chronic myelogenous leukemia (CML), and hairy cell leukemia. Cancers that may be solid tumors include, for example, prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, ovarian cancer, Kaposi's sarcoma, skin cancer, squamous cell skin cancer, renal cancer, head and neck cancers, throat cancer, squamous carcinomas that form on the moist mucosal linings of the nose, mouth, throat, bladder cancer, osteosarcoma, cervical cancer, endometrial cancer, esophageal cancer, liver cancer, and kidney cancer. In some embodiments, the condition treated by the methods described herein may be metastasis of melanoma cells, prostate cancer cells, testicular cancer cells, breast cancer cells, brain cancer cells, pancreatic cancer cells, colon cancer cells, thyroid cancer cells, stomach cancer cells, lung cancer cells, ovarian cancer cells, Kaposi's sarcoma cells, skin cancer cells, renal cancer cells, head or neck cancer cells, throat cancer cells, squamous carcinoma cells, bladder cancer cells, osteosarcoma cells, cervical cancer cells, endometrial cancer cells, esophageal cancer cells, liver cancer cells, or kidney cancer cells.

[0324] In some embodiments, a method of the current disclosure may be used to treat cancer, wherein the cancer may be prostate cancer, testicular cancer, breast cancer, brain cancer, pancreatic cancer, colon cancer, thyroid cancer, stomach cancer, lung cancer, melanoma, multiple myeloma, Hodgkin's lymphoma, or ovarian cancer.

[0325] The methods described herein may also be used for inhibiting progression of metastatic cancer tumors. Non-limiting examples of cancers include adrenocortical carcinoma, childhood adrenocortical carcinoma, aids-related cancers, anal cancer, appendix cancer, basal cell carcinoma, childhood basal cell carcinoma, bladder cancer, childhood bladder cancer, bone cancer, brain tumor, childhood astrocytomas, childhood brain stem glioma, childhood central nervous system atypical teratoid/rhabdoid tumor, childhood central nervous system embryonal tumors, childhood central nervous system germ cell tumors, childhood craniopharyngioma brain

tumor, childhood ependymoma brain tumor, breast cancer, childhood bronchial tumors, carcinoid tumor, childhood carcinoid tumor, gastrointestinal carcinoid tumor, carcinoma of unknown primary, childhood carcinoma of unknown primary, childhood cardiac tumors, cervical cancer, childhood cervical cancer, childhood chordoma , chronic myeloproliferative disorders, colon cancer, colorectal cancer, childhood colorectal cancer, extrahepatic bile duct cancer , ductal carcinoma in situ (DCIS), endometrial cancer, esophageal cancer, childhood esophageal cancer, childhood esthesioneuroblastoma, eye cancer, malignant fibrous histiocytoma of bone, gallbladder cancer, gastric (stomach) cancer, childhood gastric cancer, gastrointestinal stromal tumors (GIST), childhood gastrointestinal stromal tumors (GIST), childhood extracranial germ cell tumor, extragonadal germ cell tumor, gestational trophoblastic tumor, glioma, head and neck cancer, childhood head and neck cancer, hepatocellular cancer, hypopharyngeal cancer, kidney cancer, renal cell kidney cancer, Wilms tumor, childhood kidney tumors, Langerhans cell histiocytosis, laryngeal cancer, childhood laryngeal cancer, leukemia, acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), chronic myelogenous leukemia (cml), hairy cell leukemia, lip cancer, liver cancer (primary), childhood liver cancer (primary), lobular carcinoma in situ (LCIS), lung cancer, non-small cell lung cancer, small cell lung cancer, lymphoma, aids-related lymphoma, burkitt lymphoma, cutaneous t-cell lymphoma, Hodgkin lymphoma, non-Hodgkin lymphoma, primary central nervous system lymphoma (CNS), melanoma, childhood melanoma, intraocular melanoma, Merkel cell carcinoma, malignant mesothelioma, childhood malignant mesothelioma, metastatic squamous neck cancer with occult primary, midline tract carcinoma involving NUT gene, mouth cancer, childhood multiple endocrine neoplasia syndromes, mycosis fungoides, myelodysplastic syndromes, myelodysplastic neoplasms, myeloproliferative neoplasms, multiple myeloma, nasal cavity cancer, nasopharyngeal cancer, childhood nasopharyngeal cancer, neuroblastoma, oral cancer, childhood oral cancer, oropharyngeal cancer, ovarian cancer, childhood ovarian cancer, epithelial ovarian cancer, low malignant potential tumor ovarian cancer, pancreatic cancer, childhood pancreatic cancer, pancreatic neuroendocrine tumors (islet cell tumors) , childhood papillomatosis , paraganglioma, paranasal sinus cancer, parathyroid cancer, penile cancer, pharyngeal cancer, pheochromocytoma, pituitary tumor, plasma cell neoplasm , childhood pleuropulmonary blastoma, prostate cancer, rectal cancer, renal pelvis transitional cell cancer, retinoblastoma, salivary gland cancer, childhood salivary gland cancer, Ewing sarcoma family of tumors, Kaposi Sarcoma, osteosarcoma, rhabdomyosarcoma, childhood rhabdomyosarcoma, soft tissue sarcoma, uterine sarcoma, Sézary syndrome, childhood skin cancer, nonmelanoma skin cancer, small intestine cancer, squamous cell carcinoma, childhood squamous cell carcinoma,

testicular cancer, childhood testicular cancer, throat cancer, thymoma and thymic carcinoma, childhood thymoma and thymic carcinoma, thyroid cancer, childhood thyroid cancer, ureter transitional cell cancer, urethral cancer, endometrial uterine cancer, vaginal cancer, vulvar cancer, and Waldenström macroglobulinemia.

[0326] In some embodiments, the cancer or tumor may be squamous non-small cell lung cancer, adeno non-small cell lung cancer, colorectal cancer, head and neck squamous cell carcinoma, breast cancer, or melanoma.

[0327] In some embodiments, the cancer or tumor contacts a blood vessel. In some embodiments, the cancer or the tumor may be in the interior of a blood vessel.

[0328] In some embodiments, at least one of the anti-programmed cell death protein 1 agent, the anti-programmed death ligand 1 agent, the anti-programmed death ligand 2 agent, or a salt of any one thereof, or any combination thereof; and the immunotherapeutic agent or salt thereof may be isolated and purified.

[0329] In some embodiments, the administration may be oral. In some embodiments, the administration may be topical, intravenous, intramuscular, or spinal. In some embodiments, the administration may be administered directly to the cancer or the tumor. In some embodiments, the administration may be an administration at a location different from the cancer or the tumor. In some embodiments, the subject has been previously diagnosed with the cancer or the tumor. In some embodiments, the cancer or the tumor may be a solid tumor or a solid cancer. In some embodiments, the cancer or the tumor may be a liquid cancer or a liquid tumor. In some embodiments, the cancer or the tumor may be malignant. In some embodiments, the cancer or the tumor may be present in an organ. In some embodiments, the tumor or the cancer may be present in at least one of: blood, lymph, cerebral spinal fluid. In some embodiments, the cancer or the tumor may be located in a head or neck region, abdominal region, a upper limb, a lower limb, skin, blood, digestive tract, germ cell, or nervous system.

Cancer Interactomes

[0330] In some embodiments, a method described herein may be used to define a cancer interactome in a tumor microenvironment. A method may be used to correlate interaction partners of cells within a tumor.

[0331] To define a cancer interactome, a cell or a plurality of cells may be imaged. The cell or plurality of cells may be stained prior to imaging. An image may comprise at least about: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, or 100 cells. In some embodiments, an image may comprise 1 to 10 cells, or 2-9 cells, or 3-8 cells. In some embodiments, an image may comprise 6 cells.

[0332] A cell image may comprise of a number of pixels. The number of pixels in a cell image may be at least about: 100, 1,000, 10,000, 100,000, 1,000,000, 1,500,000, or 2,000,000 pixels. The number of pixels in a cell image may be at least about 1,500,000, pixels.

[0333] A matrix may be generated based on the stained plurality of cells. The matrix may be used to define or represent the boundaries of the cells. In some embodiments, an area that may be a cell boundary may be defined using the number 1 in a matrix, and an area that may be not a cell boundary may be defined using the number 0. Thus, a matrix may represent cellular segmentation.

[0334] A matrix may be generated to represent an intensity value of cells in a tumor microenvironment. The matrix may be determined from a fluorescence readout. The matrix may be generated by a human or by a computer or by a software program. The intensity matrix may be predetermined, or may be obtained from a reference sample. Mixed or unmixed images may be used as inputs that may be processed and formatted into unmixed matrixes.

[0335] The intensity of each cell may be calculated for total readout intensity. A reference intensity may exist, wherein the reference intensity may be based on a prior sample that has been designated as a standard. The intensity of a cell may be compared to a reference intensity. After comparison of the intensity of a cell to a reference intensity, the cell may be labeled as having a positive intensity. After comparison of the intensity of a cell to a reference intensity, the cell may be labeled as having a negative intensity.

[0336] A pixel adjacency graph may be generated. Pixel adjacency may be defined as any two pixels that may be within a distance of square-root(2) pixels. Pixels that may be directly adjacent or diagonally adjacent may be considered as having adjacency.

[0337] A cell adjacency graph may be generated. Cellular adjacency may be defined as any two cells that may be within a distance of square-root(2) cells. Cells that may be directly adjacent or diagonally adjacent may be considered as having adjacency.

[0338] An adjacency heatmap may be generated from a cell adjacency graph. The cell adjacency heatmap generated from a tumor sample of a subject may then be compared to a reference heatmap.

[0339] A reference heatmap may be generated prior to diagnosing a subject. Reference heatmaps may be generated and used as references to predict subject treatment outcome. Reference heatmaps may be used as references to diagnose subjects in need of treatment.

[0340] Two inputs may be used to define an interactome. The first is a matrix representing the cellular image where boundaries between cells are defined. FIG. 1 provides a representative example matrix that defines cellular boundaries. The matrix represents a 9 x 9 image which was

determined to be comprised of six cells. FIG. 2 provides a 9 x 9 representative example which corresponds with FIG. 1 and is an example of an intensity matrix, wherein the relative intensity of each marker of interest per pixel is defined.

[0341] Based on the boundaries defined in the cellular boundary input, each pixel is labeled based on the cellular boundary with which it is contained. Boundary pixels may be labeled based on all cells sharing that boundary pixel. An example of pixel labeling is shown in FIG. 3. The matrix represents cell labeling from the boundary information from FIG. 1, wherein the symbol "|" indicates pixels that may be boundary pixels and labeled by the cells that may be part of that boundary.

Computer Control Systems

[0342] The present disclosure provides computer control systems that are programmed to implement methods of the disclosure. FIG. 12 shows a computer control system 1201. The computer control system 1201 may be implemented on an electronic device of a user or a computer system that is remotely located with respect to the electronic device. The electronic device may be a mobile electronic device.

[0343] The computer system 1201 includes a central processing unit (CPU, also "processor" and "computer processor" herein) 1205, which may be a single core or multi core processor, or a plurality of processors for parallel processing. The computer control system 1201 also includes memory or memory location 1210 (*e.g.*, random-access memory, read-only memory, flash memory), electronic storage unit 1215 (*e.g.*, hard disk), communication interface 1220 (*e.g.*, network adapter) for communicating with one or more other systems, and peripheral devices 1225, such as cache, other memory, data storage and/or electronic display adapters. The memory 1210, storage unit 1215, interface 1220 and peripheral devices 1225 are in communication with the CPU 1205 through a communication bus (solid lines), such as a motherboard. The storage unit 1215 may be a data storage unit (or data repository) for storing data. The computer control system 1201 may be operatively coupled to a computer network ("network") 1230 with the aid of the communication interface 1220. The network 1230 may be the Internet, an internet and/or extranet, or an intranet and/or extranet that is in communication with the Internet. The network 1230 in some cases is a telecommunication and/or data network. The network 1230 may include one or more computer servers, which may enable distributed computing, such as cloud computing. The network 1230, in some cases with the aid of the computer system 1201, may implement a peer-to-peer network, which may enable devices coupled to the computer system 1201 to behave as a client or a server.

[0344] The CPU 1205 may execute a sequence of machine-readable instructions, which may be embodied in a program or software. The instructions may be stored in a memory location, such as the memory 1210. The instructions may be directed to the CPU 1205, which may subsequently program or otherwise configure the CPU 1205 to implement methods of the present disclosure. Examples of operations performed by the CPU 1205 may include fetch, decode, execute, and writeback.

[0345] The CPU 1205 may be part of a circuit, such as an integrated circuit. One or more other components of the system 1201 may be included in the circuit. In some cases, the circuit is an application specific integrated circuit (ASIC).

[0346] The storage unit 1215 may store files, such as drivers, libraries and saved programs. The storage unit 1215 may store user data, *e.g.*, user preferences and user programs. The computer system 1201 in some cases may include one or more additional data storage units that are external to the computer system 1201, such as located on a remote server that is in communication with the computer system 1201 through an intranet or the Internet.

[0347] The computer system 1201 may communicate with one or more remote computer systems through the network 1230. For instance, the computer system 1201 may communicate with a remote computer system of a user. Examples of remote computer systems include personal computers (*e.g.*, portable PC), slate or tablet PC's (*e.g.*, Apple® iPad, Samsung® Galaxy Tab), telephones, Smart phones (*e.g.*, Apple® iPhone, Android-enabled device, Blackberry®), or personal digital assistants. The user may access the computer system 1201 via the network 1230.

[0348] Methods as described herein may be implemented by way of machine (*e.g.*, computer processor) executable code stored on an electronic storage location of the computer system 1201, such as, for example, on the memory 1210 or electronic storage unit 1215. The machine executable or machine readable code may be provided in the form of software. During use, the code may be executed by the processor 1205. In some cases, the code may be retrieved from the storage unit 1215 and stored on the memory 1210 for ready access by the processor 1205. In some situations, the electronic storage unit 1215 may be precluded, and machine-executable instructions are stored on memory 1210.

[0349] The code may be pre-compiled and configured for use with a machine having a processer adapted to execute the code, or may be compiled during runtime. The code may be supplied in a programming language that may be selected to enable the code to execute in a pre-compiled or as-compiled fashion.

[0350] Aspects of the systems and methods provided herein, such as the computer system 1201, may be embodied in programming. Various aspects of the technology may be thought of as "products" or "articles of manufacture" typically in the form of machine (or processor) executable code and/or associated data that is carried on or embodied in a type of machine readable medium. Machine-executable code may be stored on an electronic storage unit, such as memory (*e.g.*, read-only memory, random-access memory, flash memory) or a hard disk. "Storage" type media may include any or all of the tangible memory of the computers, processors or the like, or associated modules thereof, such as various semiconductor memories, tape drives, disk drives and the like, which may provide non-transitory storage at any time for the software programming. All or portions of the software may at times be communicated through the Internet or various other telecommunication networks. Such communications, for example, may enable loading of the software from one computer or processor into another, for example, from a management server or host computer into the computer platform of an application server. Thus, another type of media that may bear the software elements includes optical, electrical and electromagnetic waves, such as used across physical interfaces between local devices, through wired and optical landline networks and over various air-links. The physical elements that carry such waves, such as wired or wireless links, optical links or the like, also may be considered as media bearing the software. As used herein, unless restricted to non-transitory, tangible "storage" media, terms such as computer or machine "readable medium" refer to any medium that participates in providing instructions to a processor for execution.

[0351] Hence, a machine readable medium, such as computer-executable code, may take many forms, including but not limited to, a tangible storage medium, a carrier wave medium or physical transmission medium. Non-volatile storage media include, for example, optical or magnetic disks, such as any of the storage devices in any computer(s) or the like, such as may be used to implement the databases, etc. shown in the drawings. Volatile storage media include dynamic memory, such as main memory of such a computer platform. Tangible transmission media include coaxial cables; copper wire and fiber optics, including the wires that comprise a bus within a computer system. Carrier-wave transmission media may take the form of electric or electromagnetic signals, or acoustic or light waves such as those generated during radio frequency (RF) and infrared (IR) data communications. Common forms of computer-readable media therefore include for example: a floppy disk, a flexible disk, hard disk, magnetic tape, any other magnetic medium, a CD-ROM, DVD or DVD-ROM, any other optical medium, punch cards paper tape, any other physical storage medium with patterns of holes, a RAM, a ROM, a PROM and EPROM, a FLASH-EPROM, any other memory chip or cartridge, a carrier wave

transporting data or instructions, cables or links transporting such a carrier wave, or any other medium from which a computer may read programming code and/or data. Many of these forms of computer readable media may be involved in carrying one or more sequences of one or more instructions to a processor for execution.

[0352] The computer system 1201 may include or be in communication with an electronic display 1235 that comprises a user interface (UI) 1240.

[0353] Methods and systems of the present disclosure may be implemented by way of one or more algorithms. An algorithm may be implemented by way of software upon execution by the central processing unit 1205.

EXAMPLES

EXAMPLE 1: Staining a FFPE tissue section

[0354] A procedure is used to stain a FFPE tissue section mounted on a slide for multiple antibody/TSA-fluorophore conjugates. The immunohistochemistry staining is used with up to 6 different antibodies for multiple antigen detection on a tissue section on a single slide. This procedure allows quantitative analysis of antigens to identify biomarkers within a sample.

[0355] "IHC" refers to immunohistochemistry. "FFPE" refers to formalin fixed paraffin embedded. "TBS" refers to tris buffered saline. "TBS-T" refers to tris buffered saline with tween 20. "TSA" refers to tyramide signal amplification. "DAPI" refers to 4', 6 diamidino-2-phenylindole, dihydrochloride.

[0356] A concentrated Hot Rinse at a ratio of 1:25 is formed (1 ml Hot Rinse to 24 ml of Deionized Water). A staining jar or metal slide canister is filled with 50-200 mL (enough volume to cover slides depending on size of staining jar) of 1X Hot Rinse. A second container is filled with 50-200 mL (enough volume to cover slides depending on size of staining jar) of 1X Borg Decloaker RTU. The decloaking Chamber is filled with 500 mL Deionized Water. The Borg Decloaker and Hot Rinse staining jars are placed into the Decloaking Chamber. The slides are placed into a slide rack, then the slide rack is placed into a staining jar containing Borg Decloaker. The decloaking chamber is heated at 110°C for 15 minutes. The slide are transferred to the slide container with 1X Hot Rinse and dunked vigorously for a minimum of 20 times. A rinse is performed by gradually adding 500 mL of deionized water to the solution. One fourth of the hot rinse is poured out, and deionized water is added again. This is repeated until all of the deionized water is used.

[0357] The primary antibody is prepared prior to use for fluorescent IHC staining.

[0358] The slides are transferred to 1X TBS. 2.5 ml of 30% hydrogen peroxide in 247.5 ml of deionized water is added. The slides are transferred to 0.3% hydrogen peroxide and incubated for 10 minutes. A wash in 1X TBS is performed for 3 minutes.

[0359] Slides are transferred to 1X TBS-T, then laid flat into staining tray. 3-4 drops of antibody diluent in dispensed onto the slide to cover the tissue section completely, and incubated for at least 10 minutes. The primary antibody is prepared, incubated, and washed. The secondary antibody-HRP is prepared, incubated, and washed.

EXAMPLE 2: Generation of a spectral library

[0360] A spectral library with the OPAL 7-color fIHC Kit (PerkinElmer, NEL797001kt) is generated to establish baseline fluorescent information for the performance of quantitative image analysis.

[0361] Slides on appropriate FFPE tissue are determined by study plan. The slides include: auto-fluorescent slide, DAPI only slide, Opal 520 only slide, Opal 540 only slide, Opal 570 only slide, Opal 620 only slide, Opal 650 only slide, and Opal 690 only slide.

[0362] A single antibody stain on FFPE tissue is performed. A heat induced stringent wash is performed.

[0363] One the slides have been mounted, a fluorescence image is captured and stored.

EXAMPLE 3: Image Acquisition

[0364] Images of fluorescent IHC stained slides are captured to visualize immune cells in situ in formalin-fixed paraffin-embedded (FFPE) tissue sections.

[0365] The image capture device is manually focused onto the tissue. The entire slide is scanned. The field resolution is set to 20x. An image is captured manually.

EXAMPLE 4: Quantitative Image Analysis at the Cell-segmented Level

[0366] Images from stained slides of in vivo and tissue samples are generated and analyzed. Phenotypes are quantifies, discriminated, and analyzed with multiple biomarkers in situ in FFPE.

[0367] PerkinElmer Vextra 3 inForm software, PerkinElmer OPAL 7-color flHC kit, TSA reagent/antibodies, and FFPE control slides images are used.

[0368] FFPE control slides are as follows:

Positive Control: Normal human tissue	Non-tumor antibodies
Positive Control: Tumor human	Tumor-specific antibodies
Negative Control (non-specific): Normal human tissue	Host-specific isotype Antibody in place of 1°Antibody, with 2°Antibody and TSA

Auto Fluorescent Control: Sample Specific	No 1° Antibodies, with all 2°Antibody and TSA non-tumor antibodies

[0369] The fluorophores used in the study are selected. Cell segmentation settings are set. If the system erroneously counted cells, the parameters are adjusted. The image is phenotyped, with the filters adjusted accordingly to the phenotype and stain used. The cells that express the phenotype of interest are selected.

[0370] The nature of the native cancer interactome in a tumor microenvironment of tissues may be defined and quantified. For example, tissues of humans, murines, canines, bovines, filines, and equines may be defined and quantified. A method of multiplexed staining, followed by imaging analysis may be used to define and quantify the cancer interactome.

[0371] A number of benefits may be provided by quantifying the cancer interactome, such as: defining the relationship between distinct cell-types independently of cellular density, defining interaction partners and measuring changes in interaction partners based on clinical endpoints, defining cell-subpopulations that exist in their native context but remain unknown due to tumor analysis methods based on bulk-derived measurements or single cell assays, studying and determining relationships between phenotypically defined and phenotypically undetermined cell-types that are associated with a specific clinical endpoint (*e.g.*, treatment outcome with anti-programmed cell death protein 1), and determining new insights based on cellular interactions that are not captured using other tumor analysis methods.

[0372] The following method may be used to define an interactome:

[0373] (1): Define cell boundaries and label matrix vertices by cell

[0374] Two inputs may be used to define an interactome. The first is a matrix representing the cellular image where boundaries between cells are defined. FIG. 1 provides a representative example matrix that defines cellular boundaries. The matrix represents a 9 x 9 image which was determined to be comprised of six cells. FIG. 2 provides a 9 x 9 representative example which corresponds with FIG. 1 and is an example of an intensity matrix, wherein the relative intensity of each marker of interest per pixel is defined.

[0375] Based on the boundaries defined in the cellular boundary input, each pixel is labeled based on the cellular boundary with which it is contained. Boundary pixels are labeled based on all cells sharing that boundary pixel. An example of pixel labeling is shown in FIG. 3. The matrix represents cell labeling from the boundary information from FIG. 1, wherein the symbol "|" indicates pixels that are boundary pixels and labeled by the cells that are part of that boundary.

[0376] (2): Measuring concordance between single-plex and multiplex IHC staining and imaging

[0377] A key challenge in multiplexed IHC staining is determining the impact of multiplexing on the performance of any single antibody during testing. Single-plex and multiplex pixel intensity distributions are overlaid to confirm correspondence of staining intensity scales.

[0378] The following method is used to quantify the impact on intensity scales by comparing single-plex and multiplex staining thru frequency polygons. Frequency polygons of pixel staining intensities for example single-plex and multiplex images for a single channel are overlaid and visual inspection by study leadership confirms correspondence. An example is shown in FIG. 4. The distributions of positive pixels determined from (2) for a single channel for both single-plex and multiplex are compared using the following method. Median and Median Absolute Deviation (MAD) are calculated for both distributions. The distance between medians is divided by the MAD of both distributions and the larger of the two resulting normalized distances is reported. A maximum normalized distance of less than 2.0 is labeled acceptable, between 2.0 and 4.0 is labeled marginal and above 4.0 is labeled not acceptable.

[0379] (3): Defining positive and negative intensity thresholds for each fluorophore

[0380] Raw data from fluorescence channels is provided using heatmap visualizations thresholded across the lower range of intensities. An appropriate threshold for positive staining is based on the marker of interest in a given study. FIG. 5 shows an example of positive intensity thresholding with heatmap visualization. A heatmap shows potential positive pixels for an image as intensities colored blue to red. Negative staining is shown in grey. Note that blue ranging 10-20 may also be defined as negative depending on positive and negative controls and the fluorophore's range of dynamic signal.

[0381] (4): Calculate total readout intensity for each cell and each readout

[0382] Intensities of pixels labeled as positive using the thresholds from (2) within any cellular boundary (including boundary pixels) are summed over the cell area to provide the total marker intensity within the cell for each cell. This values are normalized for the total area of the cell.

[0383] (5): Label cells as positive or negative for each readout

[0384] To accurately perform phenotyping, each the definition of positive/negative for a given marker is calibrated based on a reasonable sample of study data input from experimentalists. A set of calibration images is provided in which positive and negative may be performed manually or thru machine based learning. Phenotyping is calibrated by choosing an intensity distribution percentage cutoff where the distribution is calculated using the normalized intensity from (4) for all cells with any positive intensity in each image. The algorithm is cross-

validated within the calibration set and a minimum of 90% accuracy is required to use the calibration.

[0385] (7): Determine adjacent pixel adjacency graph

[0386] Image data (pixels and cells) may be converted into a mathematical graph that represents spatial adjacency relationships between the objects. Pixel adjacency may be defined as any two pixels that are within a distance of square-root(2) pixels, that is, direct adjacency or diagonal adjacency of any two pixels. A mathematical directed graph is constructed using this data where each node (vertex) represents a single pixel. Edges are added by iterating over all nodes and adding a single edge for each adjacent neighbor where the edge source is the node of interest and the edge target. In the case of pixels, the adjacency graph does not include pixels which are not positive for any marker of interest. An adjacency graph is shown in FIG. 6.

[0387] (8): Determine cell adjacency graph

[0388] Cellular adjacency is defined as two cells where any two pixels with either cell (including boundary pixels) are within a distance of square-root(2) pixels. That is, direct adjacency or diagonal adjacency of any two pixels within the two cells is counted as cellular adjacency. An adjacency graph is created in a similar fashion to pixels where cells counted as adjacent are linked in a directed graph. Unlike the pixel data, cells which are not positive for any marker are included as “Other” cells.

[0389] (9): Calculate fraction of adjacency between pixels

[0390] Pixels are grouped according to intensity value positivity, where each group is a positive/negative set of one or more study readouts. Pixels may be part of more than one group. Pixel adjacency graphs are pooled across a given image set defined by the study objectives. For a given pair of pixel groups, the fraction of adjacency between a source group and target group is defined as (number edges with source as node in source group and target as node in target group) / (total number of edges with source as node in source group). Different image cohorts may contain different numbers of images and different numbers of pixels, but because fraction of adjacency is a normalized quantity, it is comparable regardless of these differences.

[0391] Fraction of adjacencies may be displayed when calculated all-by-all on a set of phenotype groups as heatmap. In these heatmaps, the source phenotype is presented on the rows and the target phenotype is presented on the columns. Because each row shares a source phenotype, all cells have within a row have an equal denominator. Each cell in the heatmap is calculated independently from each other cell.

[0392] (10): Calculate fraction of adjacency between cell-types

[0393] Cells are grouped according to phenotypes of interest, where each phenotype is a positive/negative set of one or more study readouts. The adjacency heatmap is calculated using the same method as pixels.

[0394] An example calculation and resulting heatmap are presented in FIG. 7 A-C. FIG. A gives an example cell adjacency network from FIG. 4 with cells phenotyped for readout "A". FIG. B gives an example cell adjacency network from FIG. 4 with cells phenotyped with readout "B".

[0395] FIG. C provides a calculated cell adjacency heatmap. It shows closer adjacency from A -> A, B -> A and from Other -> B. Fractions of adjacency in a row may not add to 1 because of cells that are positive for multiple readouts.

[0396] (11): Calculate differences in the fraction of adjacency between sample groups.

[0397] Reference heat maps may be generated based on study objectives. In this instance, a reference heat map for non-responders and a reference heat map for responders may be generated.

[0398] If multiple image sets have been defined based on study objectives, fraction of adjacency differences may be calculated for each heatmap cell between two heatmaps of identical markers (either pixels or cells). The difference between fractions of adjacency for each source/target pair between a study reference image set and comparison set may be also reported as a heatmap. P-values for the differences may be calculated using Fisher's exact test by constructing a contingency table of the edge counts consisting of the two image sets.

[0399] FIG. 8 shows an adjacency heatmap of a subject that did not respond to treatment, or a non-responder subject. Fraction of adjacency heatmap were calculated on images taken from the invasive margin of subjects who were non-responsive to treatment. "Other" in this heatmap are cells which are not determined positive for any study readout. The heatmap shows high proximity between specific phenotypes such as CD20/CD20, CD19/CD20, and CD19/CD19.

[0400] FIG. 9 shows a fraction of adjacency heatmap that was calculated on images taken from the invasive margin of subjects who were responsive to treatment. "Other" in this heatmap are cells which are not determined positive for any study readout.

[0401] FIG. 10 shows an adjacency heatmap of the difference between the heatmap of a responder minus the heatmap of a non-responder. That is, the heatmap of FIG. 8 is subtracted from the heatmap of FIG. 9.

[0402] "Other" in this heatmap are cells which are not determined positive for any study readout. This heatmap shows lower proximity between CD20 and study phenotypes in responders as compared to non-responders and higher proximity between other cells and study phenotypes.

[0403] FIG. 11 illustrates the use of pixel-based analytics for diagnostic and therapeutic development. Each image of cells is comprised of approximately 1.5 million pixels where each pixel is defined in space according to x, y coordinate values and measures the relative intensity (*e.g.*, relative expression level) of each analyte. FIG. 11 is a subsection of an image that was acquired on a tissue section tested for CD4, CD8, PD-1, PD-L1, CD68 and CD56 expression.

EXAMPLE 5: Antitumor cell efficacy of compositions of the disclosure

[0404] Cytotoxic activity of the compositions against human tumor cells are measured using an *in vitro* cell culture viability assay. Human A375 melanoma cells are incubated with 10 different composition concentrations between 10 nM and 100 μM for 72 hours and stained with a resazurin-based cell viability reagent to quantify viable cells. Living cells may reduce the non-fluorescent resazurin to a highly fluorescent resorufin, which may be quantified with a spectrophotometric plate reader. The fluorescence signal is normalized between the signals of untreated viable cells and the background signal of dead cells. Then, the half-maximum concentration for the inhibition of resazurin staining is calculated.

EXAMPLE 6: Cell proliferation assay

[0405] The ability of a composition of the present disclosure to inhibit the growth of cells, such as human leukemia,VCaP, LNCaP, 22RV1, DU145, LNCaP-AR, MV4;11, KOPN-8, ML-2, MOLM-13, bone marrow cells (BMCs), MLL-AF9, MLL-ENL, E2A-HLF, HL-60 and NB4 cells, is tested using a cell viability assay, such as the Promega CellTiter-Glo® Luminescent Cell Viability Assay (Promega Technical Bulletin, **2015**, "CellTiter-Glo® Luminescent Cell Viability Assay": 1-15, herein incorporated by reference in its entirety). Cells are plated at relevant concentrations, for example about $1x10^5 – 2x10^5$ cells per well in a 96-well plate. A composition of the present disclosure is added at a concentration up to about 2 μM with eight, 2-fold serial dilutions for each composition. Cells are incubated at 37 °C for a period of time, for example, 72 hours, then cells in the control wells are counted. Media is changed to restore viable cell numbers to the original concentration, and compositions are re-supplied. Proliferation is measured about 72 hours later using Promega CellTiter-Glo® reagents, as per kit instructions.

EXAMPLE 7: Efficacy study in mouse xenograft tumor model

[0406] Immunodeficient mice, such as 8-10 week-old female nude (nu/nu) mice, are used for *in vivo* efficacy studies in accordance with the guidelines approved by IACUC. Leukemia cells, such as human MV4-11 leukemia cells available from ATCC, are implanted subcutaneously via needle into female nude mice (5×10^6 cells/mouse). When the tumor reaches a size of approximately 150 to 250 mm^3 in mice, the tumor-bearing mice are randomly assigned to a vehicle control or composition treatment group (8 animals per group). Animals are treated with a

composition of the present disclosure by oral gavage or intraperitoneal injection in an appropriate amount and frequency as may be determined by the skilled artisan without undue experimentation. Subcutaneous tumor volume in nude mice and mice body weight are measured twice weekly. Tumor volumes are calculated by measuring two perpendicular diameters with calipers (V = (length x width^2)/2). Percentage tumor growth inhibition (%TGI = 1 – [change of tumor volume in treatment group/change of tumor volume in control group]*100) is used to evaluate anti-tumor efficacy. Statistical significance is evaluated using a one-tailed, two sample *t* test. $P<0.05$ is considered statistically significant.

EXAMPLE 8: Synergistic efficacy study in mouse xenograft tumor model

[0407] Immunodeficient mice, such as 8-10 week-old female nude (nu/nu) mice, are used for *in vivo* efficacy studies in accordance with the guidelines approved by IACUC. Leukemia cells, such as human MV4-11 leukemia cells available from ATCC, are implanted subcutaneously via needle into female nude mice (5 x 10^6 cells/mouse). When the tumor reaches a size of approximately 150 to 250 mm^3 in mice, the tumor-bearing mice are randomly assigned to one or four groups: a vehicle control, an anti-programmed cell death protein 1 monotherapy treatment group, a tabalumab treatment group, or a combination anti-programmed cell death protein 1/tabalumab treatment group (8 animals per group). All animals in the treatment groups are treated by oral gavage or intraperitoneal injection in an appropriate amount and frequency as may be determined by the skilled artisan without undue experimentation. Subcutaneous tumor volume in nude mice and mice body weight are measured twice weekly. Tumor volumes are calculated by measuring two perpendicular diameters with calipers (V = (length x width^2)/2). Percentage tumor growth inhibition (%TGI = 1 – [change of tumor volume in treatment group/change of tumor volume in control group]*100) is used to evaluate anti-tumor efficacy. Statistical significance is evaluated using a one-tailed, two sample *t* test. $P<0.05$ is considered statistically significant. The change of tumor volume in the combination treatment group is larger than in the anti-programmed cell death protein 1 monotherapy treatment group, the tabalumab treatment group, and larger than the addition of the change of both groups separately.

EXAMPLE 9: Efficacy study in non-small cell lung cancer xenograft model

[0408] Immunodeficient mice, such as 4-6 week-old male CB17 severe combined immunodeficiency (SCID) mice, are used for *in vivo* efficacy studies in accordance with the guidelines approved by IACUC. Parental non-small cell lung cancer cells, such as VCaP or LNCaP-AR cells, are implanted subcutaneously into male CB.17.SCID mice (3-4 x 10^6 cells in 50% Matrigel). When the tumor reaches a palpable size of approximately 80 mm^3, the tumor-bearing mice are randomly assigned to a vehicle control or composition treatment group (6 or

more animals per group). Animals are treated with a composition of the present disclosure by intraperitoneal injection in an appropriate amount and frequency as may be determined by the skilled artisan without undue experimentation. In one example, mice are treated with 40 mg/kg of a composition of the present disclosure daily by i.p. injection for two weeks, then 5 days per week thereafter. Subcutaneous tumor volume and mice body weight are measured twice weekly. Tumor volumes are calculated by measuring two perpendicular diameters with calipers ($V = (\text{length} \times \text{width}^2)/2$).

EXAMPLE 10: Efficacy study in castration-resistant non-small cell lung cancer tumor xenograft model (VCaP)

[0409] Immunodeficient mice, such as 4-6 week-old male CB17 severe combined immunodeficiency (SCID) mice, are used for *in vivo* efficacy studies in accordance with the guidelines approved by IACUC. Parental non-small cell lung cancer cells, such as VCaP cells, are implanted subcutaneously into male CB.17.SCID mice (3-4 x 10^6 cells in 50% Matrigel). When the tumor reaches a size of approximately 200-300 mm^3, the tumor-bearing mice are physically castrated and tumors observed for regression and regrowth to approximately 150 mm^3. The tumor-bearing mice are randomly assigned to a vehicle control or composition treatment group (6 or more animals per group). Animals are treated with a composition of the present disclosure by intraperitoneal injection in an appropriate amount and frequency as may be determined by the skilled artisan without undue experimentation. In one example, mice are treated with 40 mg/kg of a composition of the present disclosure daily by i.p. injection. Subcutaneous tumor volume and mice body weight are measured twice weekly. Tumor volumes are calculated by measuring two perpendicular diameters with calipers ($V = (\text{length} \times \text{width}^2)/2$).

EXAMPLE 11: Efficacy study in castration-resistant non-small cell lung cancer xenograft model (LNCaP-AR)

[0410] Immunodeficient mice, such as 4-6 week-old male CB17 severe combined immunodeficiency (SCID) mice, are used for *in vivo* efficacy studies in accordance with the guidelines approved by IACUC. CB.17.SCID mice are surgically castrated and allowed to recover for 2-3 weeks before implanting parental non-small cell lung cancer cells, such as LNCaP-AR cells, subcutaneously into (3-4 x 10^6 cells in 50% Matrigel). When the tumor reaches a size of approximately 80-100 mm^3, the tumor-bearing mice are randomly assigned to a vehicle control or composition treatment group (6 or more animals per group). Animals are treated with a composition of the present disclosure by intraperitoneal injection in an appropriate amount and frequency as may be determined by the skilled artisan without undue experimentation. In one example, mice are treated with 60 mg/kg of a composition of the present disclosure daily by i.p.

injection for 27 days. Subcutaneous tumor volume and mice body weight are measured twice weekly. Tumor volumes are calculated by measuring two perpendicular diameters with calipers ($V = (\text{length} \times \text{width}^2)/2$).

EXAMPLE 12: Conservation of Type II Signature

[0411] Tumor samples were obtained from subjects with squamous non-small cell lung cancer, adeno non-small cell lung cancer, colorectal cancer, head and neck squamous cell carcinoma, breast cancer, or melanoma.

[0412] Tumor samples were stained and imaged, and determined to possess a Type II Resistant Signature.

EXAMPLE 13: Type II Signature

[0413] FIG. 13A, 13B, and 13C, along with FIG. 14A, 14B, and 14C, illustrate three types of tumors before and after treatment. FIG. 13A illustrates a traditionally "hot" tumor, with a high level of CD8 cells. This "hot" tumor responds to single agent treatment. Before treatment, the "hot" tumor is expected to respond to treatment. As illustrated in FIG. 14A, the amount of CD8 density increase during treatment at both the invasive margin and within the tumor itself.

[0414] Fig. 13B illustrates a traditionally "cold" tumor, one that is not expected to, and does not, respond to single agent treatment. The CD8 density at both the invasive margin and within the tumor (FIG. 14B) stays consistent and does not increase.

[0415] FIG. 13C illustrates a tumor that may be traditionally labeled as a "hot" tumor because of the high density of CD8 cells, and may be expected to respond to single agent therapy. However, this tumor does not respond to single agent therapy during treatment. The level of CD8 density does increase, as illustrated in FIG. 14C, and mimics a responder (FIG. 14A) pattern. Thus, FIG. 13C and FIG. 14C illustrate a Type II Signature or Type II Resistant tumor.

EXAMPLE 14: Proliferation of Type II Resistant Cells

[0416] FIG. 15A and FIG. 15B illustrate Type II resistant tumors and the evidence of cell proliferation in these tumors before and during anti-PD1 treatment. FIG. 15B provides evidence for proliferating CD8 T-cells with samples obtained during treatment from three Type II resistant subjects. The T-cells are proliferating as well as turned on by secreting granzyme B.

EXAMPLE 15: Dewaxing and Antigen Retrieval

[0417] Dilute concentrated Hot Rinse at a ratio of 1:25. Fill staining jar (100 mL) or metal slide canister with (250 mL) of 1X Hot Rinse. Fill a second container with 100-250 mL of 1X Borg Decloaker RTU. Fill Decloaking Chamber with 500 mL Deionized Water. Heat to 110°C for 15 minutes. When the solution reaches 80-125°C, the solution turns a faint purple color and

indicates that the high temperature solution is at correct pH. A yellow or red solution indicates an incorrect pH. Transfer slides to the slide container with 1X Hot Rinse and dunk vigorously for a minimum of 20 times. Gently rinse by gradually adding Deionized Water to the solution. Use a total of 500 mL of Deionized Water in this step Pour off ¼ of Hot Rinse out of staining jar. Top off with Deionized Water, dunk vigorously for a minimum of 20 times. Repeat until all of the of Deionized Water is used. Hold slides in fresh Deionized Water until next step. Turn off decloaking chamber.

EXAMPLE 16: Endogenous Peroxidase Blocking

[0418] Prepare 250 ml of 0.3% Hydrogen Peroxide in a staining jar. Add 2.5 ml 30% Hydrogen Peroxide in 247.5 ml of Deionized Water. Transfer slides to 0.3% Hydrogen Peroxide, and dunk a minimum of 20 times. Incubate for 10 minutes +/- 1 minute. Transfer slides to 1X TBS. Dunk vigorously for a minimum of 20 times to wash. Hold slides in 1X TBS until Fluorescent IHC Staining. Slides may be stored overnight at 2-8°C in a staining jar containing fresh 1X TBS.

EXAMPLE 17: Antibody Incubation

[0419] Place slides into 1X TBS-T, and agitate at least 5 dips prior to staining. Incubate for at least 30 minutes no more than 1 hour. Remove excess Antibody by aspiration. Wash with fresh 1X TBS-T, and dunk vigorously. Allow slides to equilibrate for at least 3 min. Dunk again. Transfer to a new TBS-T wash, and repeat the dunk-equilibrate-dunk for a total of 4 washes. Hold slides in last wash until Secondary Antibody HRP Incubation.

EXAMPLE 18: Secondary Antibody-HRP Incubation

[0420] Apply 200 µL of Opal Polymer HRP Ms + Rb (Perkin Elmer). Incubate for at least 10 minutes and no more than 12 minutes. Remove excess Secondary Antibody by aspiration. Wash slides with 1X TBS-T prior to placing into slide holder, or place slides into slide holder and dunk at least 5 dips to pre-wash with 1X TBS-T. To wash, transfer slides to fresh 1X TBS-T, and dunk vigorously for a minimum of 20 times. Allow slides to equilibrate for at least 3 min. Dunk again for a minimum of 20 dips. Transfer to a new TBS-T wash, and repeat the dunk-equilibrate-dunk for a total of 3 washes. Hold slides in last wash until TSA incubation.

EXAMPLE 19: TSA Incubation

[0421] Apply 150 µL/slide of TSA Reagent. Incubate for at least 10 minutes and no more than 11 minutes. Remove excess TSA Reagent by aspiration. Irrigate slides with 1X TBS-T prior to placing into slide holder, or place slides into slide holder and dunk at least 5 dips to pre-wash with 1X TBS-T. To wash, transfer slides to fresh 1X TBS-T, and dunk vigorously for a minimum of 20 times. Allow slides to equilibrate for at least 3 min. Dunk again for a minimum

of 20 dips. Transfer to a new TBS-T wash, and repeat the dunk-equilibrate-dunk for a total of 3 washes. Hold slides in last wash until Heat Induced Stringent Wash.

EXAMPLE 20: Heat Induced Stringent Wash

[0422] Prepare 250 mL of 1X AR6 Buffer from the 7-color Fluorescent IHC Kit (Perkin Elmer, NEL797001) using Deionized Water. Place the covered staining jar with slides into a 1000-Watt microwave oven, and place a second jar containing 250 mL Deionized Water to balance the heat distribution during the cycle. Heat in microwave. Gently cool by gradually adding 1X TBS to the jar. Pour off ¼ of Citrate buffer out of staining jar. Top off with 1X TBS and agitate a minimum of 10 dips. Repeat until 500 mL of TBS is used. Transfer slides into fresh 1X TBS wash, dip the slide rack up and down at least 5 times. Hold slides in 1X TBS before proceeding with next step. If multiplexing more antibodies proceed to section 15, Sequential IHC Staining for Multiplex.

EXAMPLE 21: Nuclear Counterstain

[0423] Prepare DAPI solution from the TSA kit at concentration of 2 drops/1 mL TBS-T. DAPI Counterstain. Transfer slides to staining jar filled with 1X TBS-T, and dunk at least 5 times. Apply 200 µL DAPI solution, and incubate in the staining tray for 5 minutes +/- 1 minute. Transfer to a new wash of 1X TBS-T. Dunk a minimum of 20 times, and allow slides to equilibrate for 5 min. Dunk slides a minimum of 20 times. Transfer to a new wash of 1X TBS. Dunk a minimum of 20 times, and allow slides to equilibrate for 5 min. Dunk slides a minimum of 20 times. Transfer to a new wash of deionized water, and dunk a minimum of 20 times.

[0424] EXAMPLE 22: Correlation between BAFF Expression and T-cell Inflamed Signature

[0425] This aim of this study was to examine the relationship between BAFF expression and a T-cell inflamed signature, comprising a set of 39 genes (listed below in Table 4), according to cancer type.

[0426] The Cancer Genome Atlas (TCGA) RNA-seq gene expression data was analyzed in 11,574 cancer samples. 11,574 HTSeq – FPKM (High Throughput Sequencing-Fragments Per Kilobase of transcript per Million mapped reads) files (i.e., 1 HTSeq – FPKM file per cancer sample) files representing an equivalent number of cancer samples were acquired from TCGA data release v9.0. Files were annotated with disease type based on the associated project annotations also acquired from TCGA release v.9.0. Sample data points for BAFF expression (TCGA identifier ENSG00000102524.10) were displayed as a boxplot with outliers and ordered left to right based on increasing median FPKM, as shown in Fig. 58. In addition, Table 6, below, provides number of samples analyzed based on disease types.

[0427] Table 6

Disease type	Count
Neuroblastoma	157
Brain Lower Grade Glioma	529
Endometrial Carcinoma	587
Ovarian Serous Cystadenocarcinoma	379
Acute Myeloid Leukemia	338
Renal Papillary Cell Carcinoma	321
Colon Adenocarcinoma	521
Hepatocellular Carcinoma	424
Thyroid Carcinoma	568
Breast Invasive Carcinoma	1222
Renal Clear Cell Carcinoma	611
High-Risk Wilms Tumor	132
Bladder Urothelial Carcinoma	433
Prostate Adenocarcinoma	551
Lung Adenocarcinoma	594
Glioblastoma Multiforme	174
Cervical Squamous Cell Carcinoma	309
Head and Neck Squamous Cell Carcinoma	546
Stomach Adenocarcinoma	407
Cutaneous Melanoma	472
Esophageal Carcinoma	173
Rectum Adenocarcinoma	177
Cholangiocarcinoma	45
Pancreatic Adenocarcinoma	182
Lung Squamous Cell Carcinoma	551
Pheochromocytoma and Paraganglioma	186
Sarcoma	265
Testicular Germ Cell Tumors	156
Kidney Chromophobe	89
Mesothelioma	86
Thymoma	121
Uveal Melanoma	80
Adrenocortical Carcinoma	79
Uterine Carcinosarcoma	56
Diffuse Large B-cell Lymphoma	48
Rhabdoid Tumor	5
Total	**11574**

[0428] 11,574 HTSeq – FPKM (High Throughput Sequencing-Fragments Per Kilobase of transcript per Million mapped reads) files (i.e., 1 HTSeq – FPKM file per cancer sample) were

downloaded from TCGA data release v9.0. files. The HTSeq-FPKM files were annotated with cancer type based on the associated project annotations obtained from TCGA release v.9.0.

[0429] Samples representing the 36 cancer types in the TCGA RNA-Seq dataset were used for calculating an all-by-all correlation matrix. Rest of the samples were removed from the dataset. A Spearman's rank order correlation coefficient of the FPKM expression values for each gene pair, paired by sample, was calculated using the SciPy statistical package.

[0430] BAFF expression data was extracted using the Ensembl identifier ENSG00000102524.10.

[0431] The correlation heatmap for the target correlation significance analysis was calculated as above. Figs. 21-28 illustrate the heatmaps demonstrating the T-cell inflamed signature of several cancer types, such as, Acute Myeloid Leukemia (Fig. 21), Adrenocortical Carcinoma (Fig. 22), Head and Neck squamous cell carcinoma (Fig. 23), Breast Invasive Carcinoma (Fig. 24), Lung Adenocarcinoma (Fig. 25), Lung Squamous Cell Carcinoma (Fig. 26), Bladder Urothelial Carcinoma (Fig. 27), and Skin Cutaneous Melanoma (Fig. 28). In each of these heatmaps it can be seen that there is a significant correlation between the 39 genes that comprise the T-cell inflamed signature. The heatmaps depicted in Fig. 21 and Fig. 22 indicate that BAFF may not be strongly correlated with T-cell inflamed signature in Acute Myeloid Leukemia or Adrenocortical Carcinoma, respectively. The heatmap shown in Fig. 23 indicates that BAFF may be strongly correlated with T-cell inflamed signature in Head and Neck squamous cell carcinoma. The heatmap shown in Fig. 24 indicates that BAFF may have some correlation with T-cell inflamed signature in Breast Invasive Carcinoma. The heatmap shown in Fig. 25 indicates that BAFF may be strongly correlated with T-cell inflamed signature in Lung Adenocarcinoma. The heatmap shown in Fig. 26 indicates that BAFF may be strongly correlated with T-cell inflamed signature in Lung Squamous Cell Carcinoma. The heatmap shown in Fig. 27 indicates that BAFF may be strongly correlated with T-cell inflamed signature in Bladder Urothelial Carcinoma. The heatmap shown in Fig. 28 indicates that BAFF may be strongly correlated with T-cell inflamed signature in Skin Cutaneous Melanoma. The heatmap shown in Fig. 29 indicates that BAFF may have some correlation with T-cell inflamed signature in Mesothelioma. The heatmap shown in Fig. 30 indicates that BAFF may not be correlated with T-cell inflamed signature in Brain lower grade glioma. The heatmap shown in Fig. 31 indicates that BAFF may have some correlation with T-cell inflamed signature in Cervical squamous cell carcinoma and Endocervical adenocarcinoma. The heatmap shown in Fig. 32 indicates that BAFF may have some correlation with T-cell inflamed signature in Cholangiocarcinoma. The heatmap shown in Fig. 33 indicates that BAFF may be strongly correlated with T-cell inflamed signature in Colon

adenocarcinoma. The heatmap shown in Fig. 34 indicates that BAFF may have some correlation with T-cell inflamed signature in Esophageal carcinoma. The heatmap shown in Fig. 35 indicates that BAFF may have some correlation with T-cell inflamed signature in Glioblastoma multiforme. The heatmap shown in Fig. 36 indicates that BAFF may not be correlated with T-cell inflamed signature in High-risk Wilms Tumor. The heatmap shown in Fig. 37 indicates that BAFF may have some correlation with T-cell inflamed signature in Kidney chromophobe. The heatmap shown in Fig. 38 indicates that BAFF may have some correlation with T-cell inflamed signature in Kidney renal clear cell carcinoma. The heatmap shown in Fig. 39 indicates that BAFF may have some correlation with T-cell inflamed signature in Kidney renal papillary cell carcinoma. The heatmap shown in Fig. 40 indicates that BAFF may have some correlation with T-cell inflamed signature in Liver hepatocellular carcinoma. The heatmap shown in Fig. 41 indicates that BAFF may not be correlated with T-cell inflamed signature in Lymphoid neoplasm diffuse large B-cell lymphoma. The heatmap shown in Fig. 42 indicates that BAFF may have some correlation with T-cell inflamed signature in Stomach adenocarcinoma. The heatmap shown in Fig. 43 indicates that BAFF may have some correlation with T-cell inflamed signature in neuroblastoma. The heatmap shown in Fig. 44 indicates that BAFF may have some correlation with T-cell inflamed signature in Ovarian serous cystadenocarcinoma. The heatmap shown in Fig. 45 indicates that BAFF may have some correlation with T-cell inflamed signature in Pancreatic adenocarcinoma. The heatmap shown in Fig. 46 indicates that BAFF may not be correlated with T-cell inflamed signature in Pheochromocytoma or Paraganglioma. The heatmap shown in Fig. 47 indicates that BAFF may have some correlation with T-cell inflamed signature in Prostate adenocarcinoma. The heatmap shown in Fig. 48 indicates that BAFF may have some correlation with T-cell inflamed signature in Rectum adenocarcinoma. The heatmap shown in Fig. 49 indicates that BAFF may not be correlated with T-cell inflamed signature in Rhabdoid tumor. The heatmap shown in Fig. 50 indicates that BAFF may have some correlation with T-cell inflamed signature in Sarcoma. The heatmap shown in Fig. 51 indicates that BAFF may have some correlation with T-cell inflamed signature in Testicular germ cell tumors. The heatmap shown in Fig. 52 indicates that BAFF may not be correlated with T-cell inflamed signature in Thymoma. The heatmap shown in Fig. 53 indicates that BAFF may be strongly correlated with T-cell inflamed signature in Thyroid carcinoma. The heatmap shown in Fig. 54 indicates that BAFF may have some correlation with T-cell inflamed signature in Uterine carcinosarcoma. The heatmap shown in Fig. 55 indicates that BAFF may have some correlation with T-cell inflamed signature in Uterine corpus endothelial carcinoma. The heatmap shown in

Fig. 56 indicates that BAFF may be strongly correlated with T-cell inflamed signature in uveal melanoma.

[0432] An aggregate heatmap for correlation between BAFF expression and the T-cell inflamed signature is shown in Fig. 57. BAFF expression was found to strongly correlate with the T-cell inflamed signature in a number of cancers, such as, cholangocarcinoma, lung squamous cell carcinoma.

[0433] The disease "Rhabdoid Tumor" was excluded due to the low number of samples available for analysis (N = 5). Significance for each Spearman's Rho was calculated as follows. A model of random sample gene correlation was constructed for each disease by calculating Spearman's Rho for a set of randomly selected 10,000 pairs of genes. Genes with no measured expression in any sample were excluded from this random model. A mean and standard deviation of this background model was calculated for each disease and used to determine the required Z-score and corresponding significant Spearman's Rho values for a two-sided P-value test < 0.01 corrected for multiple testing using the Bonferroni method. Spearman's rho values corresponding to those that are significant were displayed on the heatmap and those below significance were not displayed.

[0434] 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 described herein may be employed in practicing the invention. It is intended that the following claims define the scope of the invention and that methods and structures within the scope of these claims and their equivalents be covered thereby.

Table 7: Sequences

SEQ ID NO:	Protein	Amino Acid Sequence	Exemplary mRNA sequence	RefSeq Genomic Sequence
36	CCL2	>tr|J3KRT7|J3KRT7_HUMAN C-C motif chemokine 2 OS=Homo sapiens GN=CCL2 PE=4 SV=1 MKVSAALLCLLLIAATFIPQGLAQPDAINAPVTCCYNFT	SEQ ID NO: 86 >NM_002982.3 Homo sapiens C-C motif chemokine ligand 2 (CCL2), mRNA GAGGAACCGAGAGGCTGAGACTAACCCAGAAACATCCAATTCTCAAACTGAA GCTCGCACTCTCGCCTCCAGCATGAAAGTCTCTGCCGCCCTTCTGTGCCTGCTG CTCATAGCAGCCACCTTCATTCCCCAAGGGCTCGCTCAGCCAGATGCAATCAA TGCCCCAGTCACCTGCTGTTATAACTTCACCAATAGGAAGATCTCAGTGCAGA GGCTCGCGAGCTATAGAAGAATCACCAGCAGCAAGTGTCCCAAAGAAGCTGT GATCTTCAAGACCATTGTGGCCAAGGAGATCTGTGCTGACCCCAAGCAGAAGT GGGTTCAGGATTCCATGGACCACCTGGACAAGCAAACCCAAACTCCGAAGAC TTGAACACTCACTCCACAACCCAAGAATCTGCAGCTAACTTATTTTCCCCTAG	SEQ ID NO: 124 NG_012123.1

		NRKISVQRLASYR RITSSKCPKEAVM	CTTTCCCCAGACACCCTGTTTTATTTTATTATAATGAATTTTGTTTGTTGATGTG AAACATTATGCCTTAAGTAATGTTAATTCTTATTTAAGTTATTGATGTTTTAAG TTTATCTTTCATGGTACTAGTGTTTTTTAGATACAGAGACTTGGGGAAATTGCT TTTCCTCTTGAACCACAGTTCTACCCCTGGGATGTTTTGAGGGTCTTTGCAAGA ATCATTAATACAAAGAATTTTTTTTAACATTCCAATGCATTGCTAAAATATTAT TGTGGAAATGAATATTTTGTAACTATTACACCAAATAAATATATTTTTGTACA AAAAAAAAAAAAAA	
37	CCL3	>NP_002974.1 C-C motif chemokine 3 precursor [Homo sapiens] MQVSTAALAVLL CTMALCNQFSASL AADTPTACCFSYT SRQIPQNFIADYFE TSSQCSKPGVIFLT KRSRQVCADPSEE WVQKYVSDLELS A	SEQ ID NO: 87 >NM_002983.2 Homo sapiens C-C motif chemokine ligand 3 (CCL3), mRNA AGCTGGTTTCAGACTTCAGAAGGACACGGGCAGCAGACAGTGGTCAGTCCTTT CTTGGCTCTGCTGACACTCGAGCCCACATTCCGTCACCTGCTCAGAATCATGC AGGTCTCCACTGCTGCCCTTGCTGTCCTCCTCTGCACCATGGCTCTCTGCAACC AGTTCTCTGCATCACTTGCTGCTGACACGCCGACCGCCTGCTGCTTCAGCTACA CCTCCCGGCAGATTCCACAGAATTTCATAGCTGACTACTTTGAGACGAGCAGC CAGTGCTCCAAGCCCGGTGTCATCTTCCTAACCAAGCGAAGCCGGCAGGTCTG TGCTGACCCCAGTGAGGAGTGGGTCCAGAAATATGTCAGCGACCTGGAGCTG AGTGCCTGAGGGGTCCAGAAGCTTCGAGGCCCAGCGACCTCGGTGGGCCCAG TGGGGAGGAGCAGGAGCCTGAGCCTTGGGAACATGCGTGTGACCTCCACAGC TACCTCTTCTATGGACTGGTTGTTGCCAAACAGCCACACTGTGGGACTCTTCTT AACTTAAATTTTAATTTATTTATACTATTTAGTTTTTGTAATTTATTTTCGATTT CACAGTGTGTTTGTGATTGTTTGCTCTGAGAGTTCCCCTGTCCCCTCCCCCTTC CCTCACACCGCGTCTGGTGACAACCGAGTGGCTGTCATCAGCCTGTGTAGGCA GTCATGGCACCAAAGCCACCAGACTGACAAATGTGTATCGGATGCTTTTGTTC AGGGCTGTGATCGGCCTGGGGAAATAATAAAGATGCTCTTTTAAAAGGTAAA AAAAAAAAAAAAAAAA	SEQ ID NO: 125 NG_027730.1
38	ITGAL	>NP_002200.2 integrin alpha-L isoform a precursor [Homo sapiens] MKDSCITVMAMA LLSGFFFFAPASSY NLDVRGARSFSPP RAGRHFGYRVLQ VGNGVIVGAPGEG NSTGSLYQCQSGT GHCLPVTLRGSNY TSKYLGMTLATDP TDGSILACDPGLS RTCDQNTYLSGLC YLFRQNLQGPML QGRPGFQECIKGN VDLVFLFDGSMSL QPDEFQKILDFMK DVMKKLSNTSYQ FAAVQFSTSYKTE FDFSDYVKRKDPD ALLKHVKHMLLL TNTFGAINYVATE VFREELGARPDAT KVLIIITDGEATDS	SEQ ID NO: 88 >NM_002209.2 Homo sapiens integrin subunit alpha L (ITGAL), transcript variant 1, mRNA ACACCTCCCTCCCCGCCTGCCAGTGTCACCAGCCTGTTGCCTCTGTGAGAAAG TACCACTGTAAGAGGCCAAAGGGCATGATCATTTTCCTCTTTCACCCTGTCTA GGTTGCCAGCAAATCCCACGGGCCTCCTGACGCTGCCCCTGGGGCCACAGGTC CCTCGAGTGCTGGAAGGATGAAGGATTCCTGCATCACTGTGATGGCCATGGCG CTGCTGTCTGGGTTCTTTTTCTTCGCGCCGGCCTCGAGCTACAACCTGGACGTG CGGGGCGCGCGGAGCTTCTCCCCACCGCGCGCCGGGAGGCACTTTGGATACC GCGTCCTGCAGGTCGGAAACGGGGTCATCGTGGGAGCTCCAGGGGAGGGGAA CAGCACAGGAAGCCTCTATCAGTGCCAGTCGGGCACAGGACACTGCCTGCCA GTCACCCTGAGAGGTTCCAACTATACCTCCAAGTACTTGGGAATGACCTTGGC AACAGACCCCACAGATGGAAGCATTTTGGCCTGTGACCCTGGGCTGTCTCGAA CGTGTGACCAGAACACCTATCTGAGTGGCCTGTGTTACCTCTTCCGCCAGAAT CTGCAGGGTCCCATGCTGCAGGGGCGCCCTGGTTTTCAGGAATGTATCAAGGG CAACGTAGACCTGGTATTTCTGTTTGATGGTTCGATGAGCTTGCAGCCAGATG AATTTCAGAAAATTCTGGACTTCATGAAGGATGTGATGAAGAAACTCAGCAA CACTTCGTACCAGTTTGCTGCTGTTCAGTTTTCCACAAGCTACAAAACAGAATT TGATTTCTCAGATTATGTTAAACGGAAGGACCCTGATGCTCTGCTGAAGCATG TAAAGCACATGTTGCTGTTGACCAATACCTTTGGTGCCATCAATTATGTCGCG ACAGAGGTGTTCCGGGAGGAGCTGGGGGCCCGGCCAGATGCCACCAAAGTGC TTATCATCATCACGGATGGGGAGGCCACTGACAGTGGCAACATCGATGCGGC CAAAGACATCATCCGCTACATCATCGGGATTGGAAAGCATTTTCAGACCAAGG AGAGTCAGGAGACCCTCCACAAATTTGCATCAAAACCCGCGAGCGAGTTTGT GAAAATTCTGGACACATTTGAGAAGCTGAAAGATCTATTCACTGAGCTGCAGA AGAAGATCTATGTCATTGAGGGCACAAGCAAACAGGACCTGACTTCCTTCAAC	

		GNIDAAKDIIRYII	ATGGAGCTGTCCTCCAGCGGCATCAGTGCTGACCTCAGCAGGGGCCATGCAGT	
		GIGKHFQTKESQE	CGTGGGGGCAGTAGGAGCCAAGGACTGGGCTGGGGGCTTTCTTGACCTGAAG	
		TLHKFASKPASEF	GCAGACCTGCAGGATGACACATTTATTGGGAATGAACCATTGACACCAGAAG	
		VKILDTFEKLKDL	TGAGAGCAGGCTATTTGGGTTACACCGTGACCTGGCTGCCCTCCCGGCAAAAG	
		FTELQKKIYVIEGT	ACTTCGTTGCTGGCCTCGGGAGCCCCTCGATACCAGCACATGGGCCGAGTGCT	
		SKQDLTSFNMELS	GCTGTTCCAAGAGCCACAGGGCGGAGGACACTGGAGCCAGGTCCAGACAATC	
		SSGISADLSRGHA	CATGGGACCCAGATTGGCTCTTATTTCGGTGGGGAGCTGTGTGGCGTCGACGT	
		VVGAVGAKDWA	GGACCAAGATGGGGAGACAGAGCTGCTGCTGATTGGTGCCCCACTGTTCTATG	
		GGFLDLKADLQD	GGGAGCAGAGAGGAGGCCGGGTGTTTATCTACCAGAGAAGACAGTTGGGGTT	
		DTFIGNEPLTPEVR	TGAAGAAGTCTCAGAGCTGCAGGGGGACCCCGGCTACCCACTCGGGCGGTTT	
		AGYLGYTVTWLP	GGAGAAGCCATCACTGCTCTGACAGACATCAACGGCGATGGGCTGGTAGACG	
		SRQKTSLLASGAP	TGGCTGTGGGGGCCCCTCTGGAGGAGCAGGGGGCTGTGTACATCTTCAATGGG	
		RYQHMGRVLLFQ	AGGCACGGGGGGCTTAGTCCCCAGCCAAGTCAGCGGATAGAAGGGACCCAAG	
		EPQGGGHWSQVQ	TGCTCTCAGGAATTCAGTGGTTTGGACGCTCCATCCATGGGGTGAAGGACCTT	
		TIHGTQIGSYFGGE	GAAGGGGATGGCTTGGCAGATGTGGCTGTGGGGGCTGAGAGCCAGATGATCG	
		LCGVDVDQDGET	TGCTGAGCTCCCGGCCCGTGGTGGATATGGTCACCCTGATGTCCTTCTCTCCAG	
		ELLLIGAPLFYGEQ	CTGAGATCCCAGTGCATGAAGTGGAGTGCTCCTATTCAACCAGTAACAAGATG	
		RGGRVFIYQRRQL	AAAGAAGGAGTTAATATCACAATCTGTTTCCAGATCAAGTCTCTCATCCCCCA	
		GFEEVSELQGDPG	GTTCCAAGGCCGCCTGGTTGCCAATCTCACTTACACTCTGCAGCTGGATGGCC	
		YPLGRFGEAITAL	ACCGGACCAGAAGACGGGGGTTGTTCCCAGGAGGGAGACATGAACTCAGAAG	
		TDINGDGLVDVA	GAATATAGCTGTCACCACCAGCATGTCATGCACTGACTTCTCATTTCATTTCCC	
		VGAPLEEQGAVYI	GGTATGTGTTCAAGACCTCATCTCCCCCATCAATGTTTCCCTGAATTTCTCTCT	
		FNGRHGGLSPQPS	TTGGGAGGAGGAAGGGACACCGAGGGACCAAAGGGCGCAGGGCAAGGACAT	
		QRIEGTQVLSGIQ	ACCGCCCATCCTGAGACCCTCCCTGCACTCGGAAACCTGGGAGATCCCTTTTG	
		WFGRSIHGVKDLE	AGAAGAACTGTGGGGAGGACAAGAAGTGTGAGGCAAACTTGAGAGTGTCCTT	
		GDGLADVAVGAE	CTCTCCTGCAAGATCCAGAGCCCTGCGTCTAACTGCTTTTGCCAGCCTCTCTGT	
		SQMIVLSSRPVVD	GGAGCTGAGCCTGAGTAACTTGGAAGAAGATGCTTACTGGGTCCAGCTGGAC	
		MVTLMSFSPAEIP	CTGCACTTCCCCCCGGGACTCTCCTTCCGCAAGGTGGAGATGCTGAAGCCCCA	
		VHEVECSYSTSNK	TAGCCAGATACCTGTGAGCTGCGAGGAGCTTCCTGAAGAGTCCAGGCTTCTGT	
		MKEGVNITICFQIK	CCAGGGCATTATCTTGCAATGTGAGCTCTCCCATCTTCAAAGCAGGCCACTCG	
		SLIPQFQGRLVAN	GTTGCTCTGCAGATGATGTTTAATACACTGGTAAACAGCTCCTGGGGGGACTC	
		LTYTLQLDGHRTR	GGTTGAATTGCACGCCAATGTGACCTGTAACAATGAGGACTCAGACCTCCTGG	
		RRGLFPGGRHELR	AGGACAACTCAGCCACTACCATCATCCCCATCCTGTACCCCATCAACATCCTC	
		RNIAVTTSMSCTD	ATCCAGGACCAAGAAGACTCCACACTCTATGTCAGTTTCACCCCCAAAGGCCC	
		FSFHFPVCVQDLIS	CAAGATCCACCAAGTCAAGCACATGTACCAGGTGAGGATCCAGCCTTCCATCC	
		PINVSLNFSLWEEE	ACGACCACAACATACCCACCCTGGAGGCTGTGGTTGGGGTGCCACAGCCTCCC	
		GTPRDQRAQGKDI	AGCGAGGGGCCCATCACACACCAGTGGAGCGTGCAGATGGAGCCTCCCGTGC	
		PPILRPSLHSETWE	CCTGCCACTATGAGGATCTGGAGAGGCTCCCGGATGCAGCTGAGCCTTGTCTC	
		IPFEKNCGEDKKC	CCCGGAGCCCTGTTCCGCTGCCCTGTTGTCTTCAGGCAGGAGATCCTCGTCCA	
		EANLRVSFSPARS	AGTGATCGGGACTCTGGAGCTGGTGGGAGAGATCGAGGCCTCTTCCATGTTCA	
		RALRLTAFASLSV	GCCTCTGCAGCTCCCTCTCCATCTCCTTCAACAGCAGCAAGCATTTCCACCTCT	
		ELSLSNLEEDAYW	ATGGCAGCAACGCCTCCCTGGCCCAGGTTGTCATGAAGGTTGACGTGGTGTAT	
		VQLDLHFPPGLSF	GAGAAGCAGATGCTCTACCTCTACGTGCTGAGCGGCATCGGGGGGCTGCTGCT	
		RKVEMLKPHSQIP	GCTGCTGCTCATTTTCATAGTGCTGTACAAGGTTGGTTTCTTCAAACGGAACCT	
		VSCEELPEESRLLS	GAAGGAGAAGATGGAGGCTGGCAGAGGTGTCCCGAATGGAATCCCTGCAGAA	
		RALSCNVSSPIFKA	GACTCTGAGCAGCTGGCATCTGGGCAAGAGGCTGGGGATCCCGGCTGCCTGA	
		GHSVALQMMFNT	AGCCCCTCCATGAGAAGGACTCTGAGAGTGGTGGTGGCAAGGACTGAGTCCA	
		LVNSSWGDSVEL	GGCCTGTGAGGTGCAGAGTGCCCAGAACTGGACTCAGGATGCCCAGGGCCAC	
		HANVTCNNEDSD	TCTGCCTCTGCCTGCATTCTGCCGTGTGCCCTCGGGCGAGTCACTGCCTCTCCC	
		LLEDNSATTIIPILY	TGGCCCTCAGTTTCCCTATCTCGAACATGGAACTCATTCCTGCCTGTCTCCTTT	
		PINILIQDQEDSTL	GCAGGCTCATAGGGAAGACCTGCTGAGGGACCAGCCAAGAGGGCTGCAAAAG	

		YVSFTPKGPKIHQ VKHMYQVRIQPSI HDHNIPTLEAVVG VPQPPSEGPITHQ WSVQMEPPVPCH YEDLERLPDAAEP CLPGALFRCPVVF RQEILVQVIGTLEL VGEIEASSMFSLCS SLSISFNSSKHFHL YGSNASLAQVVM KVDVVYEKQMLY LYVLSGIGGLLLL LLIFIVLYKVGFFK RNLKEKMEAGRG VPNGIPAEDSEQL ASGQEAGDPGCL KPLHEKDSESGGG KD	TGAGGGCTTGTCATTACCAGACGGTTCACCAGCCTCTCTTGGTTTCCTTCCTTG GAAGAGAATGTCTGATCTAAATGTGGAGAAACTGTAGTCTCAGGACCTAGGG ATGTTCTGGCCCTCACCCCTGCCCTGGGATGTCCACAGATGCCTCCACCCCCC AGAACCTGTCCTTGCACACTCCCCTGCACTGGAGTCCAGTCTCTTCTGCTGGCA GAAAGCAAATGTGACCTGTGTCACTACGTGACTGTGGCACACGCCTTGTTCTT GGCCAAAGACCAAATTCCTTGGCATGCCTTCCAGCACCCTGCAAAATGAGACC CTCGTGGCCTTCCCCAGCCTCTTCTAGAGCCGTGATGCCTCCCTGTTGAAGCTC TGGTGACACCAGCCTTTCTCCCAGGCCAGGCTCCTTCCTGTCTTCCTGCATTCA CCCAGACAGCTCCCTCTGCCTGAACCTTCCATCTCGCCACCCCTCCTTCCTTGA CCAGCAGATCCCAGCTCACGTCACACTTGGTTGGGTCCTCACATCTTTCACACT TCCACCAGCCTGCACTACTCCCTCAAAGCACACGTCATGTTTCTTCATCCGGCA GCCTGGATGTTTTTTCCCTGTTTAATGATTGACGTACTTAGCAGCTATCTCTCA GTGAACTGTGAGGGTAAAGGCTATACTTGTCTTGTTCACCTTGGGATGATGCC TCATGATATGTCAGGGCGTGGGACATCTAGTAGGTGCTTGACATAATTTCACT GAATTAATGACAGAGCCAGTGGGAAGATACAGAAAAAGAGGGGCTGGGCTG GGCGCGGTGGTTCACGCCTGTAATCCCAGCACTTTGGGAGGCCAAGGAGGGT GGATCACCTGAGGTCAGGAGTTAGAGGCCAGCCTGGCGAAACCCCATCTCTA CTAAAAATACAAAATCCAGGCGTGGTGGCACACACCTGTAGTCCCAGCTACTC AGGAGGTTGAGGTAGGAGAATTGCTTGAACCTGGGAGGTGGAGGTTGCAGTG AGCCAAGATTGCGCCATTGCACTCCAGCCTGGGCAACACAGCGAGACTCCGTC TCAAGGAAAAAATAAAAATAAAAAGCGGGCACGGGCCCGTGACATCCCCACC CTTGGAGGCTGTCTTCTCAGGCTCTGCCCTGCCCTAGCTCCACACCCTCTCCCA GGACCCATCACGCCTGTGCAGTGGCCCCCACAGAAAGACTGAGCTCAAGGTG GGAACCACGTCTGCTAACTTGGAGCCCCAGTGCCAAGCACAGTGCCTGCATGT ATTTATCCAATAAATGTGAAATTCTGTCCAAAAAAAAAAAAAAAAAA	
39	CXCL13	>NP_006410.1 C-X-C motif chemokine 13 precursor [Homo sapiens] MKFISTSLLLMLL VSSLSPVQGVLEV YYTSLRCRCVQES SVFIPRRFIDRIQIL PRGNGCPRKEIIV WKK NKSIVCVDPQAEW IQRMMEVLRKRSS STLPVPVFKRKIP	SEQ ID NO: 89 >NM_006419.2 Homo sapiens C-X-C motif chemokine ligand 13 (CXCL13), mRNA GAGAAGATGTTTGAAAAAACTGACTCTGCTAATGAGCCTGGACTCAGAGCTC AAGTCTGAACTCTACCTCCAGACAGAATGAAGTTCATCTCGACATCTCTGCTT CTCATGCTGCTGGTCAGCAGCCTCTCTCCAGTCCAAGGTGTTCTGGAGGTCTAT TACACAAGCTTGAGGTGTAGATGTGTCCAAGAGAGCTCAGTCTTTATCCCTAG ACGCTTCATTGATCGAATTCAAATCTTGCCCCGTGGGAATGGTTGTCCAAGAA AAGAAATCATAGTCTGGAAGAAGAACAAGTCAATTGTGTGTGTGGACCCTCA AGCTGAATGGATACAAAGAATGATGGAAGTATTGAGAAAAAGAAGTTCTTCA ACTCTACCAGTTCCAGTGTTTAAGAGAAAGATTCCCTGATGCTGATATTTCCA CTAAGAACACCTGCATTCTTCCCTTATCCCTGCTCTGGATTTTAGTTTTGTGCTT AGTTAAATCTTTTCCAGGAAAAAGAACTTCCCCATACAAATAAGCATGAGACT ATGTAAAAATAACCTTGCAGAAGCTGATGGGGCAAACTCAAGCTTCTTCACTC ACAGCACCCTATATACACTTGGAGTTTGCATTCTTATTCATCAGGGAGGAAAG TTTCTTTGAAAATAGTTATTCAGTTATAAGTAATACAGGATTATTTTGATTATA TACTTGTTGTTTAATGTTTAAAATTTCTTAGAAAACAATGGAATGAGAATTTA AGCCTCAAATTTGAACATGTGGCTTGAATTAAGAAGAAAATTATGGCATATAT TAAAAGCAGGCTTCTATGAAAGACTCAAAAAGCTGCCTGGGAGGCAGATGGA ACTTGAGCCTGTCAAGAGGCAAAGGAATCCATGTAGTAGATATCCTCTGCTTA AAAACTCACTACGGAGGAGAATTAAGTCCTACTTTTAAAGAATTTCTTTATAA AATTTACTGTCTAAGATTAATAGCATTCGAAGATCCCCAGACTTCATAGAATA CTCAGGGAAAGCATTTAAAGGGTGATGTACACATGTATCCTTTCACACATTTG CCTTGACAAACTTCTTTCACTCACATCTTTTTCACTGACTTTTTTTGTGGGGGG CGGGGCCGGGGGGACTCTGGTATCTAATTCTTTAATGATTCCTATAAATCTAA TGACATTCAATAAAGTTGAGCAAACATTTTACTTAAAAAAAAAAAAAAAAAA	
40	STAT1	>NP_009330.1 signal transducer and	SEQ ID NO: 90	SEQ ID NO:

		activator of transcription 1-alpha/beta isoform alpha [Homo sapiens] MSQWYELQQLDS KFLEQVHQLYDDS FPMEIRQYLAQWL EKQDWEHAANDV SFATIRFHDLLSQL DDQYSRFSLENNF LLQHNIRKSKRNL QDNFQEDPIQMSM IIYSCLKEERKILE NAQRFNQAQSGNI QSTVMLDKQKEL DSKVRNVKDKVM CIEHEIKSLEDLQD EYDFKCKTLQNRE HETNGVAKSDQK QEQLLLKKMYLM LDNKRKEVVHKII ELLNVTELTQNAL INDELVEWKRRQ QSACIGGPPNACL DQLQNWFTIVAES LQQVRQQLKKLE ELEQKYTYEHDPI TKNKQVLWDRTF SLFQQLIQSSFVVE RQPCMPTHPQRPL VLKTGVQFTVKLR LLVKLQELNYNLK VKVLFDKDVNER NTVKGFRKFNILG THTKVMNMEEST NGSLAAEFRHLQL KEQKNAGTRTNE GPLIVTEELHSLSF ETQLCQPGLVIDL ETTSLPVVVISNVS QLPSGWASILWYN MLVAEPRNLSFFL TPPCARWAQLSEV LSWQFSSVTKRGL NVDQLNMLGEKL LGPNASPDGLIPW TRFCKENINDKNF PFWLWIESILELIK KHLLPLWNDGCI MGFISKERERALL KDQQPGTFLLRFS ESSREGAITFTWV ERSQNGGEPDFHA VEPYTKKELSAVT FPDIIRNYKVMAA ENIPENPLKYLYP NIDKDHAFGKYYS RPKEAPEPMELDG PKGTGYIKTELISV SEVHPSRLQTTDN LLPMSPEEFDEVS RIVGSVEFDSMMN TV	>NM_007315.3 Homo sapiens signal transducer and activator of transcription 1 (STAT1), transcript variant alpha, mRNA GCTGAGCGCGGAGCCGCCCGGTGATTGGTGGGGGCGGAAGGGGGCCGGGCGC CAGCGCTGCCTTTTCTCCTGCCGGGTAGTTTCGCTTTCCTGCGCAGAGTCTGCG GAGGGGCTCGGCTGCACCGGGGGGATCGCGCCTGGCAGACCCCAGACCGAGC AGAGGCGACCCAGCGCGCTCGGGAGAGGCTGCACCGCCGCGCCCCCGCCTAG CCCTTCCGGATCCTGCGCGCAGAAAAGTTTCATTTGCTGTATGCCATCCTCGA GAGCTGTCTAGGTTAACGTTCGCACTCTGTGTATATAACCTCGACAGTCTTGG CACCTAACGTGCTGTGCGTAGCTGCTCCTTTGGTTGAATCCCCAGGCCCTTGTT GGGGCACAAGGTGGCAGGATGTCTCAGTGGTACGAACTTCAGCAGCTTGACT CAAAATTCCTGGAGCAGGTTCACCAGCTTTATGATGACAGTTTTCCCATGGAA ATCAGACAGTACCTGGCACAGTGGTTAGAAAAGCAAGACTGGGAGCACGCTG CCAATGATGTTTCATTTGCCACCATCCGTTTTCATGACCTCCTGTCACAGCTGG ATGATCAATATAGTCGCTTTTCTTTGGAGAATAACTTCTTGCTACAGCATAACA TAAGGAAAAGCAAGCGTAATCTTCAGGATAATTTTCAGGAAGACCCAATCCA GATGTCTATGATCATTTACAGCTGTCTGAAGGAAGAAAGGAAAATTCTGGAA AACGCCCAGAGATTTAATCAGGCTCAGTCGGGGAATATTCAGAGCACAGTGA TGTTAGACAAACAGAAAGAGCTTGACAGTAAAGTCAGAAATGTGAAGGACAA GGTTATGTGTATAGAGCATGAAATCAAGAGCCTGGAAGATTTACAAGATGAA TATGACTTCAAATGCAAAACCTTGCAGAACAGAGAACACGAGACCAATGGTG TGGCAAAGAGTGATCAGAAACAAGAACAGCTGTTACTCAAGAAGATGTATTT AATGCTTGACAATAAGAGAAAGGAAGTAGTTCACAAAATAATAGAGTTGCTG AATGTCACTGAACTTACCCAGAATGCCCTGATTAATGATGAACTAGTGGAGTG GAAGCGGAGACAGCAGAGCGCCTGTATTGGGGGGCCGCCCAATGCTTGCTTG GATCAGCTGCAGAACTGGTTCACTATAGTTGCGGAGAGTCTGCAGCAAGTTCG GCAGCAGCTTAAAAAGTTGGAGGAATTGGAACAGAAATACACCTACGAACAT GACCCTATCACAAAAAACAAACAAGTGTTATGGGACCGCACCTTCAGTCTTTT CCAGCAGCTCATTCAGAGCTCGTTTGTGGTGGAAAGACAGCCCTGCATGCCAA CGCACCCTCAGAGGCCGCTGGTCTTGAAGACAGGGGTCCAGTTCACTGTGAAG TTGAGACTGTTGGTGAAATTGCAAGAGCTGAATTATAATTTGAAAGTCAAAGT CTTATTTGATAAAGATGTGAATGAGAGAAATACAGTAAAAGGATTTAGGAAG TTCAACATTTTGGGCACGCACACAAAAGTGATGAACATGGAGGAGTCCACCA ATGGCAGTCTGGCGGCTGAATTTCGGCACCTGCAATTGAAAGAACAGAAAAA TGCTGGCACCAGAACGAATGAGGGTCCTCTCATCGTTACTGAAGAGCTTCACT CCCTTAGTTTTGAAACCCAATTGTGCCAGCCTGGTTTGGTAATTGACCTCGAG ACGACCTCTCTGCCCGTTGTGGTGATCTCCAACGTCAGCCAGCTCCCGAGCGG TTGGGCCTCCATCCTTTGGTACAACATGCTGGTGGCGGAACCCAGGAATCTGT CCTTCTTCCTGACTCCACCATGTGCACGATGGGCTCAGCTTTCAGAAGTGCTG AGTTGGCAGTTTTCTTCTGTCACCAAAAGAGGTCTCAATGTGGACCAGCTGAA CATGTTGGGAGAGAAGCTTCTTGGTCCTAACGCCAGCCCCGATGGTCTCATTC CGTGGACGAGGTTTTGTAAGGAAAATATAAATGATAAAAATTTTCCCTTCTGG CTTTGGATTGAAAGCATCCTAGAACTCATTAAAAAACACCTGCTCCCTCTCTG GAATGATGGGTGCATCATGGGCTTCATCAGCAAGGAGCGAGAGCGTGCCCTG TTGAAGGACCAGCAGCCGGGGACCTTCCTGCTGCGGTTCAGTGAGAGCTCCCG GGAAGGGGCCATCACATTCACATGGGTGGAGCGGTCCCAGAACGGAGGCGAA CCTGACTTCCATGCGGTTGAACCCTACACGAAGAAAGAACTTTCTGCTGTTAC TTTCCCTGACATCATTCGCAATTACAAAGTCATGGCTGCTGAGAATATTCCTG AGAATCCCCTGAAGTATCTGTATCCAAATATTGACAAAGACCATGCCTTTGGA AAGTATTACTCCAGGCCAAAGGAAGCACCAGAGCCAATGGAACTTGATGGCC CTAAAGGAACTGGATATATCAAGACTGAGTTGATTTCTGTGTCTGAAGTTCAC CCTTCTAGACTTCAGACCACAGACAACCTGCTCCCCATGTCTCCTGAGGAGTT	126 NG_008294.1

			TGACGAGGTGTCTCGGATAGTGGGCTCTGTAGAATTCGACAGTATGATGAACA CAGTATAGAGCATGAATTTTTTTCATCTTCTCTGGCGACAGTTTTCCTTCTCAT CTGTGATTCCCTCCTGCTACTCTGTTCCTTCACATCCTGTGTTTCTAGGGAAAT GAAAGAAAGGCCAGCAAATTCGCTGCAACCTGTTGATAGCAAGTGAATTTTTC TCTAACTCAGAAACATCAGTTACTCTGAAGGGCATCATGCATCTTACTGAAGG TAAAATTGAAAGGCATTCTCTGAAGAGTGGGTTTCACAAGTGAAAAACATCC AGATACACCCAAAGTATCAGGACGAGAATGAGGGTCCTTTGGGAAAGGAGAA GTTAAGCAACATCTAGCAAATGTTATGCATAAAGTCAGTGCCCAACTGTTATA GGTTGTTGGATAAATCAGTGGTTATTTAGGGAACTGCTTGACGTAGGAACGGT AAATTTCTGTGGGAGAATTCTTACATGTTTTCTTTGCTTTAAGTGTAACTGGCA GTTTTCCATTGGTTTACCTGTGAAATAGTTCAAAGCCAAGTTTATATACAATTA TATCAGTCCTCTTTCAAAGGTAGCCATCATGGATCTGGTAGGGGGAAAATGTG TATTTTATTACATCTTTCACATTGGCTATTTAAAGACAAAGACAAATTCTGTTT CTTGAGAAGAGAATATTAGCTTTACTGTTTGTTATGGCTTAATGACACTAGCT AATATCAATAGAAGGATGTACATTTCCAAATTCACAAGTTGTGTTTGATATCC AAAGCTGAATACATTCTGCTTTCATCTTGGTCACATACAATTATTTTTACAGTT CTCCCAAGGGAGTTAGGCTATTCACAACCACTCATTCAAAAGTTGAAATTAAC CATAGATGTAGATAAACTCAGAAATTTAATTCATGTTTCTTAAATGGGCTACT TTGTCCTTTTTGTTATTAGGGTGGTATTTAGTCTATTAGCCACAAAATTGGGAA AGGAGTAGAAAAAGCAGTAACTGACAACTTGAATAATACACCAGAGATAATA TGAGAATCAGATCATTTCAAAACTCATTTCCTATGTAACTGCATTGAGAACTG CATATGTTTCGCTGATATATGTGTTTTTCACATTTGCGAATGGTTCCATTCTCTC TCCTGTACTTTTTCCAGACACTTTTTTGAGTGGATGATGTTTCGTGAAGTATAC TGTATTTTTACCTTTTTCCTTCCTTATCACTGACACAAAAAGTAGATTAAGAGA TGGGTTTGACAAGGTTCTTCCCTTTTACATACTGCTGTCTATGTGGCTGTATCT TGTTTTTCCACTACTGCTACCACAACTATATTATCATGCAAATGCTGTATTCTT CTTTGGTGGAGATAAAGATTTCTTGAGTTTTGTTTTAAAATTAAAGCTAAAGT ATCTGTATTGCATTAAATATAATATGCACACAGTGCTTTCCGTGGCACTGCAT ACAATCTGAGGCCTCCTCTCTCAGTTTTTATATAGATGGCGAGAACCTAAGTTT CAGTTGATTTTACAATTGAAATGACTAAAAAACAAAGAAGACAACATTAAAA CAATATTGTTTCTAATTGCTGAGGTTTAGCTGTCAGTTCTTTTTGCCCTTTGGG AATTCGGCATGGTTTCATTTTACTGCACTAGCCAAGAGACTTTACTTTTAAGAA GTATTAAAATTCTAAAATTCAAAAAAAAAAAAAAAAAA	
41	CXCL10	>NP_001556.2 C-X-C motif chemokine 10 precursor [Homo sapiens] MNQTAILICCLIFL TLSGIQGVPLSRTV RCTCISISNQPVNP RSLEKLEIIPASQF CPRVEIIATMKKK GEKRCLNPESKAI KNLLKAVSKERSK RSP	SEQ ID NO: 91 >NM_001565.3 Homo sapiens C-X-C motif chemokine ligand 10 (CXCL10), mRNA CTTTGCAGATAAATATGGCACACTAGCCCCACGTTTTCTGAGACATTCCTCAA TTGCTTAGACATATTCTGAGCCTACAGCAGAGGAACCTCCAGTCTCAGCACCA TGAATCAAACTGCCATTCTGATTTGCTGCCTTATCTTTCTGACTCTAAGTGGCA TTCAAGGAGTACCTCTCTCTAGAACTGTACGCTGTACCTGCATCAGCATTAGT AATCAACCTGTTAATCCAAGGTCTTTAGAAAAACTTGAAATTATTCCTGCAAG CCAATTTTGTCCACGTGTTGAGATCATTGCTACAATGAAAAAGAAGGGTGAGA AGAGATGTCTGAATCCAGAATCGAAGGCCATCAAGAATTTACTGAAAGCAGT TAGCAAGGAAAGGTCTAAAAGATCTCCTTAAAACCAGAGGGGAGCAAAATCG ATGCAGTGCTTCCAAGGATGGACCACACAGAGGCTGCCTCTCCCATCACTTCC CTACATGGAGTATATGTCAAGCCATAATTGTTCTTAGTTTGCAGTTACACTAA AAGGTGACCAATGATGGTCACCAAATCAGCTGCTACTACTCCTGTAGGAAGGT TAATGTTCATCATCCTAAGCTATTCAGTAATAACTCTACCCTGGCACTATAATG TAAGCTCTACTGAGGTGCTATGTTCTTAGTGGATGTTCTGACCCTGCTTCAAAT ATTTCCCTCACCTTTCCCATCTTCCAAGGGTACTAAGGAATCTTTCTGCTTTGG GGTTTATCAGAATTCTCAGAATCTCAAATAACTAAAAGGTATGCAATCAAATC TGCTTTTTAAAGAATGCTCTTTACTTCATGGACTTCCACTGCCATCCTCCCAAG	

			GGGCCCAAATTCTTTCAGTGGCTACCTACATACAATTCCAAACACATACAGGA AGGTAGAAATATCTGAAAATGTATGTGTAAGTATTCTTATTTAATGAAAGACT GTACAAAGTAGAAGTCTTAGATGTATATATTTCCTATATTGTTTTCAGTGTACA TGGAATAACATGTAATTAAGTACTATGTATCAATGAGTAACAGGAAAATTTTA AAAATACAGATAGATATATGCTCTGCATGTTACATAAGATAAATGTGCTGAAT GGTTTTCAAAATAAAAATGAGGTACTCTCCTGGAAATATTAAGAAAGACTATC TAAATGTTGAAAGATCAAAAGGTTAATAAAGTAATTATAACTAAGAAAAAAA AAAAA	
42	CXCL11	>NP_001289052.1 C-X-C motif chemokine 11 isoform 2 precursor [Homo sapiens] MSVKGMAIALAVI LCATVVQGFPMF KRGRCLCIGPGVK AVKVADIEKASIM YPSNNCDKIEVIIT LKENKGQRCLNP KSKQARLIIKLKER IFKNIKTYEVLEKS I	SEQ ID NO: 92 >NM_005409.4 Homo sapiens C-X-C motif chemokine ligand 11 (CXCL11), transcript variant 1, mRNA AGAGAACAAAACAGAAACTCTTGGAAGCAGGAAAGGTGCATGACTCAAAGA GGGAAATTCCTGTGCCATAAAAGGATTGCTGGTGTATAAAATGCTCTATATAT GCCAATTATCAATTTCCTTTCATGTTCAGCATTTCTACTCCTTCCAAGAAGAGC AGCAAAGCTGAAGTAGCAGCAGCAGCACCAGCAGCAACAGCAAAAAACAAA CATGAGTGTGAAGGGCATGGCTATAGCCTTGGCTGTGATATTGTGTGCTACAG TTGTTCAAGGCTTCCCCATGTTCAAAAGAGGACGCTGTCTTTGCATAGGCCCT GGGGTAAAAGCAGTGAAAGTGGCAGATATTGAGAAAGCCTCCATAATGTACC CAAGTAACAACTGTGACAAAATAGAAGTGATTATTACCCTGAAAGAAAATAA AGGACAACGATGCCTAAATCCCAAATCGAAGCAAGCAAGGCTTATAATCAAA AAAGTTGAAAGAAAGAATTTTTAAAAATATCAAAACATATGAAGTCCTGGAA AAGAGCATCTGAAAAACCTAGAACAAGTTTAACTGTGACTACTGAAATGACA AGAATTCTACAGTAGGAAACTGAGACTTTTCTATGGTTTTGTGACTTTCAACTT TTGTACAGTTATGTGAAGGATGAAAGGTGGGTGAAAGGACCAAAAACAGAAA TACAGTCTTCCTGAATGAATGACAATCAGAATTCCACTGCCCAAAGGAGTCCA ACAATTAAATGGATTTCTAGGAAAAGCTACCTTAAGAAAGGCTGGTTACCATC GGAGTTTACAAAGTGCTTTCACGTTCTTACTTGTTGCATTATACATTCATGCAT TTCTAGGCTAGAGAACCTTCTAGATTTGATGCTTACAACTATTCTGTTGTGACT ATGAGAACATTTCTGTCTCTAGAAGTCATCTGTCTGTATTGATCTTTATGCTAT ATTACTATCTGTGGTTACGGTGGAGACATTGACATTATTACTGGAGTCAAGCC CTTATAAGTCAAAAGCATCTATGTGTCGTAAAACATTCCTCAAACATTTTTTCA TGCAAATACACACTTCTTTCCCCAAACATCATGTAGCACATCAATATGTAGGG AGACATTCTTATGCATCATTTGGTTTGTTTTATAACCAATTCATTAAATGTAAT TCATAAAATGTACTATGAAAAAAATTATACGCTATGGGATACTGGCAAAAGT GCACATATTTCATAACCAAATTAGTAGCACCAGTCTTAATTTGATGTTTTTCAA CTTTTATTCATTGAGATGTTTTGAAGCAATTAGGATATGTGTGTTTACTGTACT TTTTGTTTTGATCCGTTTGTATAAATGATAGCAATATCTTGGACACATCTGAAA TACAAAATGTTTTTGTCTACCAAAGAAAAATGTTGAAAAATAAGCAAATGTAT ACCTAGCAATCACTTTTACTTTTTGTAATTCTGTCTCTTAGAAAAATACATAAT CTAATCAATTTCTTTGTTCATGCCTATATACTGTAAAATTTAGGTATACTCAAG ACTAGTTTAAAGAATCAAAGTCATTTTTTTCTCTAATAAACTACCACAACCTTT CTTTTTTAAAAAAAAAAA	
43	LAG3	>NP_002277.4 lymphocyte activation gene 3 protein precursor [Homo sapiens] MWEAQFLGLLFL QPLWVAPVKPLQP GAEVPVVWAQEG	SEQ ID NO: 93 >NM_002286.5 Homo sapiens lymphocyte activating 3 (LAG3), mRNA ACAGGGGTGAAGGCCCAGAGACCAGCAGAACGGCATCCCAGCCACGACGGCC ACTTTGCTCTGTCTGCTCTCCGCCACGGCCCTGCTCTGTTCCCTGGGACACCCC CGCCCCCACCTCCTCAGGCTGCCTGATCTGCCCAGCTTTCCAGCTTTCCTCTGG ATTCCGGCCTCTGGTCATCCCTCCCCACCCTCTCTCCAAGGCCCTCTCCTGGTC TCCCTTCTTCTAGAACCCCTTCCTCCACCTCCCTCTCTGCAGAACTTCTCCTTTA CCCCCCACCCCCCACCACTGCCCCCTTTCCTTTTCTGACCTCCTTTTGGAGGGC TCAGCGCTGCCCAGACCATAGGAGAGATGTGGGAGGCTCAGTTCCTGGGCTTG	

		APAQLPCSPTIPLQ DLSLLRRAGVTW QHQPDSGPPAAAP GHPLAPGPHPAAP SSWGPRPRRYTVL SVGPGGLRSGRLP LQPRVQLDERGRQ RGDFSLWLRPARR ADAGEYRAAVHL RDRALSCRLRLRL GQASMTASPPGSL RASDWVILNCSFS RPDRPASVHWFR NRGQGRVPVRESP HHHLAESFLFLPQ VSPMDSGPWGCIL TYRDGFNVSIMYN LTVLGLEPPTPLTV YAGAGSRVGLPC RLPAGVGTRSFLT AKWTPPGGGPDL LVTGDNGDFTLRL EDVSQAQAGTYT CHIHLQEQQLNAT VTLAIITVTPKSFG SPGSLGKLLCEVT PVSGQERFVWSSL DTPSQRSFSGPWL EAQEAQLLSQPW QCQLYQGERLLG AAVYFTELSSPGA QRSGRAPGALPAG HLLLFLILGVLSLL LLVTGAFGFHLW RRQWRPRRFSALE QGIHPPQAQSKIEE LEQEPEPEPEPEPE PEPEPEPEQL	CTGTTTCTGCAGCCGCTTTGGGTGGCTCCAGTGAAGCCTCTCCAGCCAGGGGC TGAGGTCCCGGTGGTGTGGGCCCAGGAGGGGGCTCCTGCCCAGCTCCCCTGCA GCCCCACAATCCCCCTCCAGGATCTCAGCCTTCTGCGAAGAGCAGGGGTCACT TGGCAGCATCAGCCAGACAGTGGCCCGCCCGCTGCCGCCCCCGGCCATCCCCT GGCCCCCGGCCCTCACCCGGCGGCGCCCTCCTCCTGGGGGCCCAGGCCCCGCC GCTACACGGTGCTGAGCGTGGGTCCCGGAGGCCTGCGCAGCGGGAGGCTGCC CCTGCAGCCCCGCGTCCAGCTGGATGAGCGCGGCCGGCAGCGCGGGGACTTC TCGCTATGGCTGCGCCCAGCCCGGCGCGCGGACGCCGGCGAGTACCGCGCCG CGGTGCACCTCAGGGACCGCGCCCTCTCCTGCCGCCTCCGTCTGCGCCTGGGC CAGGCCTCGATGACTGCCAGCCCCCCAGGATCTCTCAGAGCCTCCGACTGGGT CATTTTGAACTGCTCCTTCAGCCGCCCTGACCGCCCAGCCTCTGTGCATTGGTT CCGGAACCGGGGCCAGGGCCGAGTCCCTGTCCGGGAGTCCCCCCATCACCAC TTAGCGGAAAGCTTCCTCTTCCTGCCCCAAGTCAGCCCCATGGACTCTGGGCC CTGGGGCTGCATCCTCACCTACAGAGATGGCTTCAACGTCTCCATCATGTATA ACCTCACTGTTCTGGGTCTGGAGCCCCCAACTCCCTTGACAGTGTACGCTGGA GCAGGTTCCAGGGTGGGGCTGCCCTGCCGCCTGCCTGCTGGTGTGGGGACCCG GTCTTTCCTCACTGCCAAGTGGACTCCTCCTGGGGGAGGCCCTGACCTCCTGG TGACTGGAGACAATGGCGACTTTACCCTTCGACTAGAGGATGTGAGCCAGGCC CAGGCTGGGACCTACACCTGCCATATCCATCTGCAGGAACAGCAGCTCAATGC CACTGTCACATTGGCAATCATCACAGTGACTCCCAAATCCTTTGGGTCACCTG GATCCCTGGGGAAGCTGCTTTGTGAGGTGACTCCAGTATCTGGACAAGAACGC TTTGTGTGGAGCTCTCTGGACACCCCATCCCAGAGGAGTTTCTCAGGACCTTG GCTGGAGGCACAGGAGGCCCAGCTCCTTTCCCAGCCTTGGCAATGCCAGCTGT ACCAGGGGGAGAGGCTTCTTGGAGCAGCAGTGTACTTCACAGAGCTGTCTAG CCCAGGTGCCCAACGCTCTGGGAGAGCCCCAGGTGCCCTCCCAGCAGGCCAC CTCCTGCTGTTTCTCATCCTTGGTGTCCTTTCTCTGCTCCTTTTGGTGACTGGAG CCTTTGGCTTTCACCTTTGGAGAAGACAGTGGCGACCAAGACGATTTTCTGCC TTAGAGCAAGGGATTCACCCTCCGCAGGCTCAGAGCAAGATAGAGGAGCTGG AGCAAGAACCGGAGCCGGAGCCGGAGCCGGAACCGGAGCCCGAGCCCGAGC CCGAGCCGGAGCAGCTCTGACCTGGAGCTGAGGCAGCCAGCAGATCTCAGCA GCCCAGTCCAAATAAACTCCCTGTCAGCAGCAAAAA	
44	IRF1	>NP_001341854.1 interferon regulatory factor 1 isoform 3 [Homo sapiens] MPITRMRMRPWL EMQINSNQIPGLI WINKEEMIFQIPW KHAAKHGWDINK DACLFRSWAIHTG RYKAGEKEPDPKT WKANFRCAMNSL PDIEEVKDQSRNK	SEQ ID NO: 94 >NM_001354925.1 Homo sapiens interferon regulatory factor 1 (IRF1), transcript variant 3, mRNA AGAGCTCGCCACTCCTTAGTCGAGGCAAGACGTGCGCCCGAGCCCCGCCGAA CCGAGGCCACCCGGAGCCGTGCCCAGTCCACGCCGGCCGTGCCCGGCGGCCT TAAGAACCCGGCAACCTCTGCCTTCTTCCCTCTTCCACTCGGAGTCGCGCTCCG CGCGCCCTCACTGCAGCCCCTGCGTCGCCGGGACCCTCGCGCGCGACCGCCGA ATCGCTCCTGCAGCAGAGCCAACATGCCCATCACTCGGATGCGCATGAGACCC TGGCTAGAGATGCAGATTAATTCCAACCAAATCCCGGGGCTCATCTGGATTAA TAAAGAGGAGATGATCTTCCAGATCCCATGGAAGCATGCTGCCAAGCATGGC TGGGACATCAACAAGGATGCCTGTTTGTTCCGGAGCTGGGCCATTCACACAGG CCGATACAAAGCAGGGGAAAAGGAGCCAGATCCCAAGACGTGGAAGGCCAA CTTTCGCTGTGCCATGAACTCCCTGCCAGATATCGAGGAGGTGAAAGACCAGA	SEQ ID NO: 127 NG_011450.1

		GSSAVRVYRMLPP LTKNQRKERKSKS SRDAKSKAKRKSC GDSSPDTFSDGLSS STLPDDHSSYTVP GYMQDLEVEQAL TPALSPCAVSSTLP DWHIPVEVVPDST SDLYNFQVSPMPS TSEGDIGLSLQRVF TDLKNMDATWLD SLLTPVRLPSIQAIP CAP	GCAGGAACAAGGGCAGCTCAGCTGTGCGAGTGTACCGGATGCTTCCACCTCTC ACCAAGAACCAGAGAAAAGAAAGAAAGTCGAAGTCCAGCCGAGATGCTAAG AGCAAGGCCAAGAGGAAGTCATGTGGGGATTCCAGCCCTGATACCTTCTCTGA TGGACTCAGCAGCTCCACTCTGCCTGATGACCACAGCAGCTACACAGTTCCAG GCTACATGCAGGACTTGGAGGTGGAGCAGGCCCTGACTCCAGCACTGTCGCC ATGTGCTGTCAGCAGCACTCTCCCCGACTGGCACATCCCAGTGGAAGTTGTGC CGGACAGCACCAGTGATCTGTACAACTTCCAGGTGTCACCCATGCCCTCCACC TCTGAAGGGGATATTGGGCTGAGTCTACAGCGTGTCTTCACAGATCTGAAGAA CATGGATGCCACCTGGCTGGACAGCCTGCTGACCCCAGTCCGGTTGCCCTCCA TCCAGGCCATTCCCTGTGCACCGTAGCAGGGCCCCTGGGCCCCTCTTATTCCTC TAGGCAAGCAGGACCTGGCATCATGGTGGATATGGTGCAGAGAAGCTGGACT TCTGTGGGCCCCTCAACAGCCAAGTGTGACCCCACTGCCAAGTGGGGATGGG GCCTCCCTCCTTGGGTCATTGACCTCTCAGGGCCTGGCAGGCCAGTGTCTGGG TTTTTCTTGTGGTGTAAAGCTGGCCCTGCCTCCTGGGAAGATGAGGTTCTGAG ACCAGTGTATCAGGTCAGGGACTTGGACAGGAGTCAGTGTCTGGCTTTTTCCT CTGAGCCCAGCTGCCTGGAGAGGGTCTCGCTGTCACTGGCTGGCTCCTAGGGG AACAGACCAGTGACCCCAGAAAAGCATAACACCAATCCCAGGGCTGGCTCTG CACTAAGAGAAAATTGCACTAAATGAATCTCGTTCCCAAAGAACTACCCCCTT TTCAGCTGAGCCCTGGGGACTGTTCCAAAGCCAGTGAAATGTGAAGGAAAGT GGGGTCCTTCGGGGCGATGCTCCCTCAGCCTCAGAGGAGCTCTACCCTGCTCC CTGCTTTGGCTGAGGGGCTTGGGAAAAAAACTTGGCACTTTTTCGTGTGGATC TTGCCACATTTCTGATCAGAGGTGTACACTAACATTTCCCCCGAGCTCTTGGCC TTTGCATTTATTTATACAGTGCCTTGCTCGGCGCCCACCACCCCCTCAAGCCCC AGCAGCCCTCAACAGGCCCAGGGAGGGAAGTGTGAGCGCCTTGGTATGACTT AAAATTGGAAATGTCATCTAACCATTAAGTCATGTGTGAACACATAAGGACGT GTGTAAATATGTACATTTGTCTTTTTATAAAAAGTAAATTGTTTATAAGGGGTG TGGCCTTTTTAGAGAGAAATTTAACTTGTAGATGATTTTACTTTTTATGGAAAC ACTGATGGACTTATTATTGGCATCCCGCCTGAACTTGACTTTGGGGTGAACAG GGACATGCATCTATTATAAAATCCTTTCGGCCAGGCGCGGTGGCTCACACCTG TAATCCCAGCACTTTGGGAGGCCGAGATGGGTGGATCACCTGAGGTCAGGAG TTCGAGACCAGCCTGGTGAAACTCCATTTCTACTAAAAATGCAAAAATTAGCT GGGCGTGGTTGCGGGTGCTTGTAATCCCAGCTACTCAGGAGGCTGAGGCAAG AGAATCGCTTGAACCTGGGAGGTGGAGGTTGCAGTGAGCCGAGAACATGCCA TTGCACTCCAGCCCGGGCACCAAAAAAAAAAAAAAAAAAAAAAACCTTTCAT TTGGCCGGGCATGGTGGCTTATGCCTGTAATCCTGGCACTTTGGGAGGCCAAG GTGGGCAGATCACCTGAGGTCAGGAGTTTGAGACCAGCCTGGCCAACATGGT GAAACCTCATCTCTACTAAAAATACAAAAATTAGGCCGGGCACGGTGGCTCA CGCCTGTAATCCCAGCACTTTGGGAGGCAGAGGCGGGCGGATCACGAGGTCA GGAGATCAAGACCATCCTGGCTAACACGGTGAAACCCCGTCTCTACTAAAAAT ATAAAAAATTAGCCGGGCCTAGTGGCGGGTGCCTGTAGTCCCAGCTACTCGGG AGGCTGAGGCAGGAGAATGGCATGAACCCCGGAGGCAGAGCTTGCAGTGAGC CGAGATTGCACCACTGCACTACAGCCTGGGCGACAGAGCGAGACTCCGTCTC AAAAAAAAAAAAAAAAAATTAGCCGGGCCTGGTGGCGGGCGCCTGTAATCCCA GCTACTGTGGAGGCTGAAGCACAAGAATCACTTGAACCCGGGAGATGGAGGT TGCAGTGAGCTGAGACTGTGCCACTGCACTCCAGCCTGGGTGACAAGAGTGA GACTTTGTCTCAAAAAAAAAAAAATCCTTTTGTTTATGTTCACATAGACAATG GCAGAAGGAGGGGACATTCCTGTCATAGGAACATGCTTATATAAACATAGTC ACCTGTCCTTGACTATCACCAGGGCTGTCAGTTGATTCTGGGCTCCTGGGGCC CAAGGAGTGTTAAGTTTTGAGGCATGTGCCATAGGTGATGTGTCCTGCTAACA CACAGATGCTGCTCCAAAAAGTCAGTTGATATGACACAGTCACAGACAGAAC AGTCAGCAGCCCAAGAAAGGTCCTCACGGCTGCTGTGCTGGGTAGCACTTGCC	

			ATCCAGTTTCTAGAGTGATGAAATGCTCTGTCTGTACCGTTCAATACAGTAGG CACTGGCACTAGCCACATGTGCCAGCTAAGCACTTGAAATGTGGCCAGTGCAA TAAGGAATTGAACTTTTAATTGCATTTAATAAACTGTATGTAAATAGTCA	
45	TAGAP	>NP_687034.1 T-cell activation Rho GTPase-activating protein isoform a [Homo sapiens] MGALEMQDEEDR IEALKQVADKLPR PNLLLLKHLVYVL HLISKNSEVNRMD SSNLAICIGPNMLT LENDQSLSFEAQK DLNNKVKTLVEFL IDNCFEIFGENIPV HSSITSDDSLEHTD SSDVSTLQNDSAY DSNDPDVESNSSS GISSPSRQPQVPM ATAAGLDSAGPQ DAREVSPEPIVSTV ARLKSSLAQPDRR YSEPSMPSSQECL ESRVTNQTLTKSE GDFPVPRVGSRLE SEEAEDPFPEEVFP AVQGKTKRPVDL KIKNLAPGSVLPR ALVLKAFSSSSLD ASSDSSPVASPSSP KRNFFSRHQSFTT KTEKGKPSREIKK HSMSFTFAPHKKV LTKNLSAGSGKSQ DFTRDHVPRGVR KESQLAGRIVQEN GCETHNQTARGFC LRPHALSVDDVFQ GADWERPGSPPSY EEAMQGPAARLV ASESQTVGSMTVG SMRARMLEAHCL LPPLPPAHHVEDS RHRGSKEPLPGHG LSPLPERWKQSRT VHASGDSLGHVS GPGRPELLPLRTV SESVQRNKRDCLV RRCSQPVFEADQF	SEQ ID NO: 95 >NM_152133.2 Homo sapiens T cell activation RhoGTPase activating protein (TAGAP), transcript variant 1, mRNA GACATAGCTGCCCTAAAAGGAATGAGGAAGCGAGAGCTCTCCAGTGTCTGGC TGGCTCCGTCCGTGTGACAGCCCATGATGTTCTTTCCGGTCTCTGTAATATTCT GAATTTCCACCTGCCCGCCCCTTCGCTTATAATGCAGAGCATGTGAAGGGAGA CCGGCTCGGTCTCTCTCTCTCCCAGTGGACTAGAAGGAGCAGAGAGTTATGCT GTTTCTCCCATTCTTTACAGCTCACCGGATGTAAAAGAACTCTGGCTAGAGAC CCTCCAAGGACAGAGGCACAGCCACACGGGAGTGAAATCCACCCCTGGACAG TCAGCCGCAATACTGATGAAGCTGAGAAGCAGCCACAATGCTTCAAAAACAC TAAACGCCAATAATATGGAGACACTAATCGAATGTCAATCAGAGGGTGATAT CAAGGAACATCCCCTGTTGGCATCATGTGAGAGTGAAGACAGTATTTGCCAGC TCATTGGACATTCTCACTATTCTATGCCTTAAAGGCCCTTCAACGGAAGGGAT ATTCAGGAGAGCAGCCAACGAGAAAGCCCGTAAGGAGCTGAAGGAGGAGCT CAACTCTGGGGATGCGGTGGATCTGGAGAGGCTCCCCGTGCACCTCCTCGCTG TGGTCTTTAAGGACTTCCTCAGAAGTATCCCCCGGAAGCTACTTTCAAGCGAC CTCTTTGAGGAGTGGATGGGTGCTCTGGAGATGCAGGACGAGGAGGACAGAA TCGAGGCCCTGAAACAGGTTGCAGATAAGCTCCCCCGGCCCAACCTCCTGCTA CTCAAGCACTTGGTCTATGTGCTGCACCTCATCAGCAAGAACTCTGAGGTGAA CAGGATGGACTCCAGCAATCTGGCCATCTGCATTGGACCCAACATGCTCACCC TGGAGAATGACCAGAGCCTGTCATTTGAAGCCCAGAAGGACCTGAACAACAA GGTGAAGACACTGGTGGAATTCCTCATTGATAACTGCTTTGAAATATTTGGGG AGAACATTCCAGTGCATTCCAGTATCACTTCTGATGACTCCCTGGAGCACACT GACAGTTCAGATGTGTCGACCCTGCAGAATGACTCAGCCTACGACAGCAACG ACCCTGATGTGGAATCCAACAGCAGCAGTGGCATCAGCTCTCCCAGCAGGCA GCCCCAGGTGCCCATGGCCACAGCTGCTGGCTTGGATAGCGCGGGCCCACAG GATGCCCGAGAGGTCAGCCCAGAGCCCATTGTGAGCACCGTGGCCAGGCTGA AAAGCTCCCTCGCACAGCCCGATAGGAGATACTCAGAGCCCAGCATGCCATC CTCCCAGGAGTGCCTCGAGAGCCGGGTGACAAACCAAACACTAACAAAGAGT GAAGGGGACTTCCCCGTGCCCCGGGTAGGCTCTCGTTTGGAAAGTGAGGAGG CTGAAGACCCATTTCCAGAGGAGGTCTTCCCTGCAGTGCAAGGCAAAACCAA GAGGCCGGTGGACCTGAAGATCAAGAACTTGGCCCCGGGTTCGGTGCTCCCG CGGGCACTGGTTCTCAAAGCCTTCTCCAGCAGCTCGCTGGACGCGTCCTCTGA CAGCTCGCCCGTGGCTTCTCCTTCCAGTCCCAAAAGAAATTTCTTCAGCAGAC ATCAGTCTTTCACCACAAAGACAGAGAAAGGCAAGCCCAGCCGAGAAATTAA AAAGCACTCCATGTCTTTCACCTTTGCCCCTCACAAAAAAGTGCTGACCAAAA ACCTCAGCGCGGGCTCTGGGAAATCGCAAGACTTTACCAGGGACCACGTCCC GAGGGGTGTCAGAAAGGAAAGCCAGCTTGCCGGCCGAATCGTGCAGGAAAAT GGGTGTGAAACCCACAACCAAACAGCCCGCGGCTTCTGCCTGAGACCCCACG CCCTCTCGGTGGATGATGTGTTCCAGGGAGCTGACTGGGAGAGGCCTGGAAG CCCACCCTCTTATGAAGAGGCCATGCAGGGCCCGGCAGCCAGACTAGTGGCCT CCGAGAGCCAGACCGTGGGGAGCATGACGGTGGGGAGCATGAGGGCGAGGA TGCTGGAGGCGCACTGCCTCCTACCCCCTCTTCCACCTGCTCACCACGTAGAG GACTCAAGACACAGGGGCAGCAAAGAGCCACTCCCTGGCCACGGACTCTCTC CCCTGCCTGAGCGATGGAAACAGAGCAGAACTGTCCATGCTTCTGGGGACTCT CTGGGGCACGTGTCTGGCCCAGGGAGACCTGAGCTCCTCCCGCTGAGGACCGT CTCCGAGTCCGTGCAGAGGAATAAGCGGGACTGTCTCGTGCGACGATGTAGC CAGCCGGTCTTTGAGGCTGACCAATTCCAATATGCCAAAGAATCGTATATTTA	SEQ ID NO: 128 NG_011524.1

		QYAKESYI	GGAGGGAGGCCATACGCCATGCCATAGCTTGTGCTATCTGTAAATATGAGACT TGTAAAGAACTGCCTGTAGATTGTTTTTAAAAGGTCTTGAATAAGCTCCTTGA GAAAGTTGTGGAAAGCCCTCCTCAGTGAGGATAGCTACACCATGGCCATGGC GCATCAGATAGTCTCTGTGTACCTGGATTTGTGCAATATGTAAAAATGTATCA AATGTATTATAGATAAGGTGTTAGGTGCAAAGGATGTCTAATAATCCCTGCAC ACGTTTTGAACTTGCAGTGAAGTACACTGCTGTTCCTTGCTTCCTGGGGCACTT TTCTCTTGGTTAGTGTTTAAAAATTATCTTCGCTTTTTTAATGTGGCCTCAAAT GTCATGCCAATTTTCACATCTTCCACAAACTCCATTTAGGGAGAAATGTTTAA ATCTCTGGTATAAGTTTACTCCATACCAGAGTAAACTATATATTACTCTATATA AGCAGTCTTGCAATAACTAATCACCACCATAGAAGAAAGAAACAGACTGCAA GGAACAGAGTTGAGTGTCTGGAGTCATCAAAGGCATTAAAAACTCCAGTAAA AGCTGGGGCCGTAGCAAAAATCATGAAAAACACTTCAACGTGTCCTTTCAATC ATCCAATTAAATGTGGGTAGATTAATGAAAATGTATTACATCAATATTAACTC ATCTATAGCACTTTGAGTATCTTTGTAGTTCATGATATCCTATCCTATAATGTG GAGGTAAATGATTTTATATGCATTGGGGGTCATATATAAAACTTCAATGTAAT TTCACTACAATAAATTGCCTTCCTTATTTGAAAGTAAAAATGTTCTTTTTTTAT TGACATGTTAACTCCTTTCCCTCAATTAATAGAAATCCACTAAGAAAATCATT CACATATTGGTTCACTCAACAAGCATTTATTAAATATATATTCACTATTCTAGA CTAATAGCAAGACCGGGGATCTTGTTTAGGAAGAAGCAGTCCCTGTTCTCCAG AATTTGCAAAACCATTAAAAAAGCACCTACTTTAAGCCATTTTTTTTCAGCAA GGAGTCATTCTGCCAGAAAAATGTAGTACACAAATACAGGATAATATAACAA ATGTAAAATTTCTCATTTCTAGTGAATTAAACTTTCCAGTAATTTTACATCTCA CCTCATTCTTATGATGCTCAGTTTGCTTAATTATTGGCAAACATAATGGTAAAA TGTTTGTACTGTATTAGAGCTTTACTGTTCGATTATTAAGATATTTATCCAGTA TCTTAGAGATGCTGGACTTCAATTTTCCTTATTTTATCTTTTTAAAATAAAATA TCATGCATGCTTCTGATTTGTTATAGAAA	
46	PTPRC	>NP_002829.3 receptor-type tyrosine-protein phosphatase C isoform 1 precursor [Homo sapiens] MTMYLWLKLLAF GFAFLDTEVFVTG QSPTPSPTGLTTAK MPSVPLSSDPLPT HTTAFSPASTFERE NDFSETTTSLSPDN TSTQVSPDSLDNA SAFNTTGVSSVQT PHLPTHADSQTPS AGTDTQTFSGSAA NAKLNPTPGSNAI SDVPGERSTASTFP TDPVSPLTTTLSLA HHSSAALPARTSN TTITANTSDAYLN ASETTTLSPSGSAV ISTTTIATTPSKPTC DEKYANITVDYLY	SEQ ID NO: 96 >NM_002838.4 Homo sapiens protein tyrosine phosphatase, receptor type C (PTPRC), transcript variant 1, mRNA AGAACAACTTTTTTGACTTCCTGCAAAGAGGACCCTTACAGTATTTTTGGAGA AGTTAGTAAAACCGAATCTGACATCATCACCTAGCAGTTCATGCAGCTAGCAA GTGGTTTGTTCTTAGGGTAACAGAGGAGGAAATTGTTCCTCGTCTGATAAGAC AACAGTGGAGAAAGGACGCATGCTGTTTCTTAGGGACACGGCTGACTTCCAG ATATGACCATGTATTTGTGGCTTAAACTCTTGGCATTTGGCTTTGCCTTTCTGG ACACAGAAGTATTTGTGACAGGGCAAAGCCCAACACCTTCCCCCACTGGATTG ACTACAGCAAAGATGCCCAGTGTTCCACTTTCAAGTGACCCCTTACCTACTCA CACCACTGCATTCTCACCCGCAAGCACCTTTGAAAGAGAAAATGACTTCTCAG AGACCACAACTTCTCTTAGTCCAGACAATACTTCCACCCAAGTATCCCCGGAC TCTTTGGATAATGCTAGTGCTTTTAATACCACAGGTGTTTCATCAGTACAGACG CCTCACCTTCCCACGCACGCAGACTCGCAGACGCCCTCTGCTGGAACTGACAC GCAGACATTCAGCGGCTCCGCCGCCAATGCAAAACTCAACCCTACCCCAGGC AGCAATGCTATCTCAGATGTCCCAGGAGAGAGGAGTACAGCCAGCACCTTTCC TACAGACCCAGTTTCCCCATTGACAACCACCCTCAGCCTTGCACACCACAGCT CTGCTGCCTTACCTGCACGCACCTCCAACACCACCATCACAGCGAACACCTCA GATGCCTACCTTAATGCCTCTGAAACAACCACTCTGAGCCCTTCTGGAAGCGC TGTCATTTCAACCACAACAATAGCTACTACTCCATCTAAGCCAACATGTGATG AAAAATATGCAAACATCACTGTGGATTACTTATATAACAAGGAAACTAAATTA TTTACAGCAAAGCTAAATGTTAATGAGAATGTGGAATGTGGAAACAATACTTG CACAAACAATGAGGTGCATAACCTTACAGAATGTAAAAATGCGTCTGTTTCCA TATCTCATAATTCATGTACTGCTCCTGATAAGACATTAATATTAGATGTGCCAC CAGGGGTTGAAAAGTTTCAGTTACATGATTGTACACAAGTTGAAAAAGCAGA	SEQ ID NO: 129 NG_007730.1

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		KTLILDVPPGVEK	TTTGGGAGTCCAGGAGAGCCTCAGATTATTTTTTGTAGAAGTGAAGCTGCACA	
		FQLHDCTQVEKA	TCAAGGAGTAATTACCTGGAATCCCCCTCAAAGATCATTTCATAATTTTACCCT	
		DTTICLKWKNIET	CTGTTATATAAAAGAGACAGAAAAAGATTGCCTCAATCTGGATAAAAACCTG	
		FTCDTQNITYRFQ	ATCAAATATGATTTGCAAAATTTAAAACCTTATACGAAATATGTTTTATCATTA	
		CGNMIFDNKEIKL	CATGCCTACATCATTGCAAAAGTGCAACGTAATGGAAGTGCTGCAATGTGTCA	
		ENLEPEHEYKCDS	TTTCACAACTAAAAGTGCTCCTCCAAGCCAGGTCTGGAACATGACTGTCTCCA	
		EILYNNHKFTNAS	TGACATCAGATAATAGTATGCATGTCAAGTGTAGGCCTCCCAGGGACCGTAAT	
		KIIKTDFGSPGEPQ	GGCCCCCATGAACGTTACCATTTGGAAGTTGAAGCTGGAAATACTCTGGTTAG	
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		TWNPPQRSFHNFT	CAGACTACACTTTTAAGGCCTATTTTCACAATGGAGACTATCCTGGAGAACCC	
		LCYIKETEKDCLN	TTTATTTTACATCATTCAACATCTTATAATTCTAAGGCACTGATAGCATTTCTG	
		LDKNLIKYDLQNL	GCATTTCTGATTATTGTGACATCAATAGCCCTGCTTGTTGTTCTCTACAAAATC	
		KPYTKYVLSLHAY	TATGATCTACATAAGAAAAGATCCTGCAATTTAGATGAACAGCAGGAGCTTGT	
		IIAKVQRNGSAAM	TGAAAGGGATGATGAAAAACAACTGATGAATGTGGAGCCAATCCATGCAGAT	
		CHFTTKSAPPSQV	ATTTTGTTGGAAACTTATAAGAGGAAGATTGCTGATGAAGGAAGACTTTTTCT	
		WNMTVSMTSDNS	GGCTGAATTTCAGAGCATCCCGCGGGTGTTCAGCAAGTTTCCTATAAAGGAAG	
		MHVKCRPPRDRN	CTCGAAAGCCCTTTAACCAGAATAAAAACCGTTATGTTGACATTCTTCCTTAT	
		GPHERYHLEVEAG	GATTATAACCGTGTTGAACTCTCTGAGATAAACGGAGATGCAGGGTCAAACTA	
		NTLVRNESHKNC	CATAAATGCCAGCTATATTGATGGTTTCAAAGAACCCAGGAAATACATTGCTG	
		DFRVKDLQYSTD	CACAAGGTCCCAGGGATGAAACTGTTGATGATTTCTGGAGGATGATTTGGGAA	
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		SKALIAFLAFLIIVT	AGATGTTGTTGTAAAGATCAACCAGCACAAAAGATGTCCAGATTACATCATTC	
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		HKKRSCNLDEQQ	CTCACATTCAGTTCACCAGCTGGCCAGACCACGGGGTGCCTGAGGATCCTCAC	
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		NVEPIHADILLETY	TCCCATTGTGGTGCACTGCAGTGCTGGTGTTGGGCGCACAGGAACCTATATCG	
		KRKIADEGRLFLA	GAATTGATGCCATGCTAGAAGGCCTGGAAGCCGAGAACAAAGTGGATGTTTA	
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		YVDILPYDYNRVE	ACAGAAGTGAATTTGTCTGAATTACATCCATATCTACATAACATGAAGAAAAG	
		LSEINGDAGSNYI	GGATCCACCCAGTGAGCCGTCTCCACTAGAGGCTGAATTCCAGAGACTTCCTT	
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		GTRAFGDVVVKIN	AGGAGACCATTGGTGACTTTTGGCAGATGATCTTCCAAAGAAAAGTCAAAGTT	
		QHKRCPDYIIQKL	ATTGTTATGCTGACAGAACTGAAACATGGAGACCAGGAAATCTGTGCTCAGTA	
		NIVNKKEKATGRE	CTGGGGAGAAGGAAAGCAAACATATGGAGATATTGAAGTTGACCTGAAAGAC	
		VTHIQFTSWPDHG	ACAGACAAATCTTCAACTTATACCCTTCGTGTCTTTGAACTGAGACATTCCAA	
		VPEDPHLLLKLRR	GAGGAAAGACTCTCGAACTGTGTACCAGTACCAATATACAAACTGGAGTGTG	
		RVNAFSNFFSGPIV	GAGCAGCTTCCTGCAGAACCCAAGGAATTAATCTCTATGATTCAGGTCGTCAA	
		VHCSAGVGRTGT	ACAAAAACTTCCCCAGAAGAATTCCTCTGAAGGGAACAAGCATCACAAGAGT	
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		ENKVDVYGYVVK	TGCTTTGTTAAATCTCTTAGAAAGTGCGGAAACAGAAGAGGTAGTGGATATTT	
		LRRQRCLMVQVE	TTCAAGTGGTAAAAGCTCTACGCAAAGCTAGGCCAGGCATGGTTTCCACATTC	

		AQYILIHQALVEY NQFGETEVNLSEL HPYLHNMKKRDP PSEPSPLEAEFQRL PSYRSWRTQHIGN QEENKSKNRNSN VIPYDYNRVPLKH ELEMSKESEHDSD ESSDDDSDSEEPS KYINASFIMSYWK PEVMIAAQGPLKE TIGDFWQMIFQRK VKVIVMLTELKHG DQEICAQYWGEG KQTYGDIEVDLKD TDKSSTYTLRVFE LRHSKRKDSRTVY QYQYTNWSVEQL PAEPKELISMIQVV KQKLPQKNSSEGN KHHKSTPLLIHCR DGSQQTGIFCALL NLLESAETEEVVD IFQVVKALRKARP GMVSTFEQYQFLY DVIASTYPAQNGQ VKKNNHQEDKIEF DNEVDKVKQDAN CVNPLGAPEKLPE AKEQAEGSEPTSG TEGPEHSVNGPAS PALNQGS	GAGCAATATCAATTCCTATATGACGTCATTGCCAGCACCTACCCTGCTCAGAA TGGACAAGTAAAGAAAAACAACCATCAAGAAGATAAAATTGAATTTGATAAT GAAGTGGACAAAGTAAAGCAGGATGCTAATTGTGTTAATCCACTTGGTGCCCC AGAAAAGCTCCCTGAAGCAAAGGAACAGGCTGAAGGTTCTGAACCCACGAGT GGCACTGAGGGGCCAGAACATTCTGTCAATGGTCCTGCAAGTCCAGCTTTAAA TCAAGGTTCATAGGAAAAGACATAAATGAGGAAACTCCAAACCTCCTGTTAG CTGTTATTTCTATTTTTGTAGAAGTAGGAAGTGAAAATAGGTATACAGTGGAT TAATTAAATGCAGCGAACCAATATTTGTAGAAGGGTTATATTTTACTACTGTG GAAAAATATTTAAGATAGTTTTGCCAGAACAGTTTGTACAGACGTATGCTTAT TTTAAAATTTTATCTCTTATTCAGTAAAAAACAACTTCTTTGTAATCGTTATGT GTGTATATGTATGTGTGTATGGGTGTGTGTTTGTGTGAGAGACAGAGAAAGAG AGAGAATTCTTTCAAGTGAATCTAAAAGCTTTTGCTTTTCCTTTGTTTTTATGA AGAAAAAATACATTTTATATTAGAAGTGTTAACTTAGCTTGAAGGATCTGTTT TTAAAAATCATAAACTGTGTGCAGACTCAATAAAATCATGTACATTTCTGAAA TGACCTCAAGATGTCCTCCTTGTTCTACTCATATATATCTATCTTATATAGTTT ACTATTTTACTTCTAGAGATAGTACATAAAGGTGGTATGTGTGTGTATGCTACT ACAAAAAAGTTGTTAACTAAATTAACATTGGGAAATCTTATATTCCATATATT AGCATTTAGTCCAATGTCTTTTTAAGCTTATTTAATTAAAAAATTTCCAGTGAG CTTATCATGCTGTCTTTACATGGGGTTTTCAATTTTGCATGCTCGATTATTCCCT GTACAATATTTAAAATTTATTGCTTGATACTTTTGACAACAAATTAGGTTTTGT ACAATTGAACTTAAATAAATGTCATTAAAATAAATAAATGCAATATGTATTAA TATTCATTGTATAAAAATAGAAGAATACAAACATATTTGTTAAATATTTACAT ATGAAATTTAATATAGCTATTTTTATGGAATTTTTCATTGATATGAAAAATATG ATATTGCATATGCATAGTTCCCATGTTAAATCCCATTCATAACTTTCATTAAAG CATTTACTTTGAATTTCTCCAATGCTTAGAATGTTTTTACCAGGAATGGATGTC GCTAATCATAATAAAATTCAACCATTATTTTTTTCTTGTTTATAATACATTGTG TTATATGTTCAAATATGAAATGTGTATGCACCTATTGAAATATGTTTAATGCAT TTATTAACATTTGCAGGACACTTTTACAGGCCCCAATTATCCAATAGTCTAATA ATTGTTTAAGATCTAGAAAAAAAAAATCAAGAATAGTGGTATTTTTCATGAAG TAATAAAAACTCGTTTTGGTGAA	
47	CIITA	>NP_001273331.1 MHC class II transactivator isoform 1 [Homo sapiens] MRCLAPRPAGSYL SEPQGSSQCATME LGPLEGGYLELLN SDADPLCLYHFYD QMDLAGEEEIELY SEPDTDTINCDQFS RLLCDMEGDEETR EAYANIAELDQYV FQDSQLEGLSKDIF IEHIGPDEVIGESM EMPAEVGQKSQK RPFPEELPADLKH WKPAEPPTVVTGS	SEQ ID NO: 97 >NM_001286402.1 Homo sapiens class II major histocompatibility complex transactivator (CIITA), transcript variant 1, mRNA GGTTAGTGATGAGGCTAGTGATGAGGCTGTGTGCTTCTGAGCTGGGCATCCGA AGGCATCCTTGGGGAAGCTGAGGGCACGAGGAGGGGCTGCCAGACTCCGGGA GCTGCTGCCTGGCTGGGATTCCTACACAATGCGTTGCCTGGCTCCACGCCCTG CTGGGTCCTACCTGTCAGAGCCCCAAGGCAGCTCACAGTGTGCCACCATGGAG TTGGGGCCCCTAGAAGGTGGCTACCTGGAGCTTCTTAACAGCGATGCTGACCC CCTGTGCCTCTACCACTTCTATGACCAGATGGACCTGGCTGGAGAAGAAGAGA TTGAGCTCTACTCAGAACCCGACACAGACACCATCAACTGCGACCAGTTCAGC AGGCTGTTGTGTGACATGGAAGGTGATGAAGAGACCAGGGAGGCTTATGCCA ATATCGCGGAACTGGACCAGTATGTCTTCCAGGACTCCCAGCTGGAGGGCCTG AGCAAGGACATTTTCATAGAGCACATAGGACCAGATGAAGTGATCGGTGAGA GTATGGAGATGCCAGCAGAAGTTGGGCAGAAAAGTCAGAAAAGACCCTTCCC AGAGGAGCTTCCGGCAGACCTGAAGCACTGGAAGCCAGCTGAGCCCCCCACT GTGGTGACTGGCAGTCTCCTAGTGGGACCAGTGAGCGACTGCTCCACCCTGCC CTGCCTGCCACTGCCTGCGCTGTTCAACCAGGAGCCAGCCTCCGGCCAGATGC GCCTGGAGAAAACCGACCAGATTCCCATGCCTTTCTCCAGTTCCTCGTTGAGC TGCCTGAATCTCCCTGAGGGACCCATCCAGTTTGTCCCCACCATCTCCACTCTG	SEQ ID NO: 130 NG_009628.1

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		TEHQDRALTLLRD	CGGGGACACTGCGGGCGCGGCAGCTGCTGGAGCTGCTGCACTGCGCCCACGA	
		RPLLLSHSHSPTLC	GGCCGAGGAGGCTGGAATTTGGCAGCACGTGGTACAGGAGCTCCCCGGCCGC	
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48	HLA-DOA	>NP_002110.1 HLA class II histocompatibility antigen, DO alpha chain precursor [Homo sapiens] MALRAGLVLGFH TLMTLLSPQEAGA TKADHMGSYGPA FYQSYGASGQFTH EFDEEQLFSVDLK KSEAVWRLPEFGD FARFDPQGGLAGI AAIKAHLDILVER SNRSRAINVPPRV TVLPKSRVELGQP NILICIVDNIFPPVI NITWLRNGQTVTE GVAQTSFYSQPDH LFRKFHYLPFVPS AEDVYDCQVEHW GLDAPLLRHWEL QVPIPPPDAMETL VCALGLAIGLVGF LVGTVLIIMGTYV SSVPR	SEQ ID NO: 98 >NM_002119.3 Homo sapiens major histocompatibility complex, class II, DO alpha (HLA-DOA), mRNA CTTCTTCTTTACCTCCGCCTTGTTCCTGTCCTCACCACACGGACTGAGACTGAT TTGATTAAAGCACCAGAGTGTAATGGCCCTCAGAGCAGGGCTGGTCCTGGGGT TCCACACCCTGATGACCCTCCTGAGCCCGCAGGAGGCAGGGGCCACCAAGGC TGACCACATGGGCTCCTACGGACCCGCCTTCTACCAGTCTTACGGCGCCTCGG GCCAGTTCACCCATGAATTTGATGAGGAACAGCTGTTCTCTGTGGACCTGAAG AAAAGCGAGGCCGTGTGGCGTCTGCCTGAGTTTGGTGACTTTGCCCGCTTTGA CCCGCAGGGCGGGCTGGCCGGCATCGCCGCAATCAAAGCCCATCTGGACATC CTGGTGGAGCGCTCCAACCGCAGCAGAGCCATCAACGTGCCTCCACGGGTGA CCGTGCTCCCCAAGTCTCGGGTGGAGCTGGGCCAGCCCAACATCCTCATCTGC ATCGTGGACAACATCTTCCCCCCTGTGATCAATATCACCTGGCTGCGCAACGG CCAAACTGTCACTGAGGGAGTGGCCCAGACCAGCTTCTATTCCCAGCCTGACC ATTTGTTCCGCAAGTTCCACTACCTGCCCTTCGTGCCCTCAGCCGAGGACGTCT ATGACTGCCAGGTGGAGCACTGGGGCCTGGATGCGCCACTCCTCAGGCATTGG GAGCTCCAGGTGCCTATTCCACCACCAGATGCCATGGAGACCCTGGTCTGTGC CCTGGGCCTGGCCATCGGCCTGGTGGGCTTCCTCGTGGGCACCGTCCTCATCA TCATGGGCACATATGTGTCCAGTGTCCCCAGGTAATGATCCTTCTGAGAGAAA TGACTTGTGGGAGACACCCTGCAGATCCTCATGGGTTTGTGACAGCCCCTGCG TGCTCAGTGCCCTTTAAGTGCATCCCGCTGTGCTGACTTTGAGTGGGATCAAC ATCTGTCCTACGGGTCCCCTCTTTTTTGGCCCCAGTATTCATGGCAGGGTTTGT TGGACACCTACTAGCTTCCCTTCCCATTCAACACACACACACATTCTTGCTCTA CCCAAAGCTCTGGCTGGCAGCACTAAATGCTTTGGTGGTGTTTGCACTGTGTC CTTTCCAGGCCTTGGCCAGTTCTTCCAGGGGTGAGGCATGTGGTGCTGGGGAT TGGCAGCCATCCTGGGGCCCACACAGGTGTGTCTTGCTCCATTTGGCCCATTG TGTGTTACTTTGTGAATGAGCCATTTCACATGGACTTCATGAAATTTGCCTCCT	SEQ ID NO: 131 NG_012007.1

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49	HLA-DMA	>NP_006111.2 HLA class II histocompatibility antigen, DM alpha chain precursor [Homo sapiens] MGHEQNQGAALL QMLPLLWLLPHS	SEQ ID NO: 99 >NM_006120.3 Homo sapiens major histocompatibility complex, class II, DM alpha (HLA-DMA), mRNA GATCTAAGGCCACCCTCTCGGGGAGGGAGTTGGGGAAGCTGGGTTGGCTGGG TTGGTAGCTCCTACCTACTGTGTGGCAAGAAGGTATGGGTCATGAACAGAACC AAGGAGCTGCGCTGCTACAGATGTTACCACTTCTGTGGCTGCTACCCCACTCC TGGGCCGTCCCTGAAGCTCCTACTCCAATGTGGCCAGATGACCTGCAAAACCA CACATTCCTGCACACAGTGTACTGCCAGGATGGGAGTCCCAGTGTGGGACTCT CTGAGGCCTACGACGAGGACCAGCTTTTCTTCTTCGACTTTTCCCAGAACACTC	SEQ ID NO: 132 NG_012006.1

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50	HLA-DRA	>NP_061984.2 HLA class II histocompatibility antigen, DR alpha chain precursor [Homo sapiens] MAISGVPVLGFFII AVLMSAQESWAI KEEHVIIQAEFYLN PDQSGEFMFDFDG DEIFHVDMAKKET VWRLEEFGRFASF EAQGALANIAVD KANLEIMTKRSNY TPITNVPPEVTVLT NSPVELREPNVLIC FIDKFTPPVVNVT WLRNGKPVTTGV SETVFLPREDHLF RKFHYLPFLPSTE DVYDCRVEHWGL DEPLLKHWEFDAP SPLPETTENVVCA LGLTVGLVGIIIGTI FIIKGLRKSNAAER RGPL	SEQ ID NO: 100 >NM_019111.4 Homo sapiens major histocompatibility complex, class II, DR alpha (HLA-DRA), mRNA TTTTAATGGTCAGACTCTATTACACCCCACATTCTCTTTTCTTTTATTCTTGTCT GTTCTGCCTCACTCCCGAGCTCTACTGACTCCCAACAGAGCGCCCAAGAAGAA AATGGCCATAAGTGGAGTCCCTGTGCTAGGATTTTTCATCATAGCTGTGCTGA TGAGCGCTCAGGAATCATGGGCTATCAAAGAAGAACATGTGATCATCCAGGC CGAGTTCTATCTGAATCCTGACCAATCAGGCGAGTTTATGTTTGACTTTGATGG TGATGAGATTTTCCATGTGGATATGGCAAAGAAGGAGACGGTCTGGCGGCTTG AAGAATTTGGACGATTTGCCAGCTTTGAGGCTCAAGGTGCATTGGCCAACATA GCTGTGGACAAAGCCAACCTGGAAATCATGACAAAGCGCTCCAACTATACTC CGATCACCAATGTACCTCCAGAGGTAACTGTGCTCACAAACAGCCCTGTGGAA CTGAGAGAGCCCAACGTCCTCATCTGTTTCATAGACAAGTTCACCCCACCAGT GGTCAATGTCACGTGGCTTCGAAATGGAAAACCTGTCACCACAGGAGTGTCA GAGACAGTCTTCCTGCCCAGGGAAGACCACCTTTTCCGCAAGTTCCACTATCT CCCCTTCCTGCCCTCAACTGAGGACGTTTACGACTGCAGGGTGGAGCACTGGG GCTTGGATGAGCCTCTTCTCAAGCACTGGGAGTTTGATGCTCCAAGCCCTCTC CCAGAGACTACAGAGAACGTGGTGTGTGCCCTGGGCCTGACTGTGGGTCTGGT GGGCATCATTATTGGGACCATCTTCATCATCAAGGGATTGCGCAAAAGCAATG CAGCAGAACGCAGGGGGCCTCTGTAAGGCACATGGAGGTGATGGTGTTTCTT AGAGAGAAGATCACTGAAGAAACTTCTGCTTTAATGGCTTTACAAAGCTGGCA ATATTACAATCCTTGACCTCAGTGAAAGCAGTCATCTTCAGCATTTTCCAGCCC TATAGCCACCCCAAGTGTGGATATGCCTCTTCGATTGCTCCGTACTCTAACATC TAGCTGGCTTCCCTGTCTATTGCCTTTTCCTGTATCTATTTTCCTCTATTTCCTA TCATTTTATTATCACCATGCAATGCCTCTGGAATAAAACATACAGGAGTCTGT CTCTGCTATGGAATGCCCCATGGGGCATCTCTTGTGTACTTATTGTTTAAGGTT TCCTCAAACTGTGATTTTTCTGAACACAATAAACTATTTTGATGATCTTGGGTG GAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
51	HLA-DMB	>NP_002109.2 HLA class II histocompatibility antigen, DM beta	SEQ ID NO: 101 >NM_002118.4 Homo sapiens major histocompatibility complex, class II, DM beta (HLA-DMB), mRNA ATTTGTCCCTGCCTACCTAGCCAATCTGTCCCTGTTTGGGACACTGGACTCCCG	

		chain precursor [Homo sapiens] MITFLPLLLGLSLG CTGAGGFVAHVE STCLLDDAGTPKD FTYCISFNKDLLTC WDPEENKMAPCE FGVLNSLANVLSQ HLNQKDTLMQRL RNGLQNCATHTQ PFWGSLTNRTRPP SVQVAKTTPFNTR EPVMLACYVWGF YPAEVTITWRKNG KLVMPHSSAHKT AQPNGDWTYQTL SHLALTPSYGDTY TCVVEHTGAPEPI LRDWTPGLSPMQ TLKVSVSAVTLGL GLIIFSLGVISWRR AGHSSYTPLPGSN YSEGWHIS	TGAGCTGGAAGGAACAGATTTAATATCTAGGGGCTGGGTATCCCCACATCACT CATTTGGGGGGTCAAGGGACCCGGGCAATATAGTATTCTGCTCAGTGTCTGGA GATCATCTACCCAGGCTGGGGCTTCTGGGACAGGCGAGGACCCACGGACCCT GGAAGAGCTGGTCCAGGGGACTGAACTCCCGGCATCTTTACAGAGCAGAGCA TGATCACATTCCTGCCGCTGCTGCTGGGGCTCAGCCTGGGCTGCACAGGAGCA GGTGGCTTCGTGGCCCATGTGGAAAGCACCTGTCTGTTGGATGATGCTGGGAC TCCAAAGGATTTCACATACTGCATCTCCTTCAACAAGGATCTGCTGACCTGCT GGGATCCAGAGGAGAATAAGATGGCCCCTTGCGAATTTGGGGTGCTGAATAG CTTGGCGAATGTCCTCTCACAGCACCTCAACCAAAAAGACACCCTGATGCAGC GCTTGCGCAATGGGCTTCAGAATTGTGCCACACACACCCAGCCCTTCTGGGGA TCACTGACCAACAGGACACGGCCACCATCTGTGCAAGTAGCCAAAACCACTC CTTTTAACACGAGGGAGCCTGTGATGCTGGCCTGCTATGTGTGGGGCTTCTAT CCAGCAGAAGTGACTATCACGTGGAGGAAGAACGGGAAGCTTGTCATGCCTC ACAGCAGTGCGCACAAGACTGCCCAGCCCAATGGAGACTGGACATACCAGAC CCTCTCCCATTTAGCCTTAACCCCCTCTTACGGGGACACTTACACCTGTGTGGT AGAGCACACTGGGGCTCCTGAGCCCATCCTTCGGGACTGGACACCTGGGCTGT CCCCCATGCAGACCCTGAAGGTTTCTGTGTCTGCAGTGACTCTGGGCCTGGGC CTCATCATCTTCTCTCTTGGTGTGATCAGCTGGCGGAGAGCTGGCCACTCTAGT TACACTCCTCTTCCTGGGTCCAATTATTCAGAAGGATGGCACATTTCCTAGAG GCAGAATCCTACAACTTCCACTCCAAGTGAGAAGGAGATTCAAACTCAATGAT GCTACCATGCCTCTCCAACATCTTCAACCCCCTGACATTATCTTGGATCCTATG GTTTCTCCATCCAATTCTTTGAATTTCCCAGTCTCCCCTATGTAAAACTTAGCA ACTTGGGGGACCTCATTCCTGGGACTATGCTGTAACCAAATTATTGTCCAAGG CTATATTTCTGGGATGAATATAATCTGAGGAAGGGAGTTAAAGACCCTCCTGG GGCTCTCAGTGTGCCATAGAGGACAGCAACTGGTGATTGTTTCAGAGAAATAA ACTTTGGTGGAAATATTGTTAAAAAAAAAAAAAAA	
52	HLA-DOB	>NP_002111.1 HLA class II histocompatibility antigen, DO beta chain precursor [Homo sapiens] MGSGWVPWVVA LLVNLTRLDSSMT QGTDSPEDFVIQA KADCYFTNGTEK VQFVVRFIFNLEE YVRFDSDVGMFV ALTKLGQPDAEQ WNSRLDLLERSRQ AVDGVCRHNYRL GAPFTVGRKVQPE VTVYPERTPLLHQ HNLLHCSVTGFYP GDIKIKWFLNGQE ERAGVMSTGPIRN GDWTFQTVVMLE MTPELGHVYTCL VDHSSLLSPVSVE WRAQSEYSWRKM	SEQ ID NO: 102 >NG_009793.3 Homo sapiens transporter 2, ATP binding cassette subfamily B member (TAP2); and major histocompatibility complex, class II, DO beta (HLA-DOB), RefSeqGene on chromosome 6AGAGCGGGAGCGCGGGGTACAGGGTCGGGGGTAGCCTTCAGTCCCGGAGAG CGCCAGACCCAAAGAAGAGGCCACATGGGGATGGGGCCTGAGAGGAGGAAG TGCAAGTTAGGACAAAGAGTTACAGGTGAGGTGGGGGCTCCCAAAGGAAGAC AAGAGAACTTTCCTGCCCTTGTCCACACACAAATGGTGGAGCCTTTTTCATGG GGTTATCACATGATATAGGAGGTGTGTGGTGTCTTGGGAAACCTATGAAATTT GCCTGCTGGCCTCCTCTCAGCAACTCACTGTTGCGCGACTTAGAACAAGTCAC TTAGTCTAGGTCCCAAGCCCCTCTTCTGTAAAGTGAGGATACTGTTACTAAAC GTGTTTTGTGAGGGTTGAATGCTTTATGCATGGAAGAAACCCTTTAAGTCACT CTCAAAATTTTTTAGTAATGGTAACATGTGCTTGCTTTCATTTCTGTTGTGCTG GAAAATGGAAAAGGTTGATACTGGCATGCCTCTTCTTTTCCTTCTCCCAAGCC ATTTCCTTCTAGAGATTGGTTATTAACTGTTTCATTTATTGATGGTTAGATCAT TTCTGCATATCTCCTCACCCTCATACTCCCTAAAACCTTTTCCTGGAGCCTCTT ACTACAGAATTTTTCATTGCCTTTCTCAACCTCTTTTCTCTTATCAGCCCACAG AATTCTTCCAGTCCCTGGGTGGGGACGGAGAAAGGAACGTTCAGATTGAGAT GGCCCATGGCACCACCACGCTCGCCTTCAAGTTCCAGCATGGAGTGATTGCAG CAGTGGATTCTCGGGCCTCAGCTGGGTCCTACATTAGTGAGTGTATACGCTCC AGCAGGCAGAATCTGGGGAGCTGGGCTCTCCTTTCCACAGGAGGCCAACTCTG CAACAAAGTGGAAGTGGATATTGATTTAGGACACACTGGGGGATCTATGGGG TCATCCCTTCTCTCCCAAAGCTCCATCTTCTTCCAGGTGCCTTACGGGTGAACA AGGTGATTGAGATTAACCCTTACCTGCTTGGCACCATGTCTGGCTGTGCAGCA GACTGTCAGTACTGGGAGCGCCTGCTGGCCAAGGAATGCAGGTAAGCGAGGC	SEQ ID NO: 133 NG_009793.3

		LSGIAAFLLGLIFL LVGIVIQLRAQKG YVRTQMSGNEVS RAVLLPQSC	CTCTCATCTTCCTTTCTTAGCCTAGTGGTTAATCCCTGGATCTCTCAGATCATT GCTCCTTACTCTTGTCCTATGTGGTCCATCTTAGTGCTAATAGTATATTTCACA AAACAGCTTTTTGGTGATAAGACCCTTCTCCCAAATCTCAGCCTGTGCTCCACT CATAAGCCAGATAGTACGTCAGGTATTTAGCACTGACACATCCACCCTGGCGG GACAGTATCATTTACTAGGCTGCCTTTGTATGTTTCAGATACTTTAAATTCCAA ATCTTTCTCTGATCTTTAGATCCTACAAAATAATTCCTTTCCAATGCTTATCTCT TTAATCATTTCCTGCCCCATCAAGTTGGAAAGAGCTAACCTCTCTTTCCTCACT CCACCTTGTCCTCACCCAGGCTGTACTATCTGCGAAATGGAGAACGTATTTCA GTGTCGGCAGCCTCCAAGCTGCTGTCCAACATGATGTGCCAGTACCGGGGCAT GGGCCTCTCTATGGGCAGTATGATCTGTGGCTGGGATAAGAAGGTGGGTGCTC TCCATTCTTCATGTTCCCCCACCATGTTCCCTATGGATGACAGATCTGTTTCCC ATCATATACTCCTACTCCCTCCCTGACAAGATGCATGGCATATAGAGTGCTTG GTTATAGAACTGTTTCAGTATATCCATGGACTATTTATTGGCCCAGATATGAAT CATTGCATGTGTTTTGTAAGCTTGTCCCTTTTGTTAAACAGTTGATTTCAAGTT TGTTTTTCCTTTTTCATTTCTAAAGTTCGATGACTTTACCAAAGTGGTTTCCTAA TTCCAATGTTCTTGTGGTAATATTAATTCTTTTGTTCACTTTTTATGTCTCATAT TTGAACCCCCATGTTACCAACATCTTCCTCTCCAATTTCAGCCTGAAATCTTTC ATCTTATAGGGTCCTGGACTCTACTACGTGGATGAACATGGGACTCGGCTCTC AGGAAATATGTTCTCCACGGGTAGTGGGAACACTTATGCCTACGGGGTCATGG ACAGTGGCTATCGGCCTAATCTTAGCCCTGAAGAGGCCTATGACCTTGGCCGC AGGGCTATTGCTTATGCCACTCACAGAGACAGCTATTCTGGAGGCGTTGTCAA TAGTAAGAGACCAATGCTCCCACCACCATGCCTGGGAGGAGTCGGCGGGTGG TGGGGGGGGTGATTTAAGATTGAGAAACCAGCCTGGCCAACATGGCGAAACC CCGTCTCTACTAAAACTACAAAAATTAGCCGGACGTGGTGACGGGTGCCTGTA GTCCCAGCTACTTGGGAGGCTGAGGCAGGAGAATCACTTGAACCTGGGAGGT GGAGCTTGCAGTGAGCCAAGATGGCGCCACTGCATTCCAGTCTGGGCCACAG AGTGAGACTCCTTCTCAAAAGAAAAAAAAGAAAATGATTGAGAGACTCAAAG GAGGGAGAGTAGTAGGGAGGAAATTTTCAGAGTCAGAAGAAGGGCATTAAA GGCCCAGTCATATGGTTTTAAGCTTGCGCATGTGTCTTGTTGCTGCCTTCAACA TAACATCAGTGACAGGAACTTGCTGAGGTGAAAGGTGACTCCATGTTCTTTTC TCATTTGTCCACAGTGTACCACATGAAGGAAGATGGTTGGGTGAAAGTAGAA AGTACAGATGTCAGTGACCTGCTGCACCAGTACCGGGAAGCCAATCAATAAT GGTGGTGGTGGCAGCTGGGCAGGTCTCCTCTGGGAGGTCTTGGCCGACTCAGG GACCTAAGCCACGTTAAGTCCAAGGAGAAGAAGAGGCCTAGCCTGAGCCAAA GAGAGAGTACGGGCTCAGCAGCCAGAGGAGGCCGGTGAAGTGCATCTTCTGC GTGTTCTCTATTTGAACAAGCATTTCCCCCAGGGAAGTTTCTGGGTGCCCCACT AAGTAGAATAAAGAAAAACGGTTATAAATACCTCTGTCTTGTGGCTGAATGG GGTTGGGCCTGTGGTTGTTGGGTGGGGCAGAAAGTAAAGAGACGCTTTTTCTG GAGAAGGGGCTCAGACCCCTATCTAAGAAATGTGGCCTCACCACATAGTTCTT CCTGGGGTTTCCTTCCACACTCATCTCTCCAAGACCTCAGGAAGGCTGCTCATT GCTGTCCATGGACACTTGTTTGCAATTTCACATAGGTTAGGGTCCTTTCCATAG AGAGGCACCTGGGGACTCCTGTGTGTTCCATTGTTAATGGTTTGAGGAACAGG GAGTAGGGCACCTAGGATAACTGTTTTTGACTTTATAGAGTAGGATGAAAAAG CTTCCACTTCACTTTAATATGGTAATCATATAAACACCATACCATTTATCCCAA ATAACACTTTGGAGATATTGGATATTGAATATAAAGACAGACATTAAGGGTCT AATTTCATGATGTGTCATGCTGAATTGCAAGATGGCAGGACTATAATTTTAGA GGAAGAAGAGATCAGGAGGACTCCCCTAAGTGAGGAGTGTGGGGAAAATGTA AAAGATCCAGGTTAGAAGAAAGAGACACACATCATGAGATTTTCGGAATCAT GCTGGAACTATGGACCATGTCACTTTCCAGAAAATAAAGGAAACAAATGCTT GAAAGTAGGAGCATGAGCTTGAGCATGGAGCTTTTTTCATTAGAGAGAGATTC TTAAAATGCCAGAATGAATAGAGTTGTAAAACTTTAGCGAGCCCCTACTTAAA	

			ATCCCTCCTCCCCACCACCACTATTTTAAACTTTAAGTGACTCCTTGGTAGTCA CACAGGTAACATTTCAAAATGGTGATCTGGAATCCAAGCGACCCTTCCTTTGG GGAATTTGTTTGTTTGTTTGTTTTTAGTTTGGGAGGTGGTTTCAATCTGAAGAG TCCTTTCTGGAATAAACGAATCTTTCTGTTGCATAGGAAGGCTCTGGGTCAGG AAGGATATTTAAAAACCTAATTACTGTTCTAAACAGTGTTAAAATAGAACAAG AACCAAAGCTCAGTACGGGGCATTTCCCTCATAGGCTGAAGGTGCGCCCAAC ATAATTTGGAGTACAGACTCAGAGGCACCTGAACACGCGCCAGCTCAAGGTG CTCCGGCTGAGAAGGACGGATGAAGATGAACGCTCAGGGCCTACTAAATTCA AAGTCTGTACGTGAAAATCCCCTTTGGCCTGGTGAGATTGGTTGGAACCTTCT ATTTAGGAGAGCCCGGCTCGCTCGCCTAAAACTGGAGCTTGCATGGAAGAGG GCACTTTTTTTTTTTTTAGACGAAGTCTCACTCTTGTCGCCCAGGCTGGAGTGC AATGACCCGATCTCGGCTCACTGAAACCTCTGCCTCCTGAGTTCAAGCGATTC CCCTGCCTCAGCCTCCCGAGTAGCTGGGATTACAGGCGTCCGCCACCACGCCC TGGCTAATTTTTGTATTTTTAGTAGAGACAGGGTTTCACCATGTTGGCCAGGCT GGTCTCGAACCCCTGACCTCAGGCGATCCGCCCGCCTCGGCCTCCCAAAGTGC TGTGATTACAGGCGTGAGCCACCGCGCCGGACCAGAAAGAAGGCACTTCTTA ATAGTAGGCTCAGAGCTTGAAGTAGTAACTTTGAGAAAATTCAGTGATTCTCC AATTACAAAGCATTCTCCAATTACAAAGCAAGGACAACAGATAAAGTTGCCC TTGAGACAACTGTATTTTACTTAATGATAAAGAAACATTTTTGCAGTTTTATAT CCCAGAGTAACCGCCACTAAAGGCGAGTGAGACTCATTGCAGGCCTGTACAG TGCGAACCAGAGTTCGGGCTCCAGTTCCGCTGTCTGCGGGTCTCGCGCGCCCC CTCCCGGCGGCCCAGCCCAGAATGAAGGCCTTGGCTGGGGAAGCGAAAGCGA AAGCTGCCCGAGCCCTGACGCCCGCCCTGGCCGAGCGTAGCTGGCGGACCAG AGCCGGTAGCGAGGTTGGGAGAGACGGAGCGGACCTCAGCGCTGAAGCAGA AGTCCCCGGAGCTGCGGTCTCCCCGCCGCGGCTGGTGAGTTGGTGCGGAGGG GAACCTGGAGCGCCAACAGGGACGCAGCCCAAGTGACTACCCACTCCACGCT CCTGCTTCCCAGTCCCTCTGCACCCGGCGATAGGAGGGAGCGGAGCCCGGACC ACTTAGCTCGCCGCGGCAGGCGGGGGTGGGGGTGGGGGTCCGGGGATTTTTTT TTTTTTTTTTTAAGCACGAGGCTCCTGATGGTCATGCTTCCAGCTCCCCAGAAG GCCGAAAGCTGTCTGTCGTAGGAGGGGTGTACGGATGAGCACCGGTTACTCA GGAGAGCTCTCAGGGTTGAATAGGATAAAATGAGAAGCCGATGGACGGGTTA GGCGGAGCCGGGCGGGTAGGAGGGCAGGGACAAGGATTGGGACTCCACCCCC ATGATTTCTCATCTCGTATCCGTTGACAGAGCCATGCGGCTCCCTGACCTGAG ACCCTGGACCTCCCTGCTGCTGGTGGACGCGGCTTTACTGTGGCTGCTTCAGG GCCCTCTGGGGACTTTGCTTCCTCAAGGGCTGCCAGGACTATGGCTGGAGGGG ACCCTGCGGCTGGGAGGGCTGTGGGGGCTGCTAAAGCTAAGAGGGCTGCTGG GATTTGTGGGGACACTGCTGCTCCCGCTCTGTCTGGCCACCCCCCTGACTGTCT CCCTGAGAGCCCTGGTCGCGGGGGCCTCACGTGCTCCCCCAGCCAGAGTCGCT TCAGCCCCTTGGAGCTGGCTGCTGGTGGGGTACGGGGCTGCGGGGCTCAGCTG GTCACTGTGGGCTGTTCTGAGCCCTCCTGGAGCCCAGGAGAAGGAGCAGGAC CAGGTGAACAACAAAGTCTTGATGTGGAGGCTGCTGAAGCTCTCCAGGCCGG ACCTGCCTCTCCTCGTTGCCGCCTTCTTCTTCCTTGTCCTTGCTGTTTTGGGTGA GTCAGGAGAGGACGTTGTGAGTTGGAGGTGGTAAAAGGGCCTGGGCACCAGC ACATTCTTGTGTTATTTTTCATGCCTCTTTCAGGTGAGACATTAATCCCTCACT ATTCTGGTCGTGTGATTGACATCCTGGGAGGTGATTTTGACCCCCATGCCTTTG CCAGTGCCATCTTCTTCATGTGCCTCTTCTCCTTTGGCAGGTAGGTGGTGGGCA GCTGGGTCCATTTGCTAGCCCCAAATCTTTATAGGGGTCTTCACTTCCCTAACT CCATTTCTAGGCCCTTTCAGGCGCAAAACACAAAAATACTTAAACTAAAATAT GGTGAATGTAGTCACCATTCTGTTTCATCTATCCATTCATTTCTTCCTTCGTTCA TATTCATCCAATATCTTCAAAGTTTATCTGATCTTATTATAGGAACAAGTTATG AGTGAAGGTAGTACAAAAGGAATTTAAGTCTCAGATGGAATGTCTCTCAGTTG	

			TCTCTCAACATTCCTAGGTCCATGAAATTCCATTTCTTTCTGCCTCCTACCTCCT ACCCCTAAGTCTGTCTCCAAAGTATCTCTCCAGGGTCACTCCCTCAGGATGGG TATGCTTCTCCCTTTCACTCTTCTTTCCCAGCTCATCTTGCCAGTCCCTGAAGAT CTTACTCTGAGGCTTATCACCTTTCTTTCCAGAATCATTACTCTTTTCCCTTCAC TTGCTTTCCTTTCTCTTTCTAGACATACTCAAACAAACAAACTGTTTGATAAGG CTGGGACTGGGATGAGGTGAGCGAGGCACCTGGGGTGCAAAGTTTAAGGAGG TGTGCACTCACCTTACCCAAATCCCAGCCGGCCTGATTGTCTCTATTTTTATGG TCATACTTAATTTAGAGTACCCTCGAAAACCATTTCATTGTGCCTTCATTCCAT CCTGGCTGCTTTCTGCTGAAACTACAGTCGTGCACTGCATAACGAAGTTTAGG TCAATGATGGGCCACATATAAGATGGTGGACCCACAAGATTATAATACCATAT TTTTACTGTACCTTTTCTATGTTTAGATACACAAATACTTACTTCTGTGTTACA GTCGCCCACAGTGTTAGGTGCAGTTATATGTTGTACAGATTTGTAGCCTAGGA GCAATAGGCTAAACTACATGGCCTAGGTGTGCAGTAGGCTATGACATCTAGGT TTGTGTAAGTACACTCTATGATGTTCATACAACGATGAAACCATCTAACGACA CATTTCTCAGAACACATCCCTGTCATTAAAGTACAAACCCTCATTATATCATGT CTGACTCTCCCAAACGCCTCTTCAATATGGTAACTAAATTTGTATTAGAAACA TATATTTTGTAAAATACATGCTTTTATGCTTTATATTTTTTCCTCTAAGTGTTAC TGTAGCATGTAGTTGGTCTAAGAGGGATTTTCCAACTCGAAGGATGAAAGATG GGAATCACATGACTCTGGGGCTCCAGAGAATTGTGGGGGCAGGGAATTTATT ATTGCAGTTCCCATGATGAAGTATCTATGATGACAGAGAAGGGCTTTGGGTAT GGGGCAGGAAGGAGACCAAGGCGGAGGAGACGCACAGAGGGACAAGCCTGA GGGACGCTGGGACAGAAGCAAGCACTGGGATACTTGTTTTCACAATATCTTTT CCCTTCTATTGTAGTTTTCTATTGTGTCTAGTACAGAGTGCACTCCATAAATAC TTGTAAATTTGTACATGTTATGATTTTGTTCTCACATCTAGCTCACCATGTCTC CTCTTTCTTCTTCCTCTGTGTATTCCTTACCTCTTCTCTCTCTGTGTGTCTGTCTC TCATTTCTTTCTCTTTTGCCCCTCCTGGCATGCTTTCCCCTGACTTTGCGCTTCT CTGCACTCCTGGCTTGCTCCTCTGTTTCACCCGCTGGCTTGCTCCTTCTCTGCAT CTCCCTCCCCTCTTATTCTCCTACCCCACAGCTCACTGTCTGCAGGCTGCCGAG GAGGCTGCTTCACCTACACCATGTCTCGAATCAACTTGCGGATCCGGGAGCAG CTTTTCTCCTCCCTGCTGCGCCAGGACCTCGGTTTCTTCCAGGAGACTAAGACA GGTGGGGCCTGGAGTCCAGGTCTGAGATTCCCATGGACATCCCTTGCCCCTCA GTGACCTTCCACCCACAGCCTCTCCTCCTGCCTTCACCCGTATGCCAGGACTTG GGGATGCTTTTCTCTTGTTTGGGACAGGGTGGAGAAGCAGCCTCCACTGTCCC TCTGCAAGTGAAGGAGGATGTTCAGAGGAGGGGGCTGTGTCAGAGGGAACGG TCAGGAGGGAGTTTCTGGGGGCCCTGCAGTACACATGGTTTCCTTTTTCCTCAC CTGCTCTGTCCTTCTTAGGGGAGCTGAACTCACGGCTGAGCTCGGATACCACC CTGATGAGTAACTGGCTTCCTTTAAATGCCAATGTGCTCTTGCGAAGCCTGGT GAAAGTGGTGGGGCTGTATGGCTTCATGCTCAGCATATCGCCTCGACTCACCC TCCTTTCTCTGCTGCACATGCCCTTCACAATAGCAGCGGAGAAGGTGTACAAC ACCCGCCATCAGGTGAGCGTGCATGTAAGGGAACCCCAAAGGGAGAATAAAA CTGACAGGTGAGGAGGCTTCCACATTTGTGGCTAGAGGATCCCCTAGAGAGA GATGTTCTCTTCTCAGCCATTAGGGGAGAAGGTATATTGTAGTATATACTACA TTTTGTTTGTCCAGCCATCCAACAATGGATATTTGACTTCAGAAGATTCATGAT TCTCCAGAACTGTAAACAAAAATGTAAAGTGTATGTGAAGGTATGGGGGAGG GAATAGGAAGGGGAGATGATAGGCGATGATAACTTTTCATTAGCTTCTCAAA GGAGTCTGTACATCCCCCGCCCCCACTGCGAAGATTAAAAATGGTTTCTTAGA GGCTTTTAGGCAGGGAGATTTTCCCTTTAAAATCAGCAGAAGAAGTCTGGATG CAGCATAGGGAAAGGAGGCGTCATCAGGAAGTCCTAAGTCTGAATGTCAGCT CCACCTTCTCTTTTTCTCTTATATTGTGGTAAAACATACATAACATAAAATTTA CCATTTCAACCATTTGAAGTGTACAGTTCAGTGACATTTAGGAAACCCACATT GTTATTGGGTAACCATCATCACCATCCATCTCCAGAACTTTTTTCATCTTCCTA	

			AAATGAAACTCTGTACCCACTAAATAGTAACTGCCTACTACCCCCAACCCCTG GCCGCTGGCAACCTCCATTGTACCTTCTGTCTCCATGAATTGTGATGACTCCCG GTGCGGTACGTAAGTGGAACCATACAGTATTTGTCTTTTTGTGACTGGCATATT TTACTTAGCGTAATGTCTTCAGGCCTCATCCATATTGTAGCATGTGTTAGAATT TCCTCCCTTTTAAGGCTGAATAATATTCTGTTGTGTGCATATATCACATTTTGA TTATCCATTCATCTGTCAATGGACATTTGCGTTGTTTCCACCTTTTGGCTGTTGT GAATTATGCTGCTGTGGACATGAGTGTACACCTGTTTGAAACCCTGCTTTTGGT TCTTTTGGGTATATACTTAGAAGTGGAGCTGCTGGATCATATGGCAATTCTATT TAACAATTTTTGAGGAACCATGTATTAGTCCATTTTTACGCTGCTGATAAAGA CATACCCAAGATTGGGCAATTTACAAAAGAAAGAGGTTTATTGGACTTACAGT TCCATGTGGCTGGGAAGACCTCAAATCATGGCGGAAGGTGAAAGACACATTT CACATGGCAGCAGACAAGAGAAAAGACAGCTTGTGCAGGGGAATTCCCCTTT TTAAAACCATTATATCTCGTGAGACTTATTCAATATCACAAGAACAGCATGGG AAAGACTTGCCCTCATGATTCAATTACCTCCTACCCAGTCCCTCCCACAACAC ATGGGAATTCAAGATCAGATATGGGTAGGGACACAGCCAGATCGTATCAAAC CACCATACAGTTTTCCATAGCGGCAGCACCATTTTAAATTCCCACCAGCAGTG CATAAGGTTTCCAATTTCTCCACATCCTCATCAACACCACTTTCTGTTGTCTTTT TTTTTAATAGCCATTCTAATGGTGATTAGGTGATTAGGATTATCTCATTGTGGT TTTGATTTGCATTTCCCTAATGATTAGTAAATATTGAGCATCTTTTCGTGTGAT TTTGGCCACTTATGTTTCTTTCTTGAAAGAATGTCTGCAAGTTCTTTGCCCATTT TCTGATTTTTTTTTAAGTTGTGGGAGTTCACTATATGTTTTGCCTATTAATTTCC TATCAGATATATGATTCACAAATATTTTCTTGTATTTCATGGTTGCTTTTTCACT CTGTTGCTAGAGTTCTTTGATGCACAAACGTTTTAAATTCTGATGAAGTCTGAT TTATCTATTTTTTGTTGCCTGTGCGTTTGGTGTTATATCCAAGAAATCACTGCC AAATCTAGTGGCATGAGGCTTTTCTTCTACATTTTCCTAGGAGTTTTATAGTGT TAGCTCTTATGTTTAGGCCTCTGATCCATTTGGAATTACATCTCCACCTTTCTT AACTATCTGTGGCTCCTTGGGAAAACTACCCTTCTTTCCTGATTCAGACACTGG GGATGGGAAAATTACCTCAAATGAAGGTTAAAAAAATTGCATGTATCTCCTAT ACTACCTAACACTGAGAGCTCAATAATATTTTGTTCCCTTGCTCCTTCACTCTT ATTCCTTCTGGAAAGAAGAGTAAGGAAGAGGGAGAGAAACAGTTTGGTATTT TTAGGTAGACTAGGGAGCATCTCACTGGCTGGAGTAAGATGTGGGGGCCTGCT GTCTTTGCACATCAGCCCTGGTGTTTGCTGGCCCTCTTTTCCAGGAAGTGCTTC GGGAGATCCAGGATGCAGTGGCCAGGGCGGGGCAGGTGGTGCGGGAAGCCGT TGGAGGGCTGCAGACCGTTCGCAGTTTTGGGGCCGAGGAGCATGAAGTCTGTC GCTATAAAGAGGCCCTTGAACAATGTCGGCAGCTGTATTGGCGGAGAGACCT GGAACGCGCCTTGTACCTGCTCGTAAGGAGGGTAAGATACCAGAGTGGTTGT GAAAGGAGCCCAGGAAAGGGGGAGGGCAAGGGAAGAGGAAACTACAGCTGG TTCTAGAGGCCTTTGCAGCTCAGTCTCATAGAGGCAGAGAGGGGGAAAGAAT GGGAAGATTCCCAGCCTCATCTCTTTCTTCTCCTCTTCCAGGTGCTGCACTTGG GGGTGCAGATGCTGATGCTGAGCTGTGGGCTGCAGCAGATGCAGGATGGGGA GCTCACCCAGGGCAGCCTGCTTTCCTTTATGATCTACCAGGAGAGCGTGGGGA GCTATGTGCAGGTGAGCGAGAAGCCAAGCCTGCTCTCCTTTTTTCCCTCTCTTT TTCTTTGTGGACTCCTGGGCCTTGGGCTTTATTTGTTCTTTTTAACAATACAAT ACAAAACCAAAACCCGCAAGTAATTTTGCTATGGAGAATTTTAAACATATGCC AAAAATGAGACAAAATAATATTACAAACTCACATGTATACATCCTGTGCTTTA ACAATGATCAACTCATGCCCAATCTTGTTGGATCTGTATCCCCAGCCACTTCCC CCCACCCATATTATTCTGAAGCAAATCCAAGATATTGTATACTTTCATCTGTAA ATATTTCAGTATGTTTCTTAAAAATACAAACATCTTTAAAAGTGTATAACAAC AAAGCCATTATCACACCAAAAAATTAACAGTAGTTCTTAAAATTTATCAAATA GTCAATTGTCAAATTTCCACTTGTGGTATCCATGTAGTATATGTGTATGAGTGT GTTTATTATACTTTGCTTAAATCAGGATCCAGAAATGGTCCACATATTGTGACT	

			GGTTGATACATCTTTTAAGTCTGTCTGTCTATCTATCTATCCATCCATCTATCC ATCCATCCACCCATCAATCCATGTATCTGTCTAAAAGTTTCCCTTGCACAGTTT ATTTGTTGAAGAAATAGGTTGTTTGTCCTGTGGAGTTTCTTAGGGTCTGGATTT TGTTGACTGAATCCCTGTGGTATTATATGCTCTTCTGCCTCTGTACTTCCTGTCT ATTGATAGATAAACCTAGAAGCTTGTGAGATTGAGGGGTTTTTTTTGGTCTTTT TCCAGCAACAGTACTTTTTAGGTGGTGATGCATTCTTCCTCCAAGAGGCACAC AATGTCTGGTTCTCTATTTGTGGCAACATCAGCCACTGATGAGCAGTACCTAC ATCCATGACAGAATTAGGGCTGCAAAAGGGAGATACTCTATCATTCTTCATGT ATTAGCTGAAGTAGTCTATGAAGGGAGACTTCCCCTCATCTACCATTTCATTA CCCGGTGGTACAGTTTGATGAGGAAAGGCAGAGTGAGCATTTAGATCTCTTCC TACATTTACCAGTTCTCAAAAACAGCTACTTCATCCAGGGCTTTATTTAAACAT TTTCCTAGACACTTGATAAACATCTTTTTTGTGTAGAGAACTGCGCTGGGCACT CTGACGGCTACAAAGGTGAGTTGGGCACAGTGCCTGCATTTAAGGAGCTCCCC GTCTAATCAAGCAAGACAGAACTGGGCACAAGTAATAGGAAGCAGTAACTGA AAAGATCTGGGGCTAGAGGCAATGCTGTATGGTAGGAGAAGGGACTGTATAT CCTTTATATTGCAAATTGGAACACTGGGGTATTGGTGCCACTTTTAAATTCCGT CCAAATTGTACATTTAAAAGTGGAGAATCTCTTTTGAGTATGGAGGAGGAGCA GTGCAGTTGTGAGTGGAGTGTGTGAGGAGTTGGGAGGGTGGTTTCTGGTAGA AGTGTGTTTAATTAGCCGGCTCTCCCATTCCTGTTTTCCAGACCCTGGTATACA TATATGGGGATATGCTCAGCAACGTGGGAGCTGCAGAGAAGGTTTTCTCCTAC ATGGACCGACAGCCAAATCTGCCTTCACCTGGCACGCTTGCCCCCACCACTCT GCAGGGGGTTGTGAAATTCCAAGACGTCTCCTTTGCATATCCCAATCGCCCTG ACAGGCCTGTGCTCAAGGTGCCTGAAAGAGGGAGGAAACCTGGACCCTTGCT CTCTGCTGCTAATGCATAATTGGACATCACAGCCTATAGTTCATTTGCCTCTGA GAACCTGGTCTTGCCTCTGCTAAGAAGAGAAATGGAGGGATTTTGAGGGAGA AGGGGCAGGCCCTTAACTCTTTTTCTGGTTTTCTAGGGGCTGACGTTTACCCTA CGTCCTGGTGAGGTGACGGCGCTGGTGGGACCCAATGGGTCTGGGAAGAGCA CAGTGGCTGCCCTGCTGCAGAATCTGTACCAGCCCACAGGGGGACAGGTGCT GCTGGATGAAAAGCCCATCTCACAGTATGAACACTGCTACCTGCACAGCCAG GTGGGTGAGGAGGGAGAAGACAGGGGACAGGAGAGGGGAGCATGTACAGAG AGAGGATGGGAGATCCACGGGAAGGCGCACCAGGTGTTCATTCTGAGGGAGG TAGGTGGGGAGGACAAAAGGGCCCCTGCCTTGGGGGTTTACACATAGTCCTCT GCCCCTGTCCCTGCTGCACAGGTGGTTTCAGTTGGGCAGGAGCCTGTGCTGTT CTCCGGTTCTGTGAGGAACAACATTGCTTATGGGCTGCAGAGCTGCGAAGATG ATAAGGTGATGGCGGCTGCCCAGGCTGCCCACGCAGATGACTTCATCCAGGA AATGGAGCATGGAATATACACAGGTATCTTCTACAAATTGTAAGCTTGCTCCT TCAGTAAAAAAGAGAAAATCAGACTTACTCTTAGTGGTGAAGGTCGTGTCCCT GTAGCTTGATGTTTGCTGTTCCTCTGCCCTTTCCTCCATTCCTACGTCTCCTTCC CCACACACTGAATTCTTCAGCCTCCCTCTTGATCAAGAGTCTTTGTTTGCAGAG AGCAATGCAGCAGTGGTGCTCCCTCCGTGGGCAGCCCCGTCAGGTCCCCACCC CATGGCCCTCCTCCCACTGGGCCCTCCCCGCACTGGGCCCTCCCACCTCCCGA GGTCCTACTGGAAGTACCTGCTGTGCACTTGTCCCTCCTTGTGTGTTGTCTGTG TCACTTGTATCTGAGGAAGGGAATTTCTCTGATTTCCTCAGATGTAGGGGAGA AGGGAAGCCAGCTGGCTGCGGGACAGAAACAACGTCTGGCCATTGCCCGGGC CCTTGTACGAGACCCGCGGGTCCTCATCCTGGATGAGGCTACTAGTGCCCTAG ATGTGCAGTGCGAGCAGGCCGTGAGTACCGTGAGAGGGCAGGGGACAGTGGG GCCTGGGAGGGGCATGCTGGGAGGATCAGACTGTGCAGAATTGGGCAGAGGG AGGACGAAGGACCTACTAGTGGAAACAGTCTGTGCCTTCTTGGGGTTGGGGA ATGGAATCCGGTGGTGTGAGGGCAGCCCCAGTTCCCTCCTGGGCTTCCATTCC TCCAGCTGTGGCAGTACAGCCGGGAGAGAAGGGCAGTCCAGGCCTTTATCTA CTGCCCTTTCCTACCTTCTTTTATTTCACACCTTCTTTACCCTAAATCATAAGAG	

			ATGGTGCCCAGGTGGATGTGGTGTCCATCTCATTCCTGTCTTTCTGAGGCACTG TGATCACCCCTTCAGCTGCAGGACTGGAATTCCCGTGGGGATCGCACAGTGCT GGTGATTGCTCACAGGCTGCAGGCAGTTCAGCGCGCCCACCAGATCCTGGTGC TCCAGGAGGGCAAGCTGCAGAAGCTTGCCCAGCTCCAGGAGGGACAGGACCT CTATTCCCGCCTGGTTCAGCAGCGGCTGATGGACTGAGGCCCCAGGGATACTG GGCCCTCTTCTCAGGGGCGTCTCCAGGACCCAGAGCTGTTCCTGCTTTGAGTTT CCCTAGAGCTGTGCGGCCAGATAGCTGTTCCTGAGTTGCAGGCACGATGGAGA TTTGGACACTGTGTGCTTTTGGTGGGGTAGAGAGGTGGGGTGGGGTGGGGTGG GGGCTGTCTGTGTCCAGGAAACTTAATTCCCTGGTGACTAGAGCTTTGCCTGG TGATGAGGAGTATTTTGTGGCATAATACATATATTTTAAAATATTTTCCTTCTT ACATGAACTGTATACATTCATATAGAAAATTTAGACAATATAAAAAAGTACA AAGAAGAAAAGTAAAAGTACCCATTGTTTCACTTCCTGGAGATAACCATAGTT GCTATTTTGCTGCCTGTCCCATCAGTCGTTTATCTGTTGTTTGAGATAGAAATT AACCAAAAATGACATAAATATTCATGAGATTGCCTTCCTATATCCTTCCTTGTT CCTACCAGTGTCTGCTATTTTGAAGAAGCTAGGGTCTGGAGGGACAGAGAAC AGTTCCCTGATTAACAGTATTAATAGCGACATTGGTAACAGCTACCATTTATA GAGTTTTAATGGGAGTAGGAGCTATGCTAAGTGTTTTTCATGTATTATCGTTTT TAATCATTATCCCCAACCCTATGAGGTTGGTTATTATCCCCATTTTACAGATGA GGAAACTGAAGCTCAAAGAGGCTCAATGACTTTCCCAAGGTGGTCGTAGTGG TGGAGTTGGAGTTTGAACACAGGCCTGACCCTAGAGTCCACACCCTGACCCAA TCAATTATATTGCATCTTGGGTCCATAAACCCTAATCCATAATCCCATCAAGA AAAGCTCTGCTGCTCTTAGCTCTAAATAATTCAGAATCTATTCTCTTCTCTCCA GTCCCGTTGTTATAGTCTTCACTCATAGACTTAAGATGATCCCATCACCAGAG AGGTTTCTCTACCATTAGCTTCCCTCTTCCGGCCATTCTTCACAAAGTCATTTTT CTAAATTCTGTGTCACATACGATGATGGCATTTCTGGAAATTCCTTCAGGTGCT CTCAAGCCCTGCTGCAGAGATCCTTTTCAGAGCACACACTGTTCCAGCCCATC TGTCTCACCCTCTCCTGTTGTATCCAGCTCCACGACAAACTTCTGCCTTCCCCA ACACCTTTGTGCCTTTGCATATGGTGTTTTCTTGCCCATTTTCTGCTCGACTCGC CCCTGATTTTCAAGTTCAAGACTTAACTCAGGGTTCAGGTCTTCCAGGAGGCC TTACTTATGTCGTCAGTCTGGGGAACTCTCCATGTGCTTCTATCACTGTGCGGT TACCTCTTTCACAGCCCTTTTAAAGTTCTATCTTCCCTTTCCCACCTTTTTTGAC CTTCCACTAGACCATGAGCACCTGGGCGGAAAGCCATATATCTTATTAAGCTT TATATCTGCTACCTGGCCGAGGGCCTAATTCATAGTGGAGAATAAATAGTCAA TTGAATAAATGAATAAATATCTCCACCATCGTACTAATCTTAATCCTCCCTGCC CACTCCCACCACTGAAAATGCAACATTGTACACATCACTGGTTGTTGGGAGGG ACTTACCTTGGAAAGTTGCTATTCTAGGAAAGAGAAACCTTCATATTCCTGGA AACAGCAGGTAGTTTCCAGTGCTGGCAATGAATTCCCCAGAACTGCTGTTTTG GATTTTTTCTTGCCTGGCAGCTGTTGGGAGCAGGGTGCAGTGAGGATGGGGTG AGAGTGGGCAGTTTCTTGTGCAGATTTGCCTTTCTTTCATCCTGGGGCTGACTT GCAGCTCCACACCCATCCATCTCTCAAATTTCACAGAGGGTAAAATAGGCATT TGGAGAGAAAGAACTCTGGCCTGATTCCTTTCTCTCCCACAAATGTCCTTTATT CATAAAACAGGAATAATAATTCCTGTATCTCCCAACTACATGGAAGCTGCAGC CCTCACAGAAGAAGATGATCTGAGAAATTCTTTGATTTCCTCAGTACAGTTAT ACCCATGCATCATAATACTTTAAGCCTGGAAGGCATCTTAAAAATAATGCAAC AGTCAAACCTAATTTTACAGAGAAACTGACATGAAATCACGCAGCTAATCATG ATAAAGCTGGGTGGAAAACTTATCTTGATGGGCAGTACAGGAAGATGCAGTA GACCTTAAGATGTCCTGAAAGTTTCTTATCTCAGGGGAAACTCCCAGGTAGGC TTTATGTCAGGGACACAGAAAAATGCTCCCTGAAAGTCAAAATATTCGGGCTA GACAGACAAATTCCTGTAAGTGTGGTTTGTCTGGGAACCACAGATGTCACTAA TCCTGGTTTGCTCCAGAGTTCTTTTTGTTCACTCCTACCCCCCATCACCATTTGA TTGATCTCCTTACCCTGTAATTTCCCCTTCTTGTCGCTTACCTGCAGTATCTTTC	

			CCACCCAGGCATGCCTTATTCTTTCTAAAGGAAAGTATGAATGGAGAGGGGA AAGCTTGGGAAACTGATAGATTTCCTTGGATGCCAAAACACCTCCATAGCCTG TCTGCCCGGCCCTATGTGGAAACAGCATTGAGTTTCAAGTCCTTTATGCCTCCA CCCAGGGATAGCCACTTGTAATCCACATGGCAATTGTGAAACAAGCAGGAAA TGCGTAATTGTCAGAATTTTGTGGGGAAAGGACTAGGGAATAAGGAAAACAA AGATCTTCCTTGTGTTTTAGAGCTGTCAGCTAGAGGAGCACCTGCTTGAGTCT GATGCCATCTAATGGTCCCAGAAGAAACTGGGTTTTGAACCTAGAGTTCCATG GACTCTTAGGAATTAGACTACTACTACTACTAAGCATTCACTGGTGCTTACTAT GTGCTATTGCTGTGCCAAGTATCTGAAACCTGTCTTCTTACCTTATTTTTCAAG ATAATTCTATGTGGCAGGTATTACTATCTCAATTCTAAGAGTGAGAAAATGGA GTTTTAGAAACATTTACTAACTTGCCTGGGTCACATAGCTAAGGAAGAGGTGG ACTTGCCCAGCTTTGCATAAAACTCCTCAAAAGAGTTGCCTATACTCCCTGAC TCCACTTATCTTCCTACTATCCTCTTTTTAAAATATATTATTTATTTATTTAAAT AAGCAATATATGAATGTGGTTTGAAATTCAAAAGACACAAAGAAGTATACAG AGGAAAGCCTCACTCTCAATCCTTCTCAAGGTTTGCTAATTCCTCTTGCATAGG CAATCCGTTCTTCCAGCTTTGTGTTTATCTTTCCAGAGAAGTTTACTGTGTATT AAGCAAATATGTATATCTTTATTCTTGCTCAGTATTTTCGCAAACAGCAGCTGT CTAAGTTCACTGTTCTGAACTTTATTTTTTAAATTAAAAATATATGGCTATGTA GTATTCTATTTTATGGAAGTTCCATATTTCATTTATCCTGTTTCCTTCTACTGAT GGCTAGTTAGGTTATTGGAAGTCTTTTGCTGTTGCTAGTTAGTCTTGTATAGAC ATTGTAATGCACATGTGCAAAAATACAAGTATGATACAATCTTAAAGGGGAG TTGCTGAGTCCAATATATACATTACAAATATTGATAGATATTGCAAAATTGCC TTCATAGAGGCTATATTAATTTATAGTTCCAGCAGCAACATATGAGTTTATCTG TTTCTCCATATATATATATATGTATATAACCAACAGACAGTGTTAATTTTTAAA ATTTTGACAATCTTCTGGGTGAAAGTAGCATTGTATTGTAGTTATCATTTGCTT TTTAATATTATCATGTAAGTAACAGAGATACTAAACCCAGAAGGATAAGGGA GCAAAGATGAGAAAAATAAACACACACACAAACAACAATAACAAATCTGTCT AAAATATTGGAAAATCAGAATGAGAAATGAAATATGACTGTAACGATAAAAA TCAGTAATAAAAATGACTATTAAATTTAAAAATAAGGCAGAGCAACCACAAG TGACATGAGAATGAGGCAGACAAAGTTAAAGCACCTAAAGTCTTTGTCTTGTT TGAAAGGAGGGTAGAGATATTGATTACCTTCAGATGCTGCCACATTTGGTAAA CATGTTAAAAATATAAGACTGACTTTTAACTAATATAATTAGAATTTAAAATT CCTAAATCAGTAAGGGGAAATTAAATAATACTTTAAATAAAAATGTAATTGAT TTAATATAAGTGATGCAAGGAAAACAAAAGAAGCAAAGTAAGACATAGCAA ATACAGAGCACCATATATTGTAACAGAAACGAATGTAAATAGCACAGTGATC ACAAGTATAAATAGCTTAAATATGGGAGTTAAAGGAAAGTTCTCAGATTAGA TTAACAATATCGCAAAATCCAGTTATATGCCCTTCATAAGATCACAAGAAACC TAAAAACATGAAAATGTTAAATCAAAACCAGATATAAGATACACAAAGCAAA CACTAACAGAAGACAGAAAGACAGCTTATGTAATTACAGAAATATCTAAACA TATAGTCTAAAACCAAAGGCATTAGTAAAAACAAAGACAGCCATTACATAGT GATAATGAAGTCACCAGAACATTATACTAAAACTGAATCAGTTTGCACCTAGC AATAAAACTACAAAATATGTAAGAAATATAGGAGAATTATAGGAAGAAATTA ATTGAGAAATTGAAACACATTTCTCAATGATTATAGAATAAGTGGAAAAATG AATAAGGATATCAAATAAGCCTGTTGATGTTCTTGTCTGTAACATCTAGGAAT CAAAATATATTCTTTAAAACTAATAAATCAAGTGCTCGTATTTACACATTTAA GACTACAAAGGTAGACACACACACAGAAAGAGGAAGGGAGAGGATATGAGC TAGTTTTGTGATTGTTCATTATTTAAAACTAATAGGAATTATCTAAAGGAAGA GGGAACTAAGTGTATTATATACAAATAAACTTATCAAAGCAACCTTGAAATAT ACACCTTCCTTAATATCTGAAAAGGTAAAATTTTTAAAATGCACAATAAAGAC ATAGTGAAAGATTTTTAAAAATACTCATGTAAACATTATACTTAACAGAAGTT AATATCTCTGAATTAGACTGAATCTATTTGCTGTATGAATAATTATAAATGGG	

			CTTCTTAACTGAACTAAATAAATGAAAATATTTTTAAATTAGATTAAGATAAA AACTCTATTATTTGCAATATGCAAAAGACACCTAACATAAAGCCACTCAGAAA GATGTATTCATTATTTTCAACAAATAAGATGATGGGCAAAGACATAACAAGA GAAGGCAAACAAAAGGGAAGCAGAGGTCACATTCGTCTTACCAAACAAGATG AAATTCAGACACTCCTCACCAAAAAAAAAAAAAAAAAAAAAAAATTGAGTGT GACAAGAAGGGCACTTTATAATGTAAAGTATAAAATTCATATGAATATATGA GACATGTGTTTAAGTTCTAAATACCAAATAGGTAGCTCTTATAAAGCAGAAAT TAAGGTAGATACAAGGAAAATATTCAGAAATGTACTACCAATAGAACACTTT AATTCCCTTTCCCTGGACTAGACCAGTTAAGTGGACAAAAAAATAGGCTGGGC CTGGTGATTCATGCCTGTAATCTCAGCACTTTGGTAGGCCAAGGCGGGCGGAT CACCTGAGGTCAGGATTTCGAGGGCAGCCTGGCCAACATGGTGAAACCCTGTC TCTACCAAAAATACAAAAATTAGCTGGGTGTGGTGGTGGGCGCCTGTAATCCC AGCTACTTGGGAGGCCGAGGCAGGAGAATTGCTTGAATCTGGGAGGCAAAGG TTGTAGCGAGCCAAGATCGCACCACTGCACTCCAGCCTGGGCGGCACAGTGA GACTCTGCCTCAAAAAAAAAAAAAAAAAAAAGTATGAACACAGAAGATAGA AGATATTACTATCAATAAAAAAATAGATATGCTACATCTATATCAAACTTTTA AAATTGAAAATAGAGGCCGGGTGCAGTGGCTCACACCTATAATCCCAGCACTT TGGGAGGCCTAAGCAGTCGGATTGCTTGAACTCAGGAGCTCAAGACCAGTGT GGGCAACAGCGAAAACCCGTCTCTACAAAAAATACAAAAATTAGCCAGATGT GGTGGCTCGTGCCTGTGGTTTCAACTACTTGGCTGAGGTGGGAGGATCGCTTG GGCCCAGTTCAAGGCTGCAGTGAGCTATGATTGTGCCACTGCACTCCAGCCTG GGCAACAGAGTGAGGCCTTGTCTCTAAAACAAACAAACAAACAAACAAAAAT TAAATGGCTCAATGGCATAGAAGAAAATTTTTTTATGAAGCAAGTATAATATT GATGTTAAACTATGACAATGCACAAATATAAAAATTGTAGATGAATTTACTTA TTATACTGACACAAAAATCCTAAATAAAACATTGCAAACAGATTCTAGCACAG ATTAAAAAACACCCATTAAGATCAAGGGGTTTTTTTTGTTTTTTTTTTCTAGAA AACCCTTTGGAAGTTCATGATATTTTGAATTTCAATGGATATTTCCTGGGAATA ATGAGTTCAAATGAACGAATATGTGGAACAAAGCATCACCAACATTTATTTTT TCAGGATGAGGTGATGGACAAAACCATCACAGGGAAATTGAGGCAAATAGTA CATGTAAAACAATACTTCGGGTGAGTCCACCTATCCCAAAGTCGTATCAAAGA AGTGGCTGCAGATTGGAGCCCAAAGCCTTTGGTTCCTCAGTTTCCAAATGGAT TCTCACTAGGTGGGATCATGAGTTTGCTTTGGACACCCCAAATTCTAACTATTT CTTTTGTTTCTTACATCCTTTCCCTCTTCCCCAGCCCCTTCCCCTCATGTTACAC CTCTTGCTGGTTTGAGACGTCAATCACCACTGAGAAAGAATTAAACCAGTATT TTGAGCTGGCAAAATTCTTAGCCTAGTACAATTCCTTCAATTAAACTGTAGCTC AACAATGTGTTCTCTAAAAGTATGATTTAATATTCTACCTAGAAACTCAGAAT ATTTTTCATAACTCCTCCAGGGCAGTGTGGATTATGTTGATGTGTTAGGAGGA AGTAGAAGGAAGAAAATGAATTGAGATGTACGTTTTACTTCCATGTCAAAGTC ACCAAAATAGCAGTTGAAGGGATATTTGTGTCAGGCAATAGGGAGAATAATA ATTTTATGCCACCCTCAAAAAACAACCACACATACACCCAAATTCTCTCACTC CTCAGAGAAAGGGGAAGGAAAGAAAAGAGAGAAGCAAAATATGAGCTTGAG TGAAAAATCACAGAGGAGCCTGTAGCTATTTAGGGAGGGCTGCTGGCTGAAG TCAGGCAGGAAAAAAAGATCAAAACACCCTGCCCTATTTTTCAGGCTCGTTCA AGTAGAAGACAAAAACATAAATACAGGAGAAAGGAAGAAAACCACATCTTTT TCCTCTTGTCTCCCCAGAACTGAACAGTGTCTCTGATAAGCCCAGGCCCTTCTA TCGTAGACACTGACACTATGCACAGAAAATGACTCAAAAACGCTTCTAATGG GGGTGAATCTGATGCTTCAGTTTATTTAAGATGTACCAGAGGCCATCTAAGGA GATCCATAGCTTGCTAACTGAAGCTTATTGCTTTCTCTTCTTAGTTCCCATGCC AGGCTCTATGCCATTCCTTGCTTGTCATGTGAGATCACTGATTTCCTTTGGTTA GGTAGGATATGATTTCCTTACAGAGATCTGTCCTGACACCAAACAGCTATGAT GAAATTCCTTGGTTATTTTCCCTTTTTGTGTACCTTATCATTACCGGAATGCTA	

			AAGCTGTAGGAATAAAGTTTCCCTGGCTTCCCAAGAAATACAGTGTGACAGA AAAAGTATAGCCTAGGGACTTACTAGTTATGTGAACTTTGGTTCATTCCATCCT TACCTCATCTGTAAAAGGGAGATCATGATAGTATCTACTGCAAAGGGTTTTGT GTGATGATTCTCTCTCTTTCTCTCTCTCTCATACACACACACGCACACATTTAT ATAATGCTTAGAAAATGAACTCATAATAAGCAATTGACAAACATTAGCTATTA TTATGTAGGCAAGTCAGATTTTAGAGTTTGTGAGCCTTAGACACATTTACAGA GAAGAAAGAGCAGCCCTCCTAACTTTCTGGTCCAGCGCCATATCCTCCACTTC CTCCCCATCCCCACATCCCTTGCCATTTATCAACCCCCTCTCTCCTCTAAATCT AAATACAGGCCCCCGTTTGATCCATATTGTCTAGGCCCTTCCTCTCCTCTCCAC ATGGCCCTTCCTTCAGCTCTGAGGGAAGCTGCAGAAGCCAGCCATGGTGCTGT CTACAAAGAAGGGGACACACGCCTCTTCCACCCGCTCATGCTGTTACTGCATC TGATCATCTCCGTGCCGTGTCCTTGTTCACTTAGCCTGTGTTGAGTGTTTGTCT CCATTTCCAAATGCAATAAAACATCTGGGAAAGACTAAGGTAGGTGTGGGCA GGAAGAAGGGAGGAAGTTAGACCCAGTGGCTTGAGTGCCCTCTGATGCCTCC TTATCCTCGGCTCCACACAAGCCCTCGCCAGTGTGAGCTCCACAGCCATCCAC CTGGAGGAGGAGTACTCAAAACCAGGGTCAAATGCCTTGTACTCGGGGGTCT ACCAGTAAGCCTGTGGCCAGCCTTCCACTTCATGAATCGTCACATTTACATGA GAGATGTGGAGGGAGAGGGGTCAGCCTCCTAGCTCCTGTCCTGTAGCAGTTAA GTCAAGTCAGGCCAGGCTGTGGTAACCAAGCCAGTACCTTCTTTAAAGAACAG TTGTTTCTCATTCATACAGAGTGTGTTGTAGGTGTGAGTGATTCCCTGGGGCAG CTGCTCTTCATGGTGACTCAGCTAATTAGACTGCTTTTCTACTGGGATTGTGCC ATCTCAACACAAGGCTGTCTTGGTTGACTTGGTAGGGGAGGAGGAGAAGAGT CATGCACGAGGAGTTAAATTCTTTGACCAGGAACCTTTTGTTCACTTTCCATTG GTGAGAACGAGTCACACAGCTCCAGGAGAGTAGGAAGTCTAGTTTCTCGTTTT CCATGGGCCTAGGAATTAGAGGATGAACACTAGCGATGTCTTCCACGTCTTGC TCTCTTTTTCTTTACCTGTTATAATCTCCCATGGAGAAGAAATTATTTTTCTGAT TGGTCTGATCCAGGCCTCTAACCAAGGGCATTTACTAAGGGTCATAGAACAGT AAAAGGTTGCACAATTGCATCTCACCTCTCTTTTCTGAATCCTGCTTAATTAAA ACTTTAAAAACTCACTTACAGACCACTTCTTGCTCTTCTTAGTTATCAAATATA TTTTCTTCCAACTCCTTTTTGACAGATCTTGCCTTGTTCTCAGCTGACTCCCTTG CAACCATCTAAATGGAACTTCCTCATTCCCCTTTATCCCCTGCTAATCGTCCTG TCTTTATTCTTTTATCTGAAGAAGTGTACCCTTCTTCCCCCAAGCCTTATGCTCT CTGTCTTAGTCCATTTGTGTTAGTGTAACAAGATACACGAGATAGGGTAATTT ATGAAGAACAGAAATTTATTTCTCACAGTTCTGGAAGCTAGAAGTTCAAGGTC ATGGCCCTGGAAGATTTGATGCCTTGGCCATCGACCTGAAAAAAGTCACTGAA GTGAACTTGTGGTTACCATGATACCCTGGGTTCATTCTTAACATGCACAGTAT AGGCAAATCAGGGGCACATTTCATGCTGAAAGATGATGTGAAATGATGAGTA AACATTGCCCTTTAAATAATAATAACATAGATGGTGAATTACAATTTGCACTT TTGGTTTTATTTGCTTAAAGATAGTGTTTTACTGTCTAGGTTTTACTGAAAGAA TACTTAACTAAACACTTGAGTCAAATCATTCCAGTGTAACAGTCCTCACAAGG AGGAAGGCAGAAGGGCAAAAGTGCCAAGCTATTGCCTCCAGCCCTTCTATTTT TATTGATTGACTGATTGATTGATTGAGACAGGGCCTCGTTCTGTTACCCATGCT GGAGTACAGTGGTGCATTCATGGTTCACTGCAACTTTGAACTTCTGGGCTCAA GTAGTCTTCCCACCTCAGCCTCCAAAGTAACTAAGACCACAGGTGCATGCCAC CATGTTTATTTCTTTAATTTTTTAAATTTTATTTGGACATGGGGGTCTCACTATG TTTTCCAGGCAGGTCTCTAACTCCTAGCCTCAAGCAATCTTCCTCCTCAGCCTC CCAAAGTGCTGGGATTACAGGCATGAGCCATCATCCCTGCTCTCTCTAGCCCT TTTTAAAGTCTCTAATCCCATTCAGGAGGCCTCTGCATTCATGACTTAATCACC TCCTAAAGGGCCCACCTTTTGATACTATCACATTGGTGATTAAATTGCAACAC TTGAATTTTGAGTGACATTCAGACCACAGCATTTTGGAGAAAATGTCCCCTTT CTTCTCTTTTTTCTCTTCAGTTTCTCCTTTCTACAGATACCTTGCACTTCACTTG	

			CAACCTTGTTGAAGTCTCTCCTGTCTTAAAAGTTTCTTTTCCCAAAACACCAGA ACTCATTCCTTCTGTCTAACTGTAACTTTGTACTTGTTACCAACCTCTACCCATT TCTACCCCTGACTCCCCAGCCTCTGGTAACTCCTAACGTACTCTTTACTTCGAT GAGGTCAACTTTTTTAGATTCCACATATGAGTGAAATCACGTAATATAGTCCT TCTGTTCTTGGCTTATTTCACTTAACATAGAGCCCTCCAGGTTCACCCATGTTG TTGAAAATGACAGGATTTCATGCTTTTTTATGGCGGAATAGTATTCCATCATGT ATATATATCACATACTAATTACCCTGATTTGATCAATACACAATGTATAGGTG TGTTGGAACATCATGCTGTACCCCATAAATATGTACAATTATTACGTGTCAATT TAAAAAACCCAAGAAAAGTATTTTTTCTTAGTGTTGTTTTTTTCTAAAGTGTAT CCCATTTTTTCCTTTGTTTTCACTTTCAAAATTCTTGAAAGACTGTTTTAATCTG CGGCCTTTGTTTTCTTGTTTCCAATTCATTCTTTTGAAATATGGCTTCTACCTTT AACACTCTGCTGTCCTCTTGAAGGTTATTGGTGCCCTACTAACCATAAAACAC AATAATGCTCTCTTAGATTGTATCCTGGTGAGCCTTTTTGCAAAATTTTATTCT TTGAGAATTCTCTTTCCATGTTTTCTTTTCTTTTCTTTTTTTGTGGTCATTTTGGC TTATAGGAAATCGTACTCTCCAAATGTTCTCTATGTCTTCTATTTCTTCTCTGAT AATCCCTTTACTAAATCTTCTTGAGGCATATGCTTCAGAATGCTTAATTTACAT ACTCTTAATTCCTTCTTAATTTACACACTGCCTGTCGGCAATGTCAACACCCAA TAAGAAGGGAGACCTATTGGTCAGAACAGGCCAGGGAATAGAAGAATACATA ATAAACAGTCTGCCTAGTTCTTCTAGGGCCCCATAATATGTCAAACATATATTT TTACTTCTTCTCCCAGCCCATTTTTAGTATACCTAAATTACTGTCAGTGATTCT GCAGGCAAACAATGGTTGAGTTGTATGACACAACTTTGTGAAAGTATCCTACC CAGTACCTGATGATGCAAAACTCTTCTATCTTGATTGGTTGTCAATCTGAGGA GTTTCCAATCCTGGGGAAGCCAGAAAAACAGCGATTTATACTCTTAATGGGTA CTTTCTGACTGAATTTTATGAGCTCATTCTGAAGAGGCTGACGATTTTACTATC TCATTTTTTTCCTTTCTCCAGAATGGGTTCTGGGTGGGTCCCCTGGGTGGTGGC TCTGCTAGTGAATCTGACCCGACTGGATTCCTCCATGACTCAAGGCACAGACT CTCCAGGTAAGAACAGAGCAATTGTTTTTTTCCAGTGTGTATGCAAGAATTGG CATGGGGGAGTGATGCCTTTCTTTGTAAGTCCAGGCCACAGACCAGACTGGAA GTGGCTTTTGGTTTCAAAGAACAGTGTTCTTCCCTTTGGCAGAAAGGTACGCC TTGCCTCTTTACATGGGATGGACTTCATATACCAGAGCCACCTATTCAAGGGG TAGGGAGGCAGGAAGAGGGAAACATTGTGTCTTGTTTAGGATCCTTATTGTGT GTATCAACCTCAGTCAGTGCCTGGGCGTGTTGAAGGCCTTGGCTTGGGTTCGA GCCTGCTGGGAGAAACAACCTGCAGTAGGCTGGGTCACAGAGGCAATCTGTG ATTTTTTGGTCAGGACACGGAAACAAATCTCAGTTGGGGTATATGTGGACAAA TGAAACTGGAAACAAAGGTTGCTCCTTCTGTCATTTATTAAGCCACTATTATAT TGTCAGAATTGTACTAAACAGTTTTGAGAAGTAAGAGAAGTTGAATAGAATA CATTGTCCTTGTCCTCCGGCTACCAGGTACAAGTTACTTGTCACTGTTATTTTT CTAGCACAGGTGACAGAATATGCAGCCATGAAGCAATGTGAGATGAAAGCAC ATATTAATGAGCAGAAACAGGATGTAATGTGCTAAGAACAGAATCCCCTTTGC ATGTTAGTTTCATTAAATACAAAAGAGGAACAAACCTGGCCAGGAGAGATCA TTATTCTCAGAGAATAGAAACCGCCCTGAGTTTATAATGTCCATTAAACAATA CAACTGAAAAAAAAATCAGCACAGATGTTAAATGATGATGAAAAATTCAGAT TTCCCCCCTGGTTTAGACTACTAGAGGAAATAGAGAAGAGTATACATGCTGAG AAATTACAGGCTGGAACTTCATCTGAAATTAGCTACTGAGTGAGGGATAAGTG GGGTTCACCCAGGAAGGTCATTCTTATGGCTCAGTTCAGAGTTGGAGGAGGCT TCTGAACTTAGAAAGGAAAGTAAATTACAACCCAACATTAATAGCAATTATCT TTCAAGTCTTGACTTAGATGCAATGTCTTCAGGACGTCCTTCCTGACTTACCTA CATTATTAACTCCATTTGAATTTCCTTTTTATTGTAGTTGTTGTTCTTAAGTGCA TAGGATTGGTTTAATTTTACCCAATGAGTTCACAGCACATTGTAATTATTGGCA GTAGTGCAAGACTCTCTCGTCTCTTCTCTTGCCTCCGTTCTCATTCTCTCCCCTC CCTAGAGAATCCATTCTAAACGTGTCTGGTAAGTCTCTAAGTATGAGAGTGGC	

			TTTTAGAAATATGTAGCATTATTGCTCTTTATGTGTTTTTAAAATTTAATAAAT GTCATTCTCTGTTGAATCCCATTCTGTTTCTTTTCTCACTTGACACTGTGCTTTT TGAGCATACTGAGGTCAAAGGCCTCCTCTTAGATCCATGTGGTCTGACGTAAT TTACCAGGCATGGGTTTTCCCAGAGGAGGGGGCTGGTTCATGGTTTTGGTTTT GGTTTTCCAGAAGATTTTGTGATTCAGGCAAAGGCTGACTGTTACTTCACCAA CGGGACAGAAAAGGTGCAGTTTGTGGTCAGATTCATCTTTAACTTGGAGGAGT ATGTACGTTTCGACAGTGATGTGGGGATGTTTGTGGCATTGACCAAGCTGGGG CAGCCAGATGCTGAGCAGTGGAACAGCCGGCTGGATCTCTTGGAGAGGAGCA GACAGGCCGTGGATGGGGTCTGTAGACACAACTACAGGCTGGGCGCACCCTT CACTGTGGGGAGAAAAGGTGAGCTGGAAGCTGAGGTCTGGCGGGGCTCAGGA ATGTCCCCCATGTGAACCTGGCCATGGCTCTTCTTTCTTACAAGCAATTTTCTG CTTTAGGATAAATGGTTGTCTGTGTAGATGTTCTGGCCCCAGCTGTGATATATT ATCCTCACAAGTCAGCCACTGTGATCTTGGTCTCAGACCCCCAAGGTTCTCAG GGACTTCGAGGGCTATTGTGCCCTCAAAGAGAAGCAGTAATTGTGGGAGTAC CTCAGAAAGTCTAAATCCTCCTGACAGGCATTGACATACCCTGTTACTGATCT TGGGGGCTGAGACTTGCCTATACTTTGTGTTCACTTGGGTGATCTGGGAAAGA GATTAGACATAGTGATAGTCCCTAAAGAATCTCCTGTCCCAGCTTGGTGGTTT TCTTTCACGGTGTCTCATTTTTCCTCCCTTCCTAGTGCAACCAGAGGTGACAGT GTACCCAGAGAGGACCCCACTCCTGCACCAGCATAATCTGCTGCACTGCTCTG TGACAGGCTTCTATCCAGGGGATATCAAGATCAAGTGGTTCCTGAATGGGCAG GAGGAGAGAGCTGGGGTCATGTCCACTGGCCCTATCAGGAATGGAGACTGGA CCTTTCAGACTGTGGTGATGCTAGAAATGACTCCTGAACTTGGACATGTCTAC ACCTGCCTTGTCGATCACTCCAGCCTGCTGAGCCCTGTTTCTGTGGAGTGGAGT GAGAATTAGTTTCTAGTACTCTCTGGGCCTGACTCAGGACTATACTGACTCAA TACAGAGCCTGTGTCACTTCTGCGTTTATCTTGGTCACAACATGAATTATTCTT TCCCTTGATCTGGGACAGTCACAGAAACCAGAGTCCTTGGGTTAGGGTGGGAG AAAACATGGCAGATATCTATCCTCATATCTTCCAAGAAATGAGGAGATCTAAT CACCTCATTATGTGCTTCCAACCCTATGAACTGGTGTCCTCTAATTCTTTGGTC TTAGTATTTAGGAGGCATTCTTATGGGCTGTGAGAATCTGTAACCGATGGGGG GTAACTCCATGGGTGCCAACTTTGGTTTCGAAGAACCTTTTCTAAATTTATTTA TTTTTCTCTAGCTAGCATTGGATTTGGTGTCTAGTACAGATTCTGGGATTCCAA GAAAGTGCTTTAAATATTGGGATATTTTTACTAATTTAAAGACCTGTTTCCCAT AGGAGCTCAGTCTGAATATTCTTGGAGAAAGATGCTGAGTGGCATTGCAGCCT TCCTACTTGGGCTAATCTTCCTTCTGGTGGGAATCGTCATCCAGCTAAGGGCTC AGAAAGGTAATGAGCCTGTGAGGAGTGCCCTGCCACCTGTCCCAGACCTTCCC CACTCCCACCTTCCCTAACGTCAATGATCTGAGGCAAGGAAAGCTGATTGTGC CTCTCAGGGATCACCGGGATAATTTTTTTCTGAAGCTAGAAATGGGATAAGCA GAGAGAGTGCTGACCTTGCCAGCCATTTGTTCTTCCCTCGGGATAATCATATT GGGTCCTAATTGGGGCAATCCATTCTTTTCTCGATTTCTTTCCAGGATATGTGA GGACGCAGATGTCTGGTAATGAGGTAATGTCTCTTTTTCCTTGTCTTTGAGTGG CAGATCATTCTCCCGGTTCTTTGGCCAGAGGGAGATGACATGGGGGTAGGGA GGAGTAAGGTTGCTGCTGTCTGGATGGGACTGTCCCCTGAGTCTCTGGAACGG CTGTGGGGGGTGGTGAGGCTGCCTCCTGAGACCTTCATCACTGTGCCTCCAGG TCTCAAGAGCTGTTCTGCTCCCTCAGTCATGCTAAGGTCCTCACTGAAGCTTCT CTCTCTGGAGCCTGAAGTAGTGATGAGTAGTCTGGGCCCTGGGTGAGGTAAAG GACATTCATGAGGTCAATGTTCTGGGAATAACTCTCTTCCCTGATCCTTGGAG GAGCCCGAACTGATTCTGGAGCTCTGTGTTCTGAGATCATGCATCTCCCACCC ATCTGCCCTTCTCCCTTCTACGTGTACATCATTAATCCCCATTGCCAAGGGCAT TGTCCAGAAACTCCCCTGAGACCTTACTCCTTCCAGCCCCAAATCATTTACTTT TCTGTGGTCCAGCCCTACTCCTATAAGTCATGATCTCCAAAGCTTTCTGTCTTC CAACTGCAGTCTCCACAGTCTTCAGAAGACAAATGCTCAGGTAGTCACTGTTT	

			CCTTTTCACTGTTTTTAAAAACCTTTTATTGTCAAATAAAATGGAGATACAAAA AATGTACATTTTAGTGAATTATTTAAGAAAAACCCCTGTAATCAAGTCAAGGA ACAGGACTTTGCCAGCTCCAGCGGAAGTCTCTGTACGTCAGGCCAATCAAAGC CTCTCCTTCCCCTCGAAAGTGACCATATCCTGATTTTATTGTAACCTCTTTCAT GTCTTTGTAGTCTAGTCCCCCAGGTATGTGTTCCTGGACGCCACAGCTTAGTTG TCTTTTACGTCTCTCATACTTCACTGGTTTCTCCCCCATCAGCCTTTTTTTCCCC CTTATGATTAATCTGTTGAAAAGCTCAATCCATTTGACCTGTAGAGTTTCCCAC ACTCTGGATTTTGCTGGCTGCGTACACATGGTGCAGTGTAACACATCCTCTGC CTTCTGTGCCTCCCGCAAATTGGCATCTGGATGCAGAGGCTGGATCAGACTCT GGTTCAATCTTTTCCTTTGGAAAATCTATACGTGGTGTTGTGGCCTTTCACCAT GAGAGACATAATTTCCAGCTGTTTCTTTTTGTGATGTTAGCAACCATTGATACT AATTGCTTAGGTCTGTTAATTTATTGGGGATTGCTAAATGGTGGTATTCTGTCA TTTTTTCTTCATTTATATGCTTTATTAATGCTACAAAGAGACAGTTCCCTTCATT TACTAGTGAAGAGACACTTCCCTCCACTTACTAGTGGGCTACTTAGTGGTACA GTGGAAAGGCAGGATCAGTGTTTGACTCTCCTTTTATTTACCAGTTTTCAAGTT AGCAAATTGGTTTCCTACTATTAATAAAACCTACAGATGGCCAATCAGGTTTT ACTTTTCATTCTTTAAATAATTATAAACAGAAGGATTTAAATGTTTGATAGGTT TTACTCTATTGCAATTTTTATGCTTGTTAAAGCTTATATCCTACATTTTTGGTGA GTGAAAACTTCTTCAAGTGGCTAAAAATGAAACTGAGTTCTTTTGACGCAAAT TTCTTTTGATAATTTCTTTGTTATCTGGGATGAC	
53	HLA-E	>NP_005507.3 HLA class I histocompatibility antigen, alpha chain E precursor [Homo sapiens] MVDGTLLLLLSEA LALTQTWAGSHSL KYFHTSVSRPGRG EPRFISVGYVDDT QFVRFDNDAASPR MVPRAPWMEQEG SEYWDRETRSAR DTAQIFRVNLRTL RGYYNQSEAGSH TLQWMHGCELGP DGRFLRGYEQFAY DGKDYLTLNEDL RSWTAVDTAAQIS EQKSNDASEAEHQ RAYLEDTCVEWL HKYLEKGKETLLH LEPPKTHVTHHPIS DHEATLRCWALG FYPAEITLTWQQD GEGHTQDTELVET RPAGDGTFQKWA AVVVPSGEEQRYT CHVQHEGLPEPVT LRWKPASQPTIPIV	SEQ ID NO: 103 >NM_005516.5 Homo sapiens major histocompatibility complex, class I, E (HLA-E), mRNA GCAGACTCAGTTCTCATTCCCAATGGGTGTCGGGTTTCTAGAGAAGCCAATCA GCGTCGCCACGACTCCCGACTATAAAGTCCCCATCCGGACTCAAGAAGTTCTC AGGACTCAGAGGCTGGGATCATGGTAGATGGAACCCTCCTTTTACTCCTCTCG GAGGCCCTGGCCCTTACCCAGACCTGGGCGGGCTCCCACTCCTTGAAGTATTT CCACACTTCCGTGTCCCGGCCCGGCCGCGGGGAGCCCCGCTTCATCTCTGTGG GCTACGTGGACGACACCCAGTTCGTGCGCTTCGACAACGACGCCGCGAGTCCG AGGATGGTGCCGCGGGCGCCGTGGATGGAGCAGGAGGGGTCAGAGTATTGGG ACCGGGAGACACGGAGCGCCAGGGACACCGCACAGATTTTCCGAGTGAATCT GCGGACGCTGCGCGGCTACTACAATCAGAGCGAGGCCGGGTCTCACACCCTG CAGTGGATGCATGGCTGCGAGCTGGGGCCCGACGGGCGCTTCCTCCGCGGGT ATGAACAGTTCGCCTACGACGGCAAGGATTATCTCACCCTGAATGAGGACCTG CGCTCCTGGACCGCGGTGGACACGGCGGCTCAGATCTCCGAGCAAAAGTCAA ATGATGCCTCTGAGGCGGAGCACCAGAGAGCCTACCTGGAAGACACATGCGT GGAGTGGCTCCACAAATACCTGGAGAAGGGGAAGGAGACGCTGCTTCACCTG GAGCCCCCAAAGACACACGTGACTCACCACCCCATCTCTGACCATGAGGCCA CCCTGAGGTGCTGGGCCCTGGGCTTCTACCCTGCGGAGATCACACTGACCTGG CAGCAGGATGGGGAGGGCCATACCCAGGACACGGAGCTCGTGGAGACCAGGC CTGCAGGGGATGGAACCTTCCAGAAGTGGGCAGCTGTGGTGGTGCCTTCTGGA GAGGAGCAGAGATACACGTGCCATGTGCAGCATGAGGGGCTACCCGAGCCCG TCACCCTGAGATGGAAGCCGGCTTCCCAGCCCACCATCCCCATCGTGGGCATC ATTGCTGGCCTGGTTCTCCTTGGATCTGTGGTCTCTGGAGCTGTGGTTGCTGCT GTGATATGGAGGAAGAAGAGCTCAGGTGGAAAAGGAGGGAGCTACTCTAAG GCTGAGTGGAGCGACAGTGCCCAGGGGTCTGAGTCTCACAGCTTGTAAAGCCT GAGACAGCTGCCTTGTGTGCGACTGAGATGCACAGCTGCCTTGTGTGCGACTG AGATGCAGGATTTCCTCACGCCTCCCCTATGTGTCTTAGGGGACTCTGGCTTCT CTTTTTGCAAGGGCCTCTGAATCTGTCTGTGTCCCTGTTAGCACAATGTGAGGA GGTAGAGAAACAGTCCACCTCTGTGTCTACCATGACCCCCTTCCTCACACTGA CCTGTGTTCCTTCCCTGTTCTCTTTTCTATTAAAAATAAGAACCTGGGCAGAGT	

		GIIAGLVLLGSVVS GAVVAAVIWRKK SSGGKGGSYSKAE WSDSAQGSESHSL	GCGGCAGCTCATGCCTGTAATCCCAGCACTTAGGGAGGCCGAGGAGGGCAGA TCACGAGGTCAGGAGATCGAAACCATCCTGGCTAACACGGTGAAACCCCGTC TCTACTAAAAAATACAAAAAATTAGCTGGGCGCAGAGGCACGGGCCTGTAGT CCCAGCTACTCAGGAGGCGGAGGCAGGAGAATGGCGTCAACCCGGGAGGCGG AGGTTGCAGTGAGCCAGGATTGTGCGACTGCACTCCAGCCTGGGTGACAGGG TGAAACGCCATCTCAAAAAATAAAAATTGAAAAATAAAAAAAGAACCTGGAT CTCAATTTAATTTTTCATATTCTTGCAATGAAATGGACTTGAGGAAGCTAAGA TCATAGCTAGAAATACAGATAATTCCACAGCACATCTCTAGCAAATTTAGCCT ATTCCTATTCTCTAGCCTATTCCTTACCACCTGTAATCTTGACCATATACCTTG GAGTTGAATATTGTTTTCATACTGCTGTGGTTTGAATGTTCCCTCCAACACTCA TGTTGAGACTTAATCCCTAATGTGGCAATACTGAAAGGTGGGGCCTTTGAGAT GTGATTGGATCGTAAGGCTGTGCCTTCATTCATGGGTTAATGGATTAATGGGT TATCACAGGAATGGGACTGGTGGCTTTATAAGAAGAGGAAAAGAGAACTGAG CTAGCATGCCCAGCCCACAGAGAGCCTCCACTAGAGTGATGCTAAGTGGAAA TGTGAGGTGCAGCTGCCACAGAGGGCCCCCACCAGGGAAATGTCTAGTGTCT AGTGGATCCAGGCCACAGGAGAGAGTGCCTTGTGGAGCGCTGGGAGCAGGAC CTGACCACCACCAGGACCCCAGAACTGTGGAGTCAGTGGCAGCATGCAGCGC CCCCTTGGGAAAGCTTTAGGCACCAGCCTGCAACCCATTCGAGCAGCCACGTA GGCTGCACCCAGCAAAGCCACAGGCACGGGGCTACCTGAGGCCTTGGGGGCC CAATCCCTGCTCCAGTGTGTCCGTGAGGCAGCACACGAAGTCAAAAGAGATT ATTCTCTTCCCACAGATACCTTTTCTCTCCCATGACCCTTTAACAGCATCTGCT TCATTCCCCTCACCTTCCCAGGCTGATCTGAGGTAAACTTTGAAGTAAAATAA AAGCTGTGTTTGAGCATCATTTGTATTTCAAAAAAAAAAAAAAAAAA	
54	CCL4	>NP_002975.1 C-C motif chemokine 4 precursor [Homo sapiens] MKLCVTVLSLLM LVAAFCSPALSAP MGSDPPTACCFSY TARKLPRNFVVDY YETSSLCSQPAVV FQTKRSKQVCADP SESWVQEYVYDL ELN	SEQ ID NO: 104 >NG_033066.2 Homo sapiens C-C motif chemokine ligand 4 (CCL4), RefSeqGene on chromosome 17TCACTTCTCTAGGTTTTGCTTTCCTCTTCTGTACCGTGGCAAAACAGATTGGG ATCAGGTAAAACCACAGGCCATGGATATACTGAGGAAAATGAAAAAATACCA GGACATTTTCAAGGTCATGTTACTGCTGTGGCTGCTGGGCCTGTCTGCAGCCT GGGAGGTTGAGGACAACATGACAAGACAAATGTAAAAATGCCCAGAATGGA GTTATGAATATAGTGGTGGTCAAGGATGTGGAGGGGGAACCTCTAAATGACC ACAAGTGAGGGGGAAAGAAGGGCTTCCCTGCTCAGGGTGAGGGGGTGGACCT CTGAATGGAGCTCCCTGGAACCAAGGATGACCCTTGCTGTCACTTCTTGCAAC CCTGAGCTAAAAACAGTTGAGTCCAAGAATAGTATCCATTGTGATAAAACTAC TGGATGCGTGGGTTGAGGGTGGGGGAGAAGGGGAAGTACCACACTATCAGGG CTGAGGAATCACCTTTTGGGTGGAATGTCAGAACACCCAGTTCATTCATACTT GGTTTACTCATTTGGCTATATAGGGGTCCACATCTTGAGTCCATGTTACTCATC ACATTCCCTCCATGGAGATAAGCATAAACAGTTTCTGCATCAAGGAGCTCACT TTCTAGTTGGGGAGGCAACCACAGGAATAGATAAATATGTCATAGGTGGTAA GAAGAAATAGTTCAGGAGACTGTAGGAGCACAGTGAAGGATACAGAGTTTAC TTGGGAAAGAGGTCAGGAAAGTTTCTCTAGGGAAGATGGGAATCTTTTTCGTC ATGTATCTGAGAGTCATTTGTTATCATTGATTATTGGCTCTCCTTGGCTTTCCA GTCTCCACATTTGCCCTCCAGGAGTTCTAAATGGCACCAGTGCCTAAATCTTG GGGTGGGGGAAGTTAATATGGCTAAACGAAATGATACAAGTCCTTTTTACTCT CAGTGTGGACTTCCACTGGTGCAGACATAGTATTGTTGTTAGGATCTTCATGA AGATCTCTCAAAACCTTTTACCCCCATGAGCCAAAGATCAGATCAAGGCGAGG AAACAAAAGTCAACAGACAAACTCATTGTATGGCTCAGTGATGACTAATCAC CCATTTTATCAATCATTATTCTCCTGAAGCCCCAGAACAGGCTTCCTCCTAACC CCTCCACCCTGCTCATTCAGACAGCTGCTTTAGTGGGGATTGAGACTTAACTT GAAACTACTCATCTACAGCTAATAGACAGCCTTCTCCATCCTTCAGCCTTCCTG ACACTTTGTTTCTTCCTCTGACATGACACTTAGCTTATTCCTCCTCATGGGATA	SEQ ID NO: 134 NG_033066.2

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			TCTCCGTTTCCTCCTTGTCCTAGGACAGACTAGCCCTATCCCCTTCCTGAATTA AGTCCGAATATAGTCAGTCTTTGAGTGTGGAATAGCTCCTAGCAGTCTATCAG TCAACGGGTTCTCTTTGTGGTCACATTCTATGTTTATTCAGGAGACTACAGCAT GGAAAGAAAATGGACTTTGGAGTCAGGTGAATCTTGATTCAAATCTTGGCAGT GCCATTCATCAGCTCTGTGGCATTGAGCGCATCAGTGGACCACTCTCTGATCC CCAATTGCCTTGTCTGTAAAATGAGATTAGACACCCCTGCTCAAGATTATGGT AGGATTATATATAATGTGTGTAACACAGCTTTTCCAGTGCCTGGTACAAGGTA AGTGTCCAATAAGAAGTTACAAATGTTCCTGAGCCACCCTACTGGGTCCCTCC TCACATCCAATGCTGGACTCTTCATGCCCAAGGAAACATATAAGGCACAAAA GTCAGTGGCACTCAGCTCAGCAGAAGAAGGCACAGGAAGGGGATGGGGGAG TCCTGGCTCCCACTTTGTTCTTGGGGTCAGGCTTGTGGCCAGCCTGGAAAGAC TGACATGAACCCTCCAGCATCTGAGGGTGCCAACCACCAAGAGCAGCACAGT TCTTGTCTACAAGCCACTTGTAGCAGGTGTGAACATTTCATCTTTTCCTCTGGG GTTTGCAACTCTCTCCCCAGTCTCGGTCACTGCCTTTGGCTGTACCACTTCCCT TTTCTTCTCGCCTGCACCTCCCTCATCTTTCCTCTATGATGACATCGCCCTGGG GAAGAGAAGCTGAGAGGAACTCCTCACTCAGCTAGCTTCAGGAGCATGACGT CATCTCTACCATGGAAATTCCACTCACTCTCCTGTGCCCCCACATTTGTCCTAG GCCTCAGAGTCCCTATAAAGAGAGATTCCCAAGTCAGTATCAGCACAGGACA CAGCTGGGTTCTGAAGCTTCTGAGTTCTGCAGCCTCACCTCTGAGAAAACCTC TTTTCCACCAATACCATGAAGCTCTGCGTGACTGTCCTGTCTCTCCTCATGCTA GTAGCTGCCTTCTGCTCTCCAGCGCTCTCAGCACCAAGTAAGTCTACTTTTGCA GCTGCTATTTCGAGTCAAGGTGTAGGCAGAGTCCTTTTTTCTAGTCATGGCTGG CAAACAGTGGGATCTGGGGATGGGACAAAAGGCAGCTAGGAAGATTGCCATG TAGTCTGCTGCTAAATGTAGAGTCTAGTAGATATTCAATAACATTCAAGTTCC TATTTTCTTAAGAATTAGCAACCAGCAGAGGAAAACGATGGGCTGGAAGTCA GACTGTTGAATTGGCTCTGCCTTTAATTATTTGTTCAAGCAAGCCCCTGTCCCT CTCTGTGCCTTGGTTTCCCCATCTGTCATATGAAGGGAGTGCGATGTGTTCTGA GACTGAATCCAGTTCCAATCTTCTAGATTTCTTTCTCGTTCTTCTCTGAAGATC CACTATTCAAAATAAGACTCCTGCTCATGTTAGGTGGGAATGGATATTTGGGG TTCTGGTAGCTCCACAGGGATGCTCAATGAAGATACAAAATTAGAAGTCAAA ATAAACAGCTCCCACGGGCAGTGTTGATCTCACCCTGGCCTTTCCTTTCAGTG GGCTCAGACCCTCCCACCGCCTGCTGCTTTTCTTACACCGCGAGGAAGCTTCCT CGCAACTTTGTGGTAGATTACTATGAGACCAGCAGCCTCTGCTCCCAGCCAGC TGTGGTGTGAGTATCAACCCCTGGGCTGCCCTGGGAGGCAAGGGTGAGGGCT GGATTTTAAAAGAGGGCCTGTTTTGGGGAGGGGGTGATTGAGCATTGGGGAG GCAGCTCCCAGGGCTGAAGCCTTCCCTGAGAGCAGTGAGGACACAGGTCATG AACTCACTTTTCAAGTGCTGAAGGCGGCAGAGTGGGAGCCGAGAGAGAAGGG GGTTGCTGGGGAGGAAGTTATTCAGAGGACAGGGAAGCAGGGGAAGGCAGA CAGGTCCCATGAGATATGGACCGATTCCTTAAACCGTGCTAGAAAGACATGTG GAAAAGTCACTGCCAGGCTGGCAGGGAATGGGGAGATCTATTCATATTGATT GCAATGCCCCTTGGTTCCTAATCTGGGCAACTCCTGGGGCCCACAGCTAAATC CAGTGGGTGGAAGTTACAGGGAGTCTGCTTCCAGTGCTGCTCCAGGAAGGATC CCATCCACCAGAGCTGCCCCACATGGACCATGGTCAGGCAGAGGAAGATGCA AAGGATAAAGCCAGATGACCTCAAAGGTCTCATGAGATTCTAATCTGTCCGCT CCTTGTTCTACAGATTCCAAACCAAAAGAAGCAAGCAAGTCTGTGCTGATCCC AGTGAATCCTGGGTCCAGGAGTACGTGTATGACCTGGAACTGAACTGAGCTGC TCAGAGACAGGAAGTCTTCAGGGAAGGTCACCTGAGCCCGGATGCTTCTCCAT GAGACACATCTCCTCCATACTCAGGACTCCTCTCCGCAGTTCCTGTCCCTTCTC TTAATTTAATCTTTTTTATGTGCCGTGTTATTGTATTAGGTGTCATTTCCATTAT TTATATTAGTTTAGCCAAAGGATAAGTGTCCCCTATGGGGATGGTCCACTGTC ACTGTTTCTCTGCTGTTGCAAATACATGGATAACACATTTGATTCTGTGTGTTT	

			TCATAATAAAACTTTAAAATAAAATGCAGACAGTTTCTTTGTGATTTTAATTTG ATTTGGGGGTAAAAGGAATTGCCTGGTACCATTGGGAGGGACAAACTACAGT TTCCCAAAACAGTAAGAATGAGCAATTGCTGAGTCCTTAATATGAGCTCTGGG CTGAACACTCTTAATACACGATCTCACTGCGTACTTTCAACAAGGGTTTTAAC ACCCTTATGAACTAGGGACTGTTGCACCGAGTTTCACAGTTAAGGAAACAGAG GCACAGAGAGGTGAAGTGACTTGCTGAAGCTTGTAGGCCTGCTTGGGGAGTG TCATGAAAGAATGCCCCAGAAAAGGAGGTTATCATTTCAACATCTTGTGGGGG GAGTTGTAAAGAGGGGAAGCAGCACAGCAAAGGCGGAAGAAGAGTGAGAAG AGTGACTTCATCATCTTATTATTATTATAACATTGGGAAAGTCATCTTGCCTTA TTAGACCTCGGTGTTCACAAGTGTGAAATGGGGATAATATTAACCACTTCGAA GGGCTGTTATAAGGTGATGTATAAAGCACCCATCATAGGACCAGGCACCTGG AAGTTTCTCTCCTTCCCTCTCTGAGCTTCAGCCTTTTCACTTAAAATGGACCTA GCAATTGTCAGGATCATCATGAGGATTAGATTAGTTAGTTGACAGATCAGCAC TCTAAATCCCAATCTACTGTGAAGTGTTGTCATGAGGACAGCAGGATGGAGGT TTTGTTTGGAAGTGTTGCAGGAGTAACCTAAAGCCACTTCTACTTAATTATCCT TCAATCAGAACTGCCTATTCCATGGGTCAGACACAACACAACTCTGAAGTAGA ATTACATGCACAATAAAGCCTGATCCATGGGACACAGACTCGTAGTCTACTAA AGCTAAAAGGAAAGTTTAGACCATCTGGTCCAACCCTCTCATTTTATGGAAAC TGAGGGCCAAGGCCTGGGAAGTAACTTGCCACGTGCCACTCAGCGAGTGCAT AGCAGAGCAGGAGCCTGGCCAATGCCAGCTCCCAGGCTCGGGCCCTTTCCTGC ACACCTTCCCTAGTGACGCATCTCTGTGGTCCTCAAAAGGGAGACCGGTTGAG TAAGAACAAGGCGGAGACTATCTTGAAAATCATTTGAGTGTTCTTAGTCCTAT GCAAAAGCAGAATTGGGGCCCTGCACTTCTCTGGGGTCAACAGACACAATTCC CTTCCTTGTCCTGCCCTTAGTCACCCTCATCATTCCAGAGCCCCAGTGGAAACT TCTTTCAGATTCTGCGGGGACTGAGAGAAGGAGGTTAGGGGGCAGAGCTGAT CCAAAACAGGTGTAGGAAGAGGCTAGCAGCAAAGAATGTGCCTGGCCATAGT TTCTGCTTTCATTTGCCTAGATCTGAGCTGTCTAATATGTTAGCCACTGGCCAA AGTGGCTATTTACGTTTTCATTACATTTAATTAAAATGAAATAAAATTTAAAAT TCAGTTCCTGAGTCACACTAGTCACATTTCAAGTGCTCAGTAGCTCCATGTGG CTAGCTCCCATGTTAGACAGCACGGATTACGGGCTTTCTGTCCATCATTGCAG AAAGTTCTGTTGGAGAGCAGTCTCCTAGAATGTTCTCAGAGCCTAAAGAAAGT GAAGGGAAGGGGAGTTGGGATGGCCTGTAAGATTAGAGTGTGGATTTTGAGA AAGATATGCAATTCTATTCTGAGGCGACGGGATGGGAGAGAGAATGGATGAC TCCAGGCCAGAGACAAGGTATAGATCACTACGGTAGCTGAATAATGGCCCCC GAGGTGCACACATCCTATTCCTCAGAACCTGTGAATGTCACTTTTATAGCAAA ATGGACTTTGGAGATATGATCAAGTTAAGAATCTTGAGATGAGTGATTACCTT GAATTATTTGGTCAGGCCCTAAATGCAGTTGTAAGTGTCCTTATAAGGGGGAG GAAGAGAAGAATTTGGTAATAGAGGAGAAGATAGCAATGTGACAACAGAAG CAAGATGCTATGCTGCTGGCTTGGAAG	
55	CXCL9	>NP_002407.1 C-X-C motif chemokine 9 precursor [Homo sapiens] MKKSGVLFLLGIIL LVLIGVQGTPVVR KGRCSCISTNQGTI HLQSLKDLKQFAP SPSCEKIEIIATLKN GVQTCLNPDSAD VKELIKKWEKQVS	SEQ ID NO: 105 >NM_002416.2 Homo sapiens C-X-C motif chemokine ligand 9 (CXCL9), mRNA AAAATGTGTTCTCTAAAGAATTTCTCAGGCTCAAAATCCAATACAGGAGTGAC TTGGAACTCCATTCTATCACTATGAAGAAAAGTGGTGTTCTTTTCCTCTTGGGC ATCATCTTGCTGGTTCTGATTGGAGTGCAAGGAACCCCAGTAGTGAGAAAGGG TCGCTGTTCCTGCATCAGCACCAACCAAGGGACTATCCACCTACAATCCTTGA AAGACCTTAAACAATTTGCCCCAAGCCCTTCCTGCGAGAAAATTGAAATCATT GCTACACTGAAGAATGGAGTTCAAACATGTCTAAACCCAGATTCAGCAGATGT GAAGGAACTGATTAAAAAGTGGGAGAAACAGGTCAGCCAAAAGAAAAAGCA AAAGAATGGGAAAAAACATCAAAAAAAGAAAGTTCTGAAAGTTCGAAAATCT CAACGTTCTCGTCAAAAGAAGACTACATAAGAGACCACTTCACCAATAAGTAT TCTGTGTTAAAAATGTTCTATTTTAATTATACCGCTATCATTCCAAAGGAGGAT	

		QKKKQKNGKKHQ KKKVLKVRKSQR SRQKKTT	GGCATATAATACAAAGGCTTATTAATTTGACTAGAAAATTTAAAACATTACTC TGAAATTGTAACTAAAGTTAGAAAGTTGATTTTAAGAATCCAAACGTTAAGAA TTGTTAAAGGCTATGATTGTCTTTGTTCTTCTACCACCCACCAGTTGAATTTCA TCATGCTTAAGGCCATGATTTTAGCAATACCCATGTCTACACAGATGTTCACC CAACCACATCCCACTCACAACAGCTGCCTGGAAGAGCAGCCCTAGGCTTCCAC GTACTGCAGCCTCCAGAGAGTATCTGAGGCACATGTCAGCAAGTCCTAAGCCT GTTAGCATGCTGGTGAGCCAAGCAGTTTGAAATTGAGCTGGACCTCACCAAGC TGCTGTGGCCATCAACCTCTGTATTTGAATCAGCCTACAGGCCTCACACACAA TGTGTCTGAGAGATTCATGCTGATTGTTATTGGGTATCACCACTGGAGATCAC CAGTGTGTGGCTTTCAGAGCCTCCTTTCTGGCTTTGGAAGCCATGTGATTCCAT CTTGCCCGCTCAGGCTGACCACTTTATTTCTTTTTGTTCCCCTTTGCTTCATTCA AGTCAGCTCTTCTCCATCCTACCACAATGCAGTGCCTTTCTTCTCTCCAGTGCA CCTGTCATATGCTCTGATTTATCTGAGTCAACTCCTTTCTCATCTTGTCCCCAA CACCCCACAGAAGTGCTTTCTTCTCCCAATTCATCCTCACTCAGTCCAGCTTAG TTCAAGTCCTGCCTCTTAAATAAACCTTTTTGGACACACAAATTATCTTAAAAC TCCTGTTTCACTTGGTTCAGTACCACATGGGTGAACACTCAATGGTTAACTAAT TCTTGGGTGTTTATCCTATCTCTCCAACCAGATTGTCAGCTCCTTGAGGGCAAG AGCCACAGTATATTTCCCTGTTTCTTCCACAGTGCCTAATAATACTGTGGAACT AGGTTTTAATAATTTTTTAATTGATGTTGTTATGGGCAGGATGGCAACCAGAC CATTGTCTCAGAGCAGGTGCTGGCTCTTTCCTGGCTACTCCATGTTGGCTAGCC TCTGGTAACCTCTTACTTATTATCTTCAGGACACTCACTACAGGGACCAGGGA TGATGCAACATCCTTGTCTTTTTATGACAGGATGTTTGCTCAGCTTCTCCAACA ATAAGAAGCACGTGGTAAAACACTTGCGGATATTCTGGACTGTTTTTAAAAAA TATACAGTTTACCGAAAATCATATAATCTTACAATGAAAAGGACTTTATAGAT CAGCCAGTGACCAACCTTTTCCCAACCATACAAAAATTCCTTTTCCCGAAGGA AAAGGGCTTTCTCAATAAGCCTCAGCTTTCTAAGATCTAACAAGATAGCCACC GAGATCCTTATCGAAACTCATTTTAGGCAAATATGAGTTTTATTGTCCGTTTAC TTGTTTCAGAGTTTGTATTGTGATTATCAATTACCACACCATCTCCCATGAAGA AAGGGAACGGTGAAGTACTAAGCGCTAGAGGAAGCAGCCAAGTCGGTTAGTG GAAGCATGATTGGTGCCCAGTTAGCCTCTGCAGGATGTGGAAACCTCCTTCCA GGGGAGGTTCAGTGAATTGTGTAGGAGAGGTTGTCTGTGGCCAGAATTTAAAC CTATACTCACTTTCCCAAATTGAATCACTGCTCACACTGCTGATGATTTAGAGT GCTGTCCGGTGGAGATCCCACCCGAACGTCTTATCTAATCATGAAACTCCCTA GTTCCTTCATGTAACTTCCCTGAAAAATCTAAGTGTTTCATAAATTTGAGAGTC TGTGACCCACTTACCTTGCATCTCACAGGTAGACAGTATATAACTAACAACCA AAGACTACATATTGTCACTGACACACACGTTATAATCATTTATCATATATATA CATACATGCATACACTCTCAAAGCAAATAATTTTTCACTTCAAAACAGTATTG ACTTGTATACCTTGTAATTTGAAATATTTTCTTTGTTAAAATAGAATGGTATCA ATAAATAGACCATTAATCAGAAAACAGATCTTGATTTTTTTTCTCTTGAATGTA CCCTTCAACTGTTGAATGTTTAATAGTAAATCTTATATGTCCTTATTTACTTTTT AGCTTTCTCTCAAATAAAGTGTAACACTAGTTGAGATAAAAAAAAAAAAAAA AA	
56	ICOS	>NP_036224.1 inducible T-cell costimulator precursor [Homo sapiens] MKSGLWYFFLFCL RIKVLTGEINGSA NYEMFIFHNGGVQ	SEQ ID NO: 106 >NG_011586.1 Homo sapiens inducible T cell costimulator (ICOS), RefSeqGene (LRG_65) on chromosome 2AATATCAATCATACCATTTGGCAGTCACATCTCATGCTGATTTTTTTCACCCC TCATGGAAATATATAATCAGTTTTCTGGGCTTTATGGATTAATTAATAACTTTA AATGAGAAAATATTTGGCTGTCAAAATGGAATATACTTTTGTTTTATGATTAG AGATGGGCAAGTGATGAGAGATGAATCAGGATGATGAATTATATATTTATTCA ATTAATTTCAATGTGAAATACAAACATGTTTTGATAATTTTCTGCTCTCACATT ATGATTCAGAGTGAAAAATTGTCATTGGTGAGCATTCCCAAGGTCATATGGTT	SEQ ID NO: 135 NG_011586.1

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			GAATGTTCTTCCTTTCCCACTCTCACACTTCCCCCAGACAGTGCACCCTGCTCC ATACGTGGGTTTTGTGGAAATAATTTAAAACTTACAGTTGCAGATCATTGCTA GGTTTCCTCTTACAGTATTTCTCTTCTGTTTCAAGAATCCTTTCTTAACACTTAC ATCACATACGTTCAATGACAACATCATTCTGGACATCTGCTCCTGTCTTGTGAT CTCTGTTCTAATCTAATGATCAGAAGACTTCTCTTATTTTCGTTAAATACCCCC AACTCTCTGAATTCCAGTACAGGTAAGGGTGTCTTCCTTTTACCTTGATGAGTG ACTGATATCTTTCCTGGGAATAGGAGTCCTGGATGGCAGCCTTTCTTCTTAGTG GTTGCAGATATTCCTCCACTGTCTGCTGGCTTCTAGGGTTGTGGGTGAAGAGTT TGATGGTAGTCTAACTCTCATTCCTTTGTAAAAAAAAAAAAAACTCTAGAATT TCATAATCTTGAAAGCTATTTACTTCAGTATTGGAATTCAGGAATTCCTCCAGG ATATGTGTAACTCTCTCCCTCTGTTTCTCTTTCTGTGTGTTTCTATTAATTTTTTT TTTGAGGCGGAGTCTCACTCTGTCGCCCAGGCTGGAGTGCAGTGGCGCAATCT CGGCTTACTGCAACCTCCACCTCCCGGGTTGAAGCGATTCTCCTGCCTCAGCCT CCCAAGTAGGTGAGACTACAGGCACCCGCCACCACGCCTGGCTAATTTTTTTG TATTTTTCGTAGAGACGGGGTTTCACCGTGTTAGCCAGGATGGTCTCAATTTCC TGACCTCGTGATCCGCCCACCTCCGCCTCCGCCTCCGCCTCCCAAAGTGCTGG GATTACAGGCGTGAGCCACCGCGCCCCGCTGTTCTATTAATTTATTATTATTTT TTTTAAGACTGGGTGAAAGTTTTCAATCTCTAGACTCAAGCTTTATTCTTCATT TCAGTCATTTTTTTTCCTAGTATTTGTTTAATCATACCTTATGCTGTTTTTCCCCA CTCTTTCTAGAAATGTCTCTTATTCTTATGTAAGATCTTGAGTCCCTTATTTTTT CATCATTTGTGAACAAAATGGCTTTCACAACTTGCTGTTGCTTGTTAACCACAA CTCCTTCAGATGAAATGGATATTTCAGTTTTAAGTTACTAGTAGCATATTCCCA TTTCTTGGTAGAAACAAAATGCAGGCATGTAGGGGGGACTGAAATTCTTATAT TTACTCACTGTAAGATTCATAGCATTATTTGGCTTAAAAAAATTCATCCCAGTA TTCACAGTTGTAAACAGCAAAATCTACAACATATACTGCTTCCCTACTCTAAG AATATTGAGTTTTATATGCAAAATGACTTACTGGGCTTTGCAAATTTTTAAAA ATGAGTTTTAAAATCATTTGTAGCTTGCAATAACTGAAGAAAAGATCACAATT TCTCTGTAAATGGCATCTCAGTACTACTGCTGTTCTAATAAACTAGGTCTGTCA AATGGCACTTTTTGGTCATTCAAAGTGAAAAAAACATGGCATTTGAAACCTTA TAAAAATTCACAATTATATTTTGGAAAGTGGAACTTAAGTATGTAGGGGATAT GTCACACAAATTGAAAGTGTTAGTCAAGAAATGATTTTTTTTTTCAATAGTTTG GCCTGTAAGGTTGACCAAAACAGGTAAAGATTTGCAAGTTTAGAGAGTCAGA AACTGGGGATATGAACTTCCTTCTGGTTCATGTATAACATAATGATGCTTGTAT CTACTTTGCTTGAGGAAAAAAAAGAAACACGTTGTCCCCAAATAGGGTGATA GACCAGGAGTTTCCATCCAGTTGACCACGAGTGTTGTTAGGATCTGTTTATTTG AGTCATGTTGACACAGACACAGCACTTTCAATAAGCAATTAATGATCATTTAA AGGTAACTTTTTTGAATTTGATAAATAGATTTTTTTTACAGCCTGTATTTGTGT TCTTCTAGGACTTTGCAACAAAGAATCTGTACATGCAAAAACAACAATAACAA CAACAAGCTGTCTACTGCACTCACAGTTAAAGTTCTGTTTACTTTGCACTATCT AGGACTAATGCAAAAATCTCATAGATGTGCCTATTTGCACTTATTTAATTATG ATGAAATTTACTTCTATATGTGAATCCATTTCTGTACATTTCTACAGGCAGATA AGTGATGGGAAAATCATTAAGAATTTAGACTTCATCAGAGAAGAACCCAGGT ACAATGACAGCCCAGCTTAATACATGATGGCTGATGAATGAAAATGTCTAGG GAAATGAGTGTGTTATGTACAATGTAATTTCATATCTAAGTCACTTTAAAATA ATTTTTTGATATATAATAACCCTTTCAATCACAGAACACATATGTGGCACCAA TGTGAATACTACTTTAAGTATTAAGGTGATAATATATCCAATATACCTAGAAG GAAAATAAATACCTGAAATTCATTTTCATATCTAGCTTAATGTTAAAAGCTTCT TTTTGTTTTTTTATTTCGTAGCAAATCTCTTTAGCTCTGATGCTTTAGTTTCTGT ACAATGAGAGGATTGGACTAGATTATTAGGTGAAGAGATTAAGTAAGTGTGT GTACCCTGGTGTCAAATTATCTTATTCTTTTTTCTTTGTTTTTGTTGGACTGGGT TAATTCGAAGACCTTGTCTTCAAGCTCTGAATTTCTTTCTTCTAGTTGTTCAATT	

			CTATTGCTGAGACTTTCCAGAGCATTTCACCTTTCTAAAATTGTGTCCAAAGTT TCCTGAAATTTTTATTGTTTTTTCTTTAAGCTATCTATTTCCTTGAATATTTCTG CCTTCACTTCTTGTATCATTTTTTGCATTTCCTTGCATTGGGCTTCACCTTTCTC TGGTCCCTCCCCGATTAGCTTAATAACTAACCTCCTGAATTCTTTTTCAGGTAG ATGAAGAATTTCTTCTTGGTTTGGATCCATTGCTGGTGAACTAGTGTGATTTTT TGGGGGTGTTGAAGAGCCTTGTTTTGTCATATTACCAGAGTTGGTTTTCTGGTT CCTTCTCATTTGGGTAGGTGCTGTCAGAGGGGAGGTCTAGGGCTGAAGGCTGT TCTTCAGATTTTTTTTTTGTCCCATGGAGTGTTCCCTTGATATCATACTTTCCCC TTTTCCTATGTATGTGGCTTCCAGTGAGCCAAACTGCAGTGATTGTTGTCTCTC TTCTGGGTCTAGCCACCCAGCAAATCTACCCGGCTCTGGGCTGGTATTGGGGG TTGTCTGCACAGATTCCTGTGATGTGAACCATCTATGGGTCTCTCAGCCATGG ATACCAGTGCTGTTCTGGTGGAGGTGGCGAAGGGTGCAATGGACTCCATGAG GGCCTTTAGCTTTGGTGGTTTAATGCTCTATTTTTGTGCTGGTTGGCCTCCTGC CAGGAGGTGGCGCTTTCCAGAAAGCATCAGCTGTAATAGTATAGAGAGGGTC TGGTGGTGGGTGGGGCCCTAGAACTCCCAGGATTATATGCCCTTTGTGTTCTG CTAACCAGGGTGGGTAGGGAAGGGCAGGGCTAGGCATGTCTGAGCTCAGACT CTCCTTGGGCAGGTCTTGCTGTGGCTGCTGTGGGGGATGTGGGTGAGATTCCC AGGTCACTGGAGTTGTGTACCTAGGAGGATTATGGCTGCCTCTGCTGAGTCAT GCAGGTTGTCAGGGAAGTGGGGGAAAACCGGCAGTCACAGGTCTCATCCAGA TCCCATGCAAACGGAAGGGCTGGTCTCACTCTAATCATGCCTCCTCTAACCGC CCCAAGTCTGTTTCCAGGCAAAGGGCAAGACTGGCTTGAAAACTTGCCTGAGG CTTTCTGCCTCCCAGCTGTGAAAGAAAAGGGCTTTAGTTTTTCCCCTGCATGTG AAATCTGCATGCTGGATTCACGGCCTCCCCCCAGTTCAGGCCAGGAGACTTCT TGCCCTGTTCAAATAGTTACAAAGTTCAGCTAGAGAATTCCTTCTCCCTGTGG AGTTTTATACCCTGCTCCTCTGGCCACCCTCCAGATGGATCCCTGTGGTGCCTG GCAAGAATGGGCTGCTTGGGGACCCATTGAGCTCCCAGAGCCTTTCTGCAGCT TCCTCTACCCCTGTATTTTGCTCCGTTTGGCTCTCTAACTTGACTCACCTCCAG ATAAAGTCGGAAACTTCTCCACAAACAGACGCTCAGCTTCTCCGGTCAGAGTG TGTGTTTGGGAGAGGAGGGTCTCCCTTTCCCGTGAGTCTTTTCTTTTTGACTGG GAAATAAGTATCTCCCAATCTTCAGTAAATAGGATCTTTGCTCTCCTTTTCCCA CTCCTCTTCTTGGCCCATTACAAAGATATTTACCAAACATGCTTAGCCTTTATA TTCTTCTGTTAATATTAATTCTTTTATTTAATATGATTGAGCTTCCACTATGTTC AAGGTCCTGGGATTTTTTAGGCAACTGTAATGCAGTCCTTATCTTTGTGGAGCT CATGGTTAAATGAGGAAGACAGACAAAAATAATTATGATCCAAGATGCTATG TGCTAAAATATACTGGCCTAAACAAAGTATTATTGGGAGCATAGAAATAAGA GTCTTTGTCTGGTGGTCTTGGAAATAAATATCTCAAGAGAGAAGTTGACATTT AAAATGGTTCTTGAAGAGTGAATGAGAATTTCTTCTCAGATTAAGGGGTAATC AAATATTTTAGTTCATGGTAACAGAAATAATGAAATGTGAAGCATATTCTAGT AGTAAAGAACAGAAGTGTGAAAGAAATGGCCAAAAAGTTCAGTGTGGCTTCA ATAGATGGCCTATGAGATTGTGAAAGCATTTTGTGTCAAGCCAGATATATATA TTTTAAAACACCTTATAAGCAATAGAACACTAATAGAGACTTTTAAACTGGGG AGTGAAATGCTTTTCTGAAACATAATTTTGGGAGCAGCATGGAGGAGGGATG GGGAGGAGAGAGATCAGTATTGAGAAGGCCAGTCAAGAGGATGCTTCCACAG ATAAGGGAAGACATGAAAAAGGTGTGGATTGGCAATGGGAATGGAGAAAAA GAATTGAATTTAAGAGATATTCATGAGCTGGAGTCAACTGGACTTGGTGACCA ATTGGATGATGAAAATCAGAGAGAGGAAGAAATGAGGAAGACTCTGAGGTTC CTAGGGTCAGACTAGTGACTCCCTGAAAAGACAGGGTTTGGATTTGGTGAATG AATACAGTCACGTGCCACTTGACGATGGGAATACATTCTGAGAAATGTGTCCT TAGTGATTTTGTTGTGTGAACATCATCGAGCGTACTGACGCAATGATGTCTAC TAGATGGCAGAGCCTACTGCACTACCTAGGCTATGTGGAGTAGCCTATTGCTT CTAGGCTACAAACCTGTACAGCATGTTACTGTACTGAATACTGCAGGCCATGG	

			TAGCACAATGGTAAATATTTGTGTAACTAAACACATAAAAGGGACATTAAAA ATTTCTGTATTATAATCTTATGGGACCGCCACCATATATACAGTCCATCGTTGA CCAACATGTCATTTATGCAGCGCATGACTGTACTGAGCTCAGTTTGGAAAGGC TATACATGATGTGTTAGGGTAAAACCAGATAGTGATGTTGAAAGGAATTTGGA AACAAGGAACTAGAAGTTTGGGCTGGAGAGAAAATGTGGGCTCCTGGGGGTA GACATGAGAGCTGGAGCCATAGGTGCAAATGAGTTCAGGCAGTGAACACCCT GTCCATGTGCCCAAGGAGTTTTGCACAGTAGCTGAGCAATGGCAAGCAATGTG GGTATTCAGAGGTGTGGATAAAATCCTCTCTCCCTCCCACTCTGTGGAAGAGA GTTGGGTTCATTTAATCTCATATGATTTCCCTAGTACAATAGTTTCAAATCAAA GGCAATGAAGTAACTAACAAAATAACTTGTTTGTAAATTAATTGCTTTGTGAA TATTGATACAAAGTTTTATAATACCACTGGGATTTTTTCATTTTTCATGAAGAA ATCAGTTTTAACTAGGAGAAAATCAATCTTTCATTTTTCTTATTATACACACTT AGAGAACCAAAGGGTTGTTTTGTACCCCCTATGGAGTTCCTTGGAGAGTAAAA CAATGCACACATTGTGTGTGTGTTCATGAGCACTCTTTTGGCTTTTTCTCCTCA CTTTTCTTCTTCCCATTTTTTTTTTTTTGCTTTCTTTTTTTTTTCTCCAAATGTTAG GCATTTAGGTTAGATTGGGTTTATCTTGTCTATCCTCCCTCCCTTCCTTGCCTCA ATTACTTCTTTAGATTATGGGTGCCTTTGAATAGCAATGTAAGTTTAGAAATG ATGCATATATAAAAATCTACTAACCAGGGATCTAAAGGTTTTAGCTGGTAGAC TCATAAGACATGACATTGCTTTTATGAAAGGTGAGAAAAGTGGTAGGAAGTA CTTTTTTTTTTAATGCCAGAATTTCTTAGTAAAACATCAAATATAACTAAAACC TAATATAAACATTGCAATTTTTAGACTTTTGCCTCTTGTGTCACATTCATGTGC TGTGCTAAGCTAACACTTATCATTGTTTGATTACAGAAAATGTGTTTAATAAG CACTATCAATGATTACAAACTCAGGACATCTTATCTTTCCATCACTCTGAGACC TTTGTGGAGGTTTGTGGTTAGAAGTCTGAGTTAAAGAAAATAAAATTACATTT CTGATATCTTGCACGCTCTGCACTGAGTGGGTTCTTTAAATGTTTCCTCCAGAG GATTTTCAACCAGGAACAATACAACTGCTTGCAAAGAGTCCCAGCAGGATGG GTCTGGGCATGAGCATCTTATACTGGTGAAATGAAGTAGTCCAGATATTAAAA GCATCAACTTGCAAATGAACTCATCTGCACTATAGTGCAATTCTCAGGTGAAT GACCTTTTCTTCAGAAATTTTCTTAATAGTCCCCCAAAAGAAGAAGAAAATGT TCTTGTGCTTTATAAATTTTGAAAACCTAAAGAGATCACTTAATATAAAGATTT TTATTTTACTCTTGAAAACATTAGTCTATTGATATCAACAGTAATATTATAAAA ATTATTATTATTATTATTTTTTGAGACGGAGTCTTGCTCTGTTGCCAGGCTGGA GTGCAGTGGTGCAATCTCGGCTCACTGCAACCTCTGACTCCCTGGTTCAAGCG ATTCTCCTGCCTCAGCCTCCTGAGTAGCTGGGATTACAGGCACACACCACCAC GCCCAGCTAATTTTTATATTATTAGTAGAGACGGAGTTTCACCATGTTGGCCA GGATGGTCTCAATCTCTTGACCTCGTGATCCTCCTGCCTCGGCCTCCCAAAGTG CTGGGATTACAGGGCGAGTCACTGCGCCCGGCCTATAAAAATTATTGTTAGCA GCAGTTAACAGTCTTGAGCCTCTACTGGGAAGAATATGCCCTGTTAGACACAG TATTCTATGTGATGAAGAAAATATAGTACCTGTTCTCCAGACTGATTATAATCT AGGGTTTCCAATAAAAAGTAAACAGATATGGTAGCAAAACAAAACCTCATGT TTAATATTCAGATTTTAAGACTCATCACCAGGATCCAAGACCACATATTCCTTT TTGTGATTTTAGTAACATATTAAGTGCTAAAAGATATAAGATGATGTTTATAT CACAAACCACTAACATGCTGTGTTTATAAAACATCTTGGTATATTAGAACAAC CATTGGTCCAGGGGTTCTTGTCCTGGTCATATATTGGGCAAATGTAATGGCTG CGCTTTGGGACATCCAAGTGAGCAACCAGGTTTGTTGCTCACTTGGATGGAAC AAAGTTGTCCTGCCCTCCACAGACATATAAGAGCCAAGAGAATTATCAACTGT CTAAATAAGTATTTATGAACCCAGTGGATATTTGAAGGTAAAGAAAGTTTTTC TTTAAAGCTCAGACAGATAATTTCCATTAGAACATGACATCTCAGTTGGGGTA GTGTCTTGTATGCATGATTGTGTATCTTCATACACTTGTTTCCAGAAGAAAAGC AATAATATGGCATAGCTAACTCTGGGATCATGCCCCAGCTATGAGCTATGTAA TCCTGGGCAAGATAGTCACCTTTTCTGGCTCTAGTTTAATTTGATAAATGCAAA	

			TGGAAAATGCAAAATGAAAGGTTTAACTTGTCATTTCTAGAAGCCCTTTTGGC TCTTATATTATAAATCCTGTGCTTCATCTCCTCAGATTTAAAATGTCACCGTCT ATATATTCATTTGTTCGCCCATCCAACCATGCTTTCATCCATCCAATAAATACT GATTGCAGCTTACAACACACCAGGTATTATTGTAGATACTTGGGATGGATTTG TGAATAAGACCAACAAGGTCCCTGGTTTTAAAGCTTAGAGTGGAGTAGCCAG ACAATAAAGAAGAAAACAATCAGATAAACCAGATAATTTCAGACAGTGATAA ATGCTTTATGTCAGTTAATGTACTAGATAATGACCTGGATATATTCTTTAGATT GGGTGGCCAGTGGTCACTGAAGAAGTGTCATTACTCTTGAACGATGACAAAG AAGCAGCCATGTGAAAATCAGAGAGAATGTTCTAGGTGGAGAAATGAGAAAT TAAAAGCCCTGGGAACCTGCTTTGTGTGTTTGAGGAACAGAAAGAAGGGCAG TGTGACTGTGGTGTAGTGTGTGACTGGTATAAAATGGGGAGAGGTAGGAGAG GTCATGCAAGTCATGGGAAACCAGGGTAAGAACTTAGATTTTACTGTAAGTGG AATGAGAAGCACCTGGAGGTTTTATAAGCAGAACAATGACTCTATTGGATTAT GCATGTAAGAAGGTCATTCTGGTTTCTCTGTGGAGAATGGATTGTAAATGGGC AGGAGTAAAAGCAGAAGCTCTTGTAGTCCCAGAGAGAGATGACAATGGTTTG GACCAGTTGAAGCTGAGATGGAGGAGAAGTGGATAGATTCTGTTGGACATAA AACAGAGGTGCTGGAAATTAGGCGTTCTTCCTGCTCACAGATTTTTAGCACTG GTCCTGTAACACTCAGTTGTTAGTGACCACTGTCTAGCTTCCTGTGGTTGCCTG CTTCTATTATACTTCTGTTGATTGTTGCTAGTGACACTTTGACTGTGGATTGAA CCAAAAATCTTTCATGCACCCAGGAAGCTGTGTGACCTCGGGCAAATAATTTA ATCTGTCTGGGCCTTCAGTTGTCTGTATGTACACAAAAGAGGTCACCAGATCT GACTGTGTATGATGCTGAGAAGAGGTTGAATCATGTTACAGGAAACAAAAAG TGTAAAGCTGAGGGTATTTATAGGATGCCTGAAACATGAAGTGTTGATGAAAT TTATTAGCAATGGAAATGGTATGTTAGGAAGCATGAGGAGCATATCAAAGAT AGTATGAGAGAGGATGTTTTGGAGAAGATTTTATATTAAAGGTGGTATGGGA AGAAAAGGCAAACATGAGAAAAAGGAAGAAAGAACAAGAAGAGAGAGATTG GTAAGGGGAACACTGACAATTTTTAACTACTGGTATGGCAACAGAATTGACCA AATAGATTTGACACCTTACCAATCAGAGCAGACACTATCTATAAAAGTGGTGC TATCTATCATACCAGCATTCCAGGCTGAGTATTAGACTTGGAGATAAGAACAT CCAAGAAGGATGGAGAAAAGATCCTAGATGCTTTTGCAGTTATAAGAAACTA ACGTATTCAGATCTTCCTTAAATTGTCTATCCATTAAATGCTTTAGTCATGGTT ATAAGGGGCAGTCTCCTTTAATACTATTTTCAAATGTTACCAAAGGCTAAGAA GAATTTGTAATTTGTCATTTGAGCATTGTCTTAGTCCATTTTCTGTTGCTATCAC TGAATACCGGAGACTGGGTAATTTATAAAGAAAAGAAATGTATTTCTTACAGT TCTGGAGGCTGGGGCCTAAGTCTAGGGGTCTAGGGGCCTAGGTCTAGGCTGA GGCCTAGGGGCGAAATCTGGTGAGGGCCTTCTTTCTGGTGGGGACACTCATCA GAGGCCCAAGGCAGTACAGAGGATTACATGATGAGGAGGTTCTTGAGAGACA GCCAATCTGGCTGTTTATAACATACTAACTCTCATGATAATTAACCCACTCCTG TGATAACCTATTAATCTGTTAACCCATTAACCCATGAATTGGATTAAGCTATTC ATGGGGGTTCTGCCAATCATCTCTTAAAGGCCCCACCTCCCAATTCTATTACAC TGGGGATTAATTTTCAATATGAGTGTCAGTCAGAGGGGGACAAACATTCAAGC TATAGCAAGCATATCTGTTCTATATCTGCCAAAATAGTTATGAAATAATTAAT TAAATGCTATAGTTAAAAACATTCGAACTGCAGACTTAGAGCTGTCAAGCGGT TTTCCAGATGGAAAGTTTAAACACTGGATATGTGGAAACCTAAGTCAGCCTTC TGATCACTACATTTCATAATAAATAGGCGATCCAGGTAGTTTTTAAGTTAAAG ATAAAAAAATGAGTAATTAAGAGCGTCCAGGCCAGGTGCGGTGGCTCACGCT TATAATCCCAGCACTTTGGGAGGCCAAGGTGGGCGGATCGTGAGGTAAAGAG ATGGAGACCATCCTGGCCAACACGGTGAAACCCTGTCTCTACTAAAAATACAA AAATTAGCTGAGCATGGTGGCATGTGACTGTAGTCCCAGCTACTTGGGAAGCT GAGGCAGCAGAATCGCTTGAACCTAGGAGGCAGAGGTTGCAGTGAGCTGAGA TTGCACCACTGCACTCTAGCCTGCTGGTGACAGAACAAGACTCCATCTCAAAA	

			AAAAAAAAAAGAGTGTCCAATAGAAATGACACTCTGAAATCTTCAGCTGATG TCAGTGGCACACACTCTCAACATGCCATTCAAGAAAAATTGAGGCACGGCATT CCTGGTCCTACCTAAATACTTTTGTGGGCAAGAAAGACAGTCTCCTTTATTTTA ATTTATTCTGACTTTCTGGAATAGCCCATTATGATATTGAGACAGAAAGTGGT TAACAGGAACATTGTTTTCCCTTTGGAAGACTTACCCAACAGCAAAGAATTAG CTCTCTCAGTTGTTTGCAGTCTTATCTGGATATATTCTGATGCTGAATCCAGAG AAAGCAGGTGTTAGAAATAACATTAAGATGTTTTTGTTTCACTTCTTCATTTCA CGGATGAGGAGGCTGAATTCCACAGGGGTACCCTAGCCACAGAGCCTTGCTA GTGGCAGAGCCAGAATTTGCCTCTGGTTTCCTTGGGATCCACTGCAATGCACT TCCACCACACTGCACCGCCAACCATTCATGTCCTCTTGTGTTTGCCACAGTGCG GGCACAATGGGGGAAAAATCTGCTGAGAAAATCATCTTCGGAAGTAGAAGAC AATGCGTCTATGTCTGTGTATACATGGTGACCACAGACGCTTTGGCTCCAAGA TCATTGTGGTTTACTTGCTGCCATTCTAAAGTCTCTGGGAAATTTTTTGTGAAC ATTTCTAAAGGAACTGAGAACCCGTCCACTGATTTTATCTTCTGCAGCAGACG GTAGAGACATACGCATCAAAGCAACAGTGGGGCAACATATTTTACTGTCAGA CAAATAAAGCCCCAAGCAAAATACCCTACGTTTTAATCTAATGTAGACTGCAC CTGTTCTCATGCCAACAGTTTTTTTTCTTTGCCTCTGGATAATATTGTTCCTTC CAGTTTTTAAAACGAAGCAAGTATTATTTTCCTTCTGTATGCTTTTAAACATAC TTGTTATTATAAAACAAAACATACATATAGAAAAGTGAAAAAAATGTATAATT TAATGAATAATGCTAAAGCATACTATCTTACCCTCATAATCACCACAGGTCAA GAAATACAAGACTGTCAGCACCCCTATTTCCTTCTGATTCCAACTCTTTCTCCC TCTTTAGACAAAACCATTAGGCTGAATTTTGTGATACTAATTCAGATTATATTA ACTATTTCTATTTTTTAGTAATTATGGAAGAAATCAAAACATGTATACTTCACT TAGAAAAGTTTCAAATTACATATACCTTCACTATCTTTCTAGACAATGTGCTCT ATATTGACAGATGTTTCTTTTAGCACATTGGAGGTATATGTTATAATTCCACTG TATCAGGGCTTTTATTGTTGATGTTGAAACAGTCTAATAGTTGCTCCTTGGAAG GTAATCAGTCTCTTTTCTCTGGCTGCTTTTAGGATTTTCACTAAGATACATCTA GGTGTGCATACTTTTAAAAAATATGCTTGTGAATTGTTGGGATTCTTGAATCTG TGGAGTGTGACTGGGTTCTAACTAATTTTTCCAACCTATCTGCTGGTTCACCAA TTTTCTCTTTAACTCTGTCTAATATATATTAAACTTATCTATTGAGTTTTAAATC TCAGTGCATTTTTTTGGCCGATTCTTGTAGGTTCTTTTTCAAATTAGTTGACTTA AATTTTCCTGTGTACTACAGATATTATTACAAGTTTTTCTCTTATTTGCTTAAAC ATAATAAGCTTAATTACTTTATTTTGGGGACCTGATAATTCAGGTATATAAATC ATGAGTTTGTTTTTGTAGTTTGTTGTTTCTGTTGTTCCCTTGTTTTCTTGTATGTC TCATTATTTTTGTGATGTGTTTGCCATTGAATGTGAATATTATTTGTATGAAAT TTTTTGAGGCCTAGGATGTAAACCTTTTCTTCTTGTAATAGTTTGCATTTTTACT TTCAAAAGCTGAAGGGTAATAATAATGCAAATCTCCTTAAAGAAAATTCAAG GATTGAGGTTTTCTAACCATTGAAGTCCAGAAGATTTTTCTGGACCATCTAATC TGAATGAGGTCTGGTTTATTTCTTTACCTGTGCTCCAAGAATGTAACTCTTTGG GGTCCCAATTTATTGGGGAGAGGGTTTTCTGCTAGATCACTCACTCTGCAGAT TCTGGGAGTTGAGACATAAAAACAAAAGTTTGAATTTGAAAGAACAGCAATG CTTTCCGAGTAAAAGCAGCTTCCAAGCTTTGCCTGTCTCTCGGGGTTCTGGTTC TCTCTTCAAATTTAGCCTGGTAATTTCTCCTCCTTTGTGTCATTCTTTAATGCTT TTAATAATATTTTTGGACATTTGTTCAACATTTTTGGTTGTTTTGGCGTGAGAA TTAGTTTGAATAATAGGGACTGCTATAACTGAAGACTAGAACACTTGTGCTTA TTTTCACAATCAAATCACCCAAATTGAAGATATATAGGGAAAATATAAATTGA AGCCCAGGGTCATTAAGAAAATAAGTAATTGTGTATCTTAAATAAAATTAAGG CAACTAGTGTAAGTAGAGGTGTGACAAATAGCCCCTCCTGCATAATGCTAATC CTGTTACAAATTTCAGAAAGCAAAATGGCAATACATAGTATTATAACTTTTAA ACATTTTGACCAAATGTCATAATATTTACATAAAAGCAAAATGCTGAAAATAA TCCCAATATCCAACGTTAGTATTTTAGTTTTAACAAATTATGATAGATTAACAT	

			TTTGGCCAATAATATAGTCATTAAAAAGGATAATTATGATGACTAAAAATGAA ATGTTTATGACATAAAATAACAATAGCAGAACACAAAATAACATGTTTGCTAT AAATAATAAGTATGTTTTTGCAAGATAAAGAGCAAAAATATACAAATAGTATT TCTATTTCACTGTAGAACTAGGTAATTTTTTTCCTTAAAATTTTTTTACACTTAC ATAGTTTTCTCAAAAACAAAGACCAAGATTTCAAAACTTAGGAAAAAACCAG CATACTAATAATTTTCCCAAACAATTTCAGCATGAAAATTTGTCATATTAAAA AGGAAAATAAAACAAAAAGAAAGAGAAGGCAATGAGCAGTTTGAATTTATA GTCTAATAACTCAGAATCTGCAACCACCAGGCCAAGGTGATTTCAGTTTTTTC CTTCTGTGATTCCCATGTAGCTTGCAAAAACAACCTTGGCTTCCTATAAGCATA AATTTATTTCAGAAAATGAAAAAGTGGGGCTGGGCATGGTGGTTCACGTCTGT AATCCTAGCACTTTAAGAGGCTGAGGCAGGAGGATTGCTTGAGGCCAGGAGT TCAAGACCAGCCTGGGCAACATAGCAAGACCTGTCTCTACAAAATTTCTTTTT CAAAGTTAGCCAGATATGGTGGTGTGTGCCTGTATTCCCAGCTTCTTGGGAGG CTGAGGCAGGAGGGACCCTTGAGTCAAGGAAGTGGAGGCTACAACGAGCTAG GATCATGCCACTGCACTGTAGCCTGGGGAACAGAGTAAACCCTTTTCTCTGAA AAGAAAAGAAAAGAAAAGAAAGAGAGAGAAAAAGTAAACAAAAATCTGGG GCTTTATCTTTATTATCAGGCCTTGATTCAGTTCTCAGTGGATGAGGTTTGGAG AAAATACATTTCTGTCATTTGAAAATGATTAGTCTGTTCTTTTACTCTTTAGCA GGAGGACATAATGTATGTGTGTATATATGTATGTATATGTATACAATTATTTGT ATATATACACACACATAGTCTCTATATATTGTAATATACATATACATATAATA CATATATTTTAATATATAATATGTAATATACATACATATATAAAATATATATAC AATTATTCATTTTTAAACTACTTCGTACTTTTACAAAGTGAGCAATTTCTATCT TTCCTTTTATCTGCTTTACTGATGTACATCAGTGATTATTTACTCATCAGAAGT ACACATGGTTCTTGTCAGAGTAGTTTGATCAACAGGTAGACAATTCCTTCTCC CCAAGATATACCTACTAATAAATGAAGTTTTTCCTAAACTTCAACTTTTCCCAT ATCTCTCTGTTTAGCTAAGTGCTACTAATCCTTTAATTCCAATTTTAAAACTCA CTTCCTCAAGGCGGCATTTTCTGATTCTATAATCAAAATTATAACCCACCTGAC TCTACCACCTTCATTTAAATAGTACTCCATTCCTATCACAAATTATGTTGCATT ACTACATATTTATTCCTTTACCATCTGCCTCCAATATGAAAGCTACCAAAGGA CAGAGGCCATACCAGTTTGATTCATACACACTATGTAAATATATTATTTAATA TTTAGTATATTCTATATTCACATATGACAAGCAAGTTTCTGGTTAGGATTTTTT TTTCTCTAGGACATAGTTTTATCTTATGTTCTTCCTTGAGGGGTGGAGGGAGAA TGTGAAGCTGTTTCATTTTGGTGCAACAGAGATGACTTTATGCATTGAATAAA TTGCTTTTATGTTAAAATATAATTATTAGGGCAACATTATAAAATGTCACTTTT GCTTTGTTTTCTTTCTTTTTATGCAGGAGAAATCAATGGTTCTGCCAATTATGA GATGTTTATATTTCACAACGGAGGTGTACAAATTTTATGCAAATATCCTGACA TTGTCCAGCAATTTAAAATGCAGTTGCTGAAAGGGGGGCAAATACTCTGCGAT CTCACTAAGACAAAAGGAAGTGGAAACACAGTGTCCATTAAGAGTCTGAAAT TCTGCCATTCTCAGTTATCCAACAACAGTGTCTCTTTTTTTCTATACAACTTGG ACCATTCTCATGCCAACTATTACTTCTGCAACCTATCAATTTTTGATCCTCCTC CTTTTAAAGTAACTCTTACAGGAGGATATTTGCATATTTATGGTAAGACATTG CTTTCATCTTCCAAACTTAAGAGTATATATATGTTTTGACAACTTTTCTCACTA ATAAAATCAATTAGACAAATAAATATCTTTTGTGTTGGAGTTCACTTAGATGC AGTTGATGGTAATCATTTATAATGAAGATATACAGGTGATGATTTACTATTAA TCATAATTAGTATTATTCAGCAATATGCAATGTAATCCCATAGACTGCTAAGT CAGAAATAGATCATATTGCCTTTTAAACACATATGCTATTAAAAATCAGGAAA AACATTAAGACAAATACTTAAACTTATGGCTTAATAATGGGTATTATCTCTAT TCACCTAAGATTTAAGGTTTGGTTTTGCACTGTGTTTGTGGAATGAAGTATGAT GATTGAAAATCATAGTTTTATAACATTACTTTTACTATTACCTCTTTTATAAAA ATATAGGCAGAAAAGCCCTTTCTATTAACCACATTTGTAAATACATTATATGC ATAATCTTTTAAGTTTTAGTTCCTGGATCCTTGCCATAATACTGAGATGATGTT	

			AGTCTAATAACTTGCCCACTTACTGGATTTCATGACTATAATAAAGAAAAGCT TCATTTGATTAAATAGCTCTTTTAAATTTGGTAAGAGAACTTGTGGTTCAGCAG AATTTTTCATTAACATACCTTTTTTTCCAATCCAGAATCACAACTTTGTTGCCA GCTGAAGTTCTGGTTACCCATAGGATGTGCAGCCTTTGTTGTAGTCTGCATTTT GGGATGCATACTTATTTGTTGGCTTACAAAAAAGGTAAGCGATTTCTATCTTTC CTTGTATCTGCTTTACAGATGCACATCAGTGATTATTTCCTCATCAAAAGTACA CATGGCTCTTGTCAGAGTAATTTGACCAACAGGGAGACAATTCCTTCCCCCCA AGACATACCTACTAATTAAACTAATCACTTGGAACAGAAATTTATGTATTTGT TTTATAGCCCACACATTCCAAAGAGGACTTGACTTGATGGCTTACAGAGAGTT ACATTATTATTATTATTGTTCAAACTAGATGAGGAAATTGAGGTCAAGAGAAG ACTAAAGGTCAGGAGGAAGGTTAAAACATCAAAATAGATGACTCTGATTTTT AAAAAATTATTATGCATGGGCTGCGAATTTGAATCCAAGGTTCCTGAGAGGCA GGGCAGAGATGAAACAATTAGTTATAAGTTTTGCTTAGCTGGTAAGTTAAAAA CAGTCAGCAAGAAAGCCTTCTAAGGTGTCAATTGTAGCTGAGAAGGAAATTG ACAACTTTTTTACATGGTAGGTTATTAGACTCCTTGCTTTTAAAGAAAACCACT GAGGAGCTATTTAGAAAGATAAACAACAATGACAACAACAAAAATCTCCCTG TGCTGGGGGATATTCTTTTTGGTCTCTTGCATTACAGGTTCTCAATCAAAGAAC TGACACCACTCTGCATATTACGCGAGTATGCTAGTACTCAAGTATATCCACAG TGTGGTCATTGGCCAGTGTATATCTGTGGGAGAGTGGAATTTGGAAAGAGACA TAAAGAAGGAAGAGAATGAGATAGCGCCCATGGTCTAAGTCTGCTGGGAAAG AAACAATAAAGGCAAAAACGAGGAAGAAAGTTCAGTAGAAAGCTCTTTTTAT GTAAAGCCCTTTTCATATTGTTTTTCTACTTAGCCTAAAGCCAGGAACCTAAGT CACATTATCATGTTTTTGTCACATACCACTTCAACAAAGAATAGAAAACAGTC AAAAAACAAAGAGATGGAGAAGAAAAGATGACCAAGCATGTTTCTGGCTTTT TCTTTCAGAAGTATTCATCCAGTGTGCACGACCCTAACGGTGAATACATGTTC ATGAGAGCAGTGAACACAGCCAAAAAATCTAGACTCACAGGTATGACTCCAT TTGGGGGTTTGGGAAGGGAAGAGGTTTCTTCACAGTAAGCCTGGAATGTTAAT TTTTTTTTTTTTAATTTTAAAGGAAAGGAAAACATCTCCAAGGCCTAATTCTAG AATTTTCTGTGAAAATCTGGATTTCTCACTTTTAACTAGATTTATATTTTCTGC AGTATATTGAAAACAAACAAGCAATAGGTTTGTAAGCCACTATTGAAACTAA ACACACAAACAGCTCATAAACCACCATAGTATCAAGGCAATTTTCCCATTGAT GTTTCAAAAGTTGGGATGATTCTAAGTGTTTTTTGTTGAAGGGTTCATTCAGTC ATTCAATGAGCGTTTATTGAGCATCAGTTAAGTGTGAGTTACTGAGTGAGGCA CTCTGGGGAATTTGGACAGATATATGCTAATTTTGGACTGAGATTAGGAAGAG AGATCTGTGCTGGTACTGCTAGAGGGAAGAAGGAGAAATTGATGAAGATATC TGGTTATTTTGAGGTAAAGAGTGTGCAAGTTTAGAGAACTTGGATGGCTTTAG AAGTCTCAGTAACATGGAAATTTGACCTTTTCTGTTAAGAGTCAGAAAACTGA AAGTTGCCAAGTTTGAGGAGCACCCAGAAAGTTTGAAGCTTCCATTGTGGAAA ATTCATGTCTTATGCCCTTGAGGTTCGAATGATGTGCGATGTGTAATGAGACA GAAGCCACTGCATTTTTCCACCCCTCAGTGGCTACAGATTATCTAAAGGGGAC ACACATAGCTTGCGTTGTCATGGAATTATAGCATGGGATGGGAGCTAAAAAG GATCCTTGAGTTCACATTTCATGTTTTAGATGACAGAAATTGATGCTCAAAGT GTTCAGTGACTCTTTTGGTTCCCTAGACAGTTAATACCTAGCTTTGACACTTGC AAAGAGCTTATGTTTCATTACTTTGCTGTTTAAAAAATATATGATCTCTCAATC TCTTTGCTTAATGTGTTCTGGCTGTTTGGATCCCCACAAGCAGAACCTGACATA AGGACTTGGGTGCAAGTAGTTTATTTGGGAGGTGATCCCAGGAAGAAGGGGT GAGGGGGCAGGGAGAGTGAGACAGCCAACAAGGAGAAGCAAATGAAGGGCG CATTATTATCAAGGTCTCAGCTCCAGGCCACAGAGGCCTGACTTCATTGGACC TCTGAGAAGTGTACAGATGCCTCCCAGAATCATTCTCTTGAAGGATGGCAACC ACTGGCTCCATCCTCACTGATTTGGGGTTGCCTGCGGAGGGCATTAGCTTTCCC TCATCTCTGAGCTGTGCCTCTACTTGGGATGAGCCTACTTGGGATGAGTCTTCA	

			GAGAAAGTCTGGAGGCAGAAAAGCAGTGAAATGCAGTGGGGCTGTTGTGCTA GAACAGTCAGCCCATGCAGCGCTTTCTGCCCCAGCAGCAGCTGCAATCAGAG GTGGACAGTTTCAAAGTGATGAGTTTAGATAATGTCTGTTATAGGAGTCGAGA GCTAAACTTCTCTGGAAATGGGGAACTGGTGCTGGGTGTTGAAGCATAAAGAT GAGTTTGCATGGTGTGTGTGTGAGTGTGTGTGTGTGTGTGTGTGTGCACGTGT GTGTTTGTGTGTATGAAAGGCAATGGAGAGGGGAAAGCTTCTTGTAGGGAAC TGGCACATGGAGAGCATTTAGATAATTTATGCTGAATTTTTGTTACAGATGTG ACCCTATAATATGGAACTCTGGCACCCAGGCATGAAGCACGTTGGCCAGTTTT CCTCAACTTGAAGTGCAAGATTCTCTTATTTCCGGGACCACGGAGAGTCTGAC TTAACTACATACATCTTCTGCTGGTGTTTTGTTCAATCTGGAAGAATGACTGTA TCAGTCAATGGGGATTTTAACAGACTGCCTTGGTACTGCCGAGTCCTCTCAAA ACAAACACCCTCTTGCAACCAGCTTTGGAGAAAGCCCAGCTCCTGTGTGCTCA CTGGGAGTGGAATCCCTGTCTCCACATCTGCTCCTAGCAGTGCATCAGCCAGT AAAACAAACACATTTACAAGAAAAATGTTTTAAAGATGCCAGGGGTACTGAA TCTGCAAAGCAAATGAGCAGCCAAGGACCAGCATCTGTCCGCATTTCACTATC ATACTACCTCTTCTTTCTGTAGGGATGAGAATTCCTCTTTTAATCAGTCAAGGG AGATGCTTCAAAGCTGGAGCTATTTTATTTCTGAGATGTTGATGTGAACTGTA CATTAGTACATACTCAGTACTCTCCTTCAATTGCTGAACCCCAGTTGACCATTT TACCAAGACTTTAGATGCTTTCTTGTGCCCTCAATTTTCTTTTTAAAAATACTT CTACATGACTGCTTGACAGCCCAACAGCCACTCTCAATAGAGAGCTATGTCTT ACATTCTTTCCTCTGCTGCTCAATAGTTTTATATATCTATGCATACATATATAC ACACATATGTATATAAAATTCATAATGAATATATTTGCCTATATTCTCCCTACA AGAATATTTTTGCTCCAGAAAGACATGTTCTTTTCTCAAATTCAGTTAAAATGG TTTACTTTGTTCAAGTTAGTGGTAGGAAACATTGCCCGGAATTGAAAGCAAAT TTATTTTATTATCCTATTTTCTACCATTATCTATGTTTTCATGGTGCTATTAATT ACAAGTTTAGTTCTTTTTGTAGATCATATTAAAATTGCAAACAAAATCATCTTT AATGGGCCAGCATTCTCATGGGGTAGAGCAGAATATTCATTTAGCCTGAAAGC TGCAGTTACTATAGGTTGCTGTCAGACTATACCCATGGTGCCTCTGGGCTTGA CAGGTCAAAATGGTCCCCATCAGCCTGGAGCAGCCCTCCAGACCTGGGTGGA ATTCCAGGGTTGAGAGACTCCCCTGAGCCAGAGGCCACTAGGTATTCTTGCTC CCAGAGGCTGAAGTCACCCTGGGAATCACAGTGGTCTACCTGCATTCATAATT CCAGGATCTGTGAAGAGCACATATGTGTCAGGGCACAATTCCCTCTCATAAAA ACCACACAGCCTGGAAATTGGCCCTGGCCCTTCAAGATAGCCTTCTTTAGAAT ATGATTTGGCTAGAAAGATTCTTAAATATGTGGAATATGATTATTCTTAGCTG GAATATTTTCTCTACTTCCTGTCTGCATGCCCAAGGCTTCTGAAGCAGCCAATG TCGATGCAACAACATTTGTAACTTTAGGTAAACTGGGATTATGTTGTAGTTTA ACATTTTGTAACTGTGTGCTTATAGTTTACAAGTGAGACCCGATATGTCATTAT GCATACTTATATTATCTTAAGCATGTGTAATGCTGGATGTGTACAGTACAGTA CTGAACTTGTAATTTGAATCTAGTATGGTGTTCTGTTTTCAGCTGACTTGGACA ACCTGACTGGCTTTGCACAGGTGTTCCCTGAGTTGTTTGCAGGTTTCTGTGTGT GGGGTGGGGTATGGGGAGGAGAACCTTCATGGTGGCCCACCTGGCCTGGTTG TCCAAGCTGTGCCTCGACACATCCTCATCCCCAGCATGGGACACCTCAAGATG AATAATAATTCACAAAATTTCTGTGAAATCAAATCCAGTTTTAAGAGGAGCCA CTTATCAAAGAGATTTTAACAGTAGTAAGAAGGCAAAGAATAAACATTTGAT ATTCAGCAACTGAAAATACCTCACTGTGTTTTCTTGGGGGGAGCAGGGAATTG ATTACCTTAGCTAGCATGTACAAATTTGACATTGTACTTGAAGATAGTTACATT GCTTGGAACAGTTGCTTTCTTTCTTTTTTTTTTTTAAATTTTGAAATAGCCACAA ACTTATAAAACAGTTGGAAGCACAGCAAAAGGACTGTTCTTTTCCTGAGTAAG TTTCTGATCTAATGTCCTATCACCTTTGAATGGTATTTTTTACAAACAAGAACA CTGTCCTTCCTAACCATAGTATAGCCTTCAGAAAATTAACATTGATACATTGCT ACCATCCAATCCTCAGAGCGCCTTCAACATTAGCCCTGTGCATTTAGTTGATAT	

			GTTTCATGCGCGTCTGTGTGAAGAGACCACCAAACAGGCTTTGTGTGAGCAAT AAAGCTGTTTATTTCACCTGGGTGCAGGTGAGTTGAGTCCGAAAAGAGAGTCA GCGAAGGGAGATGGGGTGGGGCCGTTTTATAGAATTTGGGTACGTAAAGGAA AATTACATTCAAAGGGGGGTTGTTCTCTGGCGGGCAGAGTGGGGGTCACAAG GTGCTCAGTAGGGGAGCTTTTGAGCCAGGATGAGCCAGAAGAAGGAATTTCA CAAGACGATGTCATCAGTTAAGGCAGGAACAGGCCATTTTCACTTCTTTTATG GTGGAATGTCATCAGTTAAGGCAGGAACCGGCCATCTGGATGTGCACGTGCA GGTCACAGGGGATATGATGGCTTAGCTTGGGCTCAGAGGCCTGACATTCCTGT CTTCTTATATTAATAAGAAAAATAAAACGAAATAGTGGTAAAGTGTTGGGATG TCGAAAATTTTTGGGGGTGATATGGAGAGATAATGGGTGATGTTTCTCAGGGC TGCTTTGAGCGGGATTAGGGGCGGCGTGGGAACCTACAGTGGGAGAGATTAA GCTGAAGGAAGATTTTGTGGTAAGGGGTGATATTGTGGGGTTGTTAGAAGAA ACATTTTTCATTTAGAATTATTGGTGATGGCCTGGATACGGTTTTGTATGAATT GAAAAACTAAACGGAATAAGAGAAGGAGAAAAACAGGTATTAAAGGTCTAA GAATTGGGAGGACCCGGGACATCTAATTAGAGAGTGCCTAAGGAGGTTCAGC ATAGCCTTGCCAGTAAAGATTATTTATTTACTTCAAGAGCTAAGAGTGGCAGT TTGGGGATAGCACCAGGGGATATCAGCTGTGATGACTTGGAGAAACAGTGTA AACCGGCAGTGTAAACAAGAGCAGGGCATGTATGAGTAGCTGAGAACGGTGA ATAGGAGTGTGACTAGACAGAAGATGGTAGGGATGACAAGTTTTTCTGGGGC ACAGTCTAAGTTAGTCTGGTGTCTGGAATGAGACTGGGGCCTAATAAAGAGG AGCATCCATACAGGAGCTCAAATGGGCTGTACGCTGTAGCATTCTGAGGACA GGTCTGACTTCTGAGAAGGGAAAGTGGTAAAAGTATTGTCTAGTCCTTTTTAA GTTGGTGGCTGAGCTTGGTGAGGTGTGTTTTTAAAAGACCATTAGTCTGTTCTA CTTTTCCTGAAGACTGAGGACCGTAAGGGATATAAAGGTTTCACTGAATACTA AGAGCTTGAAAAACTGCTTGGCTGATTTGACTAATAAAGGCTGGTCTGTTATC AGACTGTATAGAGGTGGGAAGGCTAAACTGAGGAATTATGTCTGACAGAAGG GAAGAAATGACTGCGGTGGCCTTCTCAGACCCTGTAGGAAAGGACTCTACCTA TATAGTGAAAGTGTCTACCTAGACTAAGAGATATTTTAGTTATCTGACTCGGG GCATGTTGAGTAAAGCTAATTTGCCAGTCCTGGGTGGGGGCAAATCCTCGAGC TTGATGTGTAGGGAAGGGAGGGGGCCTGAATAATCCCTGAGGAGTAGTAGAA TAGCAGATGGAACACTGAGAAGTTATTTCCTTGAGGATAGATTTCCACGATGG AAAGGAAATG	
57	IFNG	>NP_000610.2 interferon gamma precursor [Homo sapiens] MKYTSYILAFQLC IVLGSLGCYCQDP YVKEAENLKKYF NAGHSDVADNGT LFLGILKNWKEES DRKIMQSQIVSFY FKLFKNFKDDQSI QKSVETIKEDMNV KFFNSNKKKRDDF EKLTNYSVTDLNV QRKAIHELIQVMA ELSPAAKTGKRKR SQMLFRGRRASQ	SEQ ID NO: 107 >NM_000619.2 Homo sapiens interferon gamma (IFNG), mRNA CACATTGTTCTGATCATCTGAAGATCAGCTATTAGAAGAGAAAGATCAGTTAA GTCCTTTGGACCTGATCAGCTTGATACAAGAACTACTGATTTCAACTTCTTTGG CTTAATTCTCTCGGAAACGATGAAATATACAAGTTATATCTTGGCTTTTCAGCT CTGCATCGTTTTGGGTTCTCTTGGCTGTTACTGCCAGGACCCATATGTAAAAGA AGCAGAAAACCTTAAGAAATATTTTAATGCAGGTCATTCAGATGTAGCGGATA ATGGAACTCTTTTCTTAGGCATTTTGAAGAATTGGAAAGAGGAGAGTGACAGA AAAATAATGCAGAGCCAAATTGTCTCCTTTTACTTCAAACTTTTTAAAAACTTT AAAGATGACCAGAGCATCCAAAAGAGTGTGGAGACCATCAAGGAAGACATG AATGTCAAGTTTTTCAATAGCAACAAAAAGAAACGAGATGACTTCGAAAAGC TGACTAATTATTCGGTAACTGACTTGAATGTCCAACGCAAAGCAATACATGAA CTCATCCAAGTGATGGCTGAACTGTCGCCAGCAGCTAAAACAGGGAAGCGAA AAAGGAGTCAGATGCTGTTTCGAGGTCGAAGAGCATCCCAGTAATGGTTGTCC TGCCTGCAATATTTGAATTTTAAATCTAAATCTATTTATTAATATTTAACATTA TTTATATGGGGAATATATTTTTAGACTCATCAATCAAATAAGTATTTATAATAG CAACTTTTGTGTAATGAAAATGAATATCTATTAATATATGTATTATTTATAATT CCTATATCCTGTGACTGTCTCACTTAATCCTTTGTTTTCTGACTAATTAGGCAA GGCTATGTGATTACAAGGCTTTATCTCAGGGGCCAACTAGGCAGCCAACCTAA	SEQ ID NO: 136 NG_015840.1

			GCAAGATCCCATGGGTTGTGTGTTTATTTCACTTGATGATACAATGAACACTT ATAAGTGAAGTGATACTATCCAGTTACTGCCGGTTTGAAAATATGCCTGCAAT CTGAGCCAGTGCTTTAATGGCATGTCAGACAGAACTTGAATGTGTCAGGTGAC CCTGATGAAAACATAGCATCTCAGGAGATTTCATGCCTGGTGCTTCCAAATAT TGTTGACAACTGTGACTGTACCCAAATGGAAAGTAACTCATTTGTTAAAATTA TCAATATCTAATATATATGAATAAAGTGTAAGTTCACAACAAAAAAAAAAAA AAAAAAAAAAAAAAAAAA	
58	GZMB	>NP_004122.2 granzyme B isoform 1 preproprotein [Homo sapiens] MQPILLLLAFLLLP RADAGEIIGGHEA KPHSRPYMAYLMI WDQKSLKRCGGF LIRDDFVLTAAHC WGSSINVTLGAHN IKEQEPTQQFIPVK RPIPHPAYNPKNFS NDIMLLQLERKAK RTRAVQPLRLPSN KAQVKPGQTCSV AGWGQTAPLGKH SHTLQEVKMTVQ EDRKCESDLRHYY DSTIELCVGDPEIK KTSFKGDSGGPLV CNKVAQGIVSYGR NNGMPPRACTKV SSFVHWIKKTMKR Y	SEQ ID NO: 108 >NM_004131.5 Homo sapiens granzyme B (GZMB), transcript variant 1, mRNA GGGGAACATGAAGTCACTGAGCCTGCTCCACCTCTTTCCTCTCCCAAGAGCTA AAAGAGAGCAAGGAGGAAACAACAGCAGCTCCAACCAGGGCAGCCTTCCTGA GAAGATGCAACCAATCCTGCTTCTGCTGGCCTTCCTCCTGCTGCCCAGGGCAG ATGCAGGGGAGATCATCGGGGGACATGAGGCCAAGCCCCACTCCCGCCCCTA CATGGCTTATCTTATGATCTGGGATCAGAAGTCTCTGAAGAGGTGCGGTGGCT TCCTGATACGAGACGACTTCGTGCTGACAGCTGCTCACTGTTGGGGAAGCTCC ATAAATGTCACCTTGGGGGCCCACAATATCAAAGAACAGGAGCCGACCCAGC AGTTTATCCCTGTGAAAAGACCCATCCCCCATCCAGCCTATAATCCTAAGAAC TTCTCCAACGACATCATGCTACTGCAGCTGGAGAGAAAGGCCAAGCGGACCA GAGCTGTGCAGCCCCTCAGGCTACCTAGCAACAAGGCCCAGGTGAAGCCAGG GCAGACATGCAGTGTGGCCGGCTGGGGGCAGACGGCCCCCCTGGGAAAACAC TCACACACACTACAAGAGGTGAAGATGACAGTGCAGGAAGATCGAAAGTGCG AATCTGACTTACGCCATTATTACGACAGTACCATTGAGTTGTGCGTGGGGGAC CCAGAGATTAAAAAGACTTCCTTTAAGGGGGACTCTGGAGGCCCTCTTGTGTG TAACAAGGTGGCCCAGGGCATTGTCTCCTATGGACGAAACAATGGCATGCCTC CACGAGCCTGCACCAAAGTCTCAAGCTTTGTACACTGGATAAAGAAAACCAT GAAACGCTACTAACTACAGGAAGCAAACTAAGCCCCCGCTGTAATGAAACAC CTTCTCTGGAGCCAAGTCCAGATTTACACTGGGAGAGGTGCCAGCAACTGAAT AAATACCTCTTAGCTGAGTGGAAAAAAAAAAAAAAAAA	SEQ ID NO: 137 NG_028340.1
59	IDO1	>NP_002155.1 indoleamine 2,3- dioxygenase 1 [Homo sapiens] MAHAMENSWTIS KEYHIDEEVGFAL PNPQENLPDFYND WMFIAKHLPDLIE SGQLRERVEKLN MLSIDHLTDHKSQ RLARLVLGCITMA YVWGKGHGDVR KVLPRNIAVPYCQ LSKKLELPPILVYA DCVLANWKKKDP NKPLTYENMDVL FSFRDGDCSKGFF LVSLLVEIAAASAI	SEQ ID NO: 109 >NM_002164.5 Homo sapiens indoleamine 2,3-dioxygenase 1 (IDO1), mRNA AATTTCTCACTGCCCCTGTGATAAACTGTGGTCACTGGCTGTGGCAGCAACTA TTATAAGATGCTCTGAAAACTCTTCAGACACTGAGGGGCACCAGAGGAGCAG ACTACAAGAATGGCACACGCTATGGAAAACTCCTGGACAATCAGTAAAGAGT ACCATATTGATGAAGAAGTGGGCTTTGCTCTGCCAAATCCACAGGAAAATCTA CCTGATTTTTATAATGACTGGATGTTCATTGCTAAACATCTGCCTGATCTCATA GAGTCTGGCCAGCTTCGAGAAAGAGTTGAGAAGTTAAACATGCTCAGCATTG ATCATCTCACAGACCACAAGTCACAGCGCCTTGCACGTCTAGTTCTGGGATGC ATCACCATGGCATATGTGTGGGGCAAAGGTCATGGAGATGTCCGTAAGGTCTT GCCAAGAAATATTGCTGTTCCTTACTGCCAACTCTCCAAGAAACTGGAACTGC CTCCTATTTTGGTTTATGCAGACTGTGTCTTGGCAAACTGGAAGAAAAAGGAT CCTAATAAGCCCCTGACTTATGAGAACATGGACGTTTTGTTCTCATTTCGTGAT GGAGACTGCAGTAAAGGATTCTTCCTGGTCTCTCTATTGGTGGAAATAGCAGC TGCTTCTGCAATCAAAGTAATTCCTACTGTATTCAAGGCAATGCAAATGCAAG AACGGGACACTTTGCTAAAGGCGCTGTTGGAAATAGCTTCTTGCTTGGAGAAA GCCCTTCAAGTGTTTCACCAAATCCACGATCATGTGAACCCAAAAGCATTTTT CAGTGTTCTTCGCATATATTTGTCTGGCTGGAAAGGCAACCCCCAGCTATCAG ACGGTCTGGTGTATGAAGGGTTCTGGGAAGACCCAAAGGAGTTTGCAGGGGG	SEQ ID NO: 138 NG_028155.1

		KVIPTVFKAMQM QERDTLLKALLEI ASCLEKALQVFHQ IHDHVNPKAFFSV LRIYLSGWKGNPQ LSDGLVYEGFWE DPKEFAGGSAGQS SVFQCFDVLLGIQ QTAGGGHAAQFL QDMRRYMPPAHR NFLCSLESNPSVRE FVLSKGDAGLREA YDACVKALVSLRS YHLQIVTKYILIPA SQQPKENKTSEDP SKLEAKGTGGTDL MNFLKTVRSTTEK SLLKEG	CAGTGCAGGCCAAAGCAGCGTCTTTCAGTGCTTTGACGTCCTGCTGGGCATCC AGCAGACTGCTGGTGGAGGACATGCTGCTCAGTTCCTCCAGGACATGAGAAG ATATATGCCACCAGCTCACAGGAACTTCCTGTGCTCATTAGAGTCAAATCCCT CAGTCCGTGAGTTTGTCCTTTCAAAAGGTGATGCTGGCCTGCGGGAAGCTTAT GACGCCTGTGTGAAAGCTCTGGTCTCCCTGAGGAGCTACCATCTGCAAATCGT GACTAAGTACATCCTGATTCCTGCAAGCCAGCAGCCAAAGGAGAATAAGACC TCTGAAGACCCTTCAAAACTGGAAGCCAAAGGAACTGGAGGCACTGATTTAA TGAATTTCCTGAAGACTGTAAGAAGTACAACTGAGAAATCCCTTTTGAAGGAA GGTTAATGTAACCCAACAAGAGCACATTTTATCATAGCAGAGACATCTGTATG CATTCCTGTCATTACCCATTGTAACAGAGCCACAAACTAATACTATGCAATGT TTTACCAATAATGCAATACAAAAGACCTCAAAATACCTGTGCATTTCTTGTAG GAAAACAACAAAAGGTAATTATGTGTAATTATACTAGAAGTTTTGTAATCTGT ATCTTATCATTGGAATAAAATGACATTCAATAAATAAAAATGCATAAGATATA TTCTGTCGGCTGGGCGCGGTGGCTCACGCCTGTAATCCCAGCACTTTGGGAGG CCGAGGCGGGCGGATCACAAGGTCAGGAGATCGAGACCATCTTGGCTAACAC GGTGAAACCCCGTCTCTACTAAAAATACAAAAAATTAGCCGGGCGCGGTGGC GGGCACCTGTAGTCCCAGCTACTCGGGAGGCTGAGGCAGGAGAATGGCGTGA ACCTGGGAGGCGGAGCTTGCAGTGAGCCAAGATTGTGCCACTGCAATCCGGC CTGGGCTAAAGAGCGGGACTCCGTCTCAAAAAAAAAAAAAAAAAGATATATT CTGTCATAATAAATAAAAATGCATAAGATATAAAAAAAAAAAAAA	
60	NKG7	>NP_005592.1 protein NKG7 [Homo sapiens] MELCRSLALLGGS LGLMFCLIALSTD FWFEAVGPTHSAH SGLWPTGHGDIIS GYIHVTQTFSIMA VLWALVSVSFLVL SCFPSLFPPGHGPL VSTTAAFAAAISM VVAMAVYTSERW DQPPHPQIQTFFS WSFYLGWVSAILL LCTGALSLGAHCG GPRPGYETL	SEQ ID NO: 110 >NM_005601.3 Homo sapiens natural killer cell granule protein 7 (NKG7), mRNA TCATGTGACAAAGCGCAGGACCCCTCACTGCCCCAACTGCTTGCTGTTCTCTCT TTCTTGGGCTCTAAGGACCCAGGAGTCTGGGTGCACAGCCTCCTTCTCTCTGA GATTCAAGAGTCTGATCAGCAGCCTCTTCCTCCTCCAGGACCCAGAAGCCCTG AGCTTATCCCCATGGAGCTCTGCCGGTCCCTGGCCCTGCTGGGGGGCTCCCTG GGCCTGATGTTCTGCCTGATTGCTTTGAGCACCGATTTCTGGTTTGAGGCTGTG GGTCCCACCCACTCAGCTCACTCGGGCCTCTGGCCAACAGGGCATGGGGACAT CATATCAGGCTACATCCACGTGACGCAGACCTTCAGCATTATGGCTGTTCTGT GGGCCCTGGTGTCCGTGAGCTTCCTGGTCCTGTCCTGCTTCCCCTCACTGTTCC CCCCAGGCCACGGCCCGCTTGTCTCAACCACCGCAGCCTTTGCTGCAGCCATC TCCATGGTGGTGGCCATGGCGGTGTACACCAGCGAGCGGTGGGACCAGCCTC CACACCCCCAGATCCAGACCTTCTTCTCCTGGTCCTTCTACCTGGGCTGGGTCT CAGCTATCCTCTTGCTCTGTACAGGTGCCCTGAGCCTGGGTGCTCACTGTGGC GGTCCCCGTCCTGGCTATGAAACCTTGTGAGCAGAAGGCAAGAGCGGCAAGA TGAGTTTTGAGCGTTGTATTCCAAAGGCCTCATCTGGAGCCTCGGGAAAGTCT GGTCCCACATCTGCCCGCCCTTCCAGCCCTTCCCCAGCCCCTCCTCTTGTTTCT TCATTCATTCAACAAAATTTGGCTGGAA	
61	PRF1	>NP_001076585.1 perforin-1 precursor [Homo sapiens] MAARLLLLGILLL LLPLPVPAPCHTA ARSECKRSHKFVP GAWLAGEGVDVT SLRRSGSFPVDTQ RFLRPDGTCTLCE NALQEGTLQRLPL ALTNWRAQGSGC QRHVTRAKVSSTE	SEQ ID NO: 111 >NM_001083116.2 Homo sapiens perforin 1 (PRF1), transcript variant 2, mRNA GGGGCAGGAAGTAGAAGTGATGTGAGTGGTGGCTGGTGCAAGGAGCCACAGT GGGCTGCCTGGGGGGCTGATGCCACCATTCCAGGAGCCTCGGTGAAGAGAGG ATATCCATCTGTGTAGCCGCTTCTCTATACGGGATTCCAGAGCCCAAGTGCCC CCTGTCTCTGCAGCTCCATGGCAGCCCGTCTGCTCCTCCTGGGCATCCTTCTCC TGCTGCTGCCCCTGCCCGTCCCTGCCCCGTGCCACACAGCCGCACGCTCAGAG TGCAAGCGCAGCCACAAGTTCGTGCCTGGTGCATGGCTGGCCGGGGAGGGTG TGGACGTGACCAGCCTCCGCCGCTCGGGCTCCTTCCCAGTGGACACACAAAGG TTCCTGCGGCCCGACGGCACCTGCACCCTCTGTGAAAATGCCCTACAGGAGGG CACCCTCCAGCGCCTGCCTCTGGCGCTCACCAACTGGCGGGCCCAGGGCTCTG GCTGCCAGCGCCATGTAACCAGGGCCAAAGTCAGCTCCACTGAAGCTGTGGC CCGGGATGCGGCTCGTAGCATCCGCAACGACTGGAAGGTCGGGCTGGACGTG	SEQ ID NO: 139 NG_009615.1

		AVARDAARSIRND WKVGLDVTPKPT SNVHVSVAGSHSQ AANFAAQKTHQD QYSFSTDTVECRF YSFHVVHTPPLHP DFKRALGDLPHHF NASTQPAYLRLIS NYGTHFIRAVELG GRISALTALRTCEL ALEGLTDNEVEDC LTVEAQVNIGIHG SISAEAKACEEKK KKHKMTASFHQT YRERHSEVVGGH HTSINDLLFGIQAG PEQYSAWVNSLPG SPGLVDYTLEPLH VLLDSQDPRREAL RRALSQYLTDRAR WRDCSRPCPPGRQ KSPRDPCQCVCHG SAVTTQDCCPRQR GLAQLEVTFIQAW GLWGDWFTATDA YVKLFFGGQELRT STVWDNNNPIWS VRLDFGDVLLATG GPLRLQVWDQDS GRDDDLLGTCDQ APKSGSHEVRCNL NHGHLKFRYHAR CLPHLGGGTCLDY VPQMLLGEPPGNR SGAVW	ACTCCTAAGCCCACCAGCAATGTGCATGTGTCTGTGGCCGGCTCACACTCACA GGCAGCCAACTTTGCAGCCCAGAAGACCCACCAGGACCAGTACAGCTTCAGC ACTGACACGGTGGAGTGCCGCTTCTACAGTTTCCATGTGGTACACACTCCCCC GCTGCACCCTGACTTCAAGAGGGCCCTCGGGGACCTGCCCCACCACTTCAACG CCTCCACCCAGCCCGCCTACCTCAGGCTTATCTCCAACTACGGCACCCACTTC ATCCGGGCTGTGGAGCTGGGTGGCCGCATATCGGCCCTCACTGCCCTGCGCAC CTGCGAGCTGGCCCTGGAAGGGCTCACGGACAACGAGGTGGAGGACTGCCTG ACTGTCGAGGCCCAGGTCAACATAGGCATCCACGGCAGCATCTCTGCCGAAG CCAAGGCCTGTGAGGAGAAGAAGAAGAAGCACAAGATGACGGCCTCCTTCCA CCAAACCTACCGGGAGCGCCACTCGGAAGTGGTTGGCGGCCATCACACCTCC ATTAACGACCTGCTGTTCGGGATCCAGGCCGGGCCCGAGCAGTACTCAGCCTG GGTAAACTCGCTGCCCGGCAGCCCTGGCCTGGTGGACTACACCCTGGAACCCC TGCACGTGCTGCTGGACAGCCAGGACCCGCGGCGGGAGGCACTGAGGAGGGC CCTGAGTCAGTACCTGACGGACAGGGCTCGCTGGAGGGACTGCAGCCGGCCG TGCCCACCAGGGCGGCAGAAGAGCCCCCGAGACCCATGCCAGTGTGTGTGCC ATGGCTCAGCGGTCACCACCCAGGACTGCTGCCCTCGGCAGAGGGGCCTGGC CCAGCTGGAGGTGACCTTCATCCAAGCATGGGGCCTGTGGGGGGACTGGTTCA CTGCCACGGATGCCTATGTGAAGCTCTTCTTTGGTGGCCAGGAGCTGAGGACG AGCACCGTGTGGGACAATAACAACCCCATCTGGTCAGTGCGGCTGGATTTTGG GGATGTGCTCCTGGCCACAGGGGGGCCCCTGAGGTTGCAGGTCTGGGATCAG GACTCTGGCAGGGACGATGACCTCCTTGGCACCTGTGATCAGGCTCCCAAGTC TGGTTCCCATGAGGTGAGATGCAACCTGAATCATGGCCACCTAAAATTCCGCT ATCATGCCAGGTGCTTGCCCCACCTGGGAGGAGGCACCTGCCTGGACTATGTC CCCCAAATGCTTCTGGGGGAGCCTCCAGGAAACCGGAGTGGGGCCGTGTGGT GAGAACAGTGAGCTTGGAAAGGACCAGTATGCTTGGACTGAAGGGGTTCTCA CAGTGGGAGCCAGGGCTGTCTTCGTATTCCCATTAGACCAAGCTTGTCCAACC CGAGGCCCGCATGCGGCCCAGGATGGCTTTGAATGCGGCCCAACGCAAATTC GCAAACTTTCTTAAAACATTATGAGTTTCTTTTTGCTATTTTTTTTTTTTTTTA GCTCATCGGCTATCGTTAGTGCTAGTGGATTTTACATGTGGCCCAACACAATT CTTCTTCCAACGTGGCCCAGAGAAGCCAAAAGATTGGATACGCATCAGACAG ATGGAAAAGGGAGATTCAGACTGTTTTTCAGGGAGGTGGCTGGGTTTACACGC TAATCCCGATTCACCCTGTCCAAACTGCCTAAGCCCTCCGCCATTCTCAAGCCC TGCAGTCACAGCTACACAGATCACAGCTTCAGCCAGGAGCTGGGCAGAAGGC CAAGAGGCTGTTCCCACCAGGCTGCTCAGGGCTGGTCTTTTAGGACCCTTCCC TTGAGCCCTCTATGGTGTGGCAAAGCCTTCATTGCCTTAACTGGAGCCCCATC AGCTCCAGCTGCTCTGTCTTCTTTGCCCACAATGCTTTGCCCCTGAGACAAATG GAGGCCTGTCCTGACCTGTCTCACCATGTACATAGCTTGATAAAGGGCCAATA AATATGATGTTATGGTGAAAAAAAAAAAAAAAAAAAAA	
62	CCL5	>NP_002976.2 C-C motif chemokine 5 isoform 1 precursor [Homo sapiens] MKVSAAALAVILI ATALCAPASASPY SSDTTPCCFAYIAR PLPRAHIKEYFYTS GKCSNPAVVFVTR KNRQVCANPEKK WVREYINSLEMS	SEQ ID NO: 112 >NM_002985.2 Homo sapiens C-C motif chemokine ligand 5 (CCL5), transcript variant 1, mRNA GCTGCAGAGGATTCCTGCAGAGGATCAAGACAGCACGTGGACCTCGCACAGC CTCTCCCACAGGTACCATGAAGGTCTCCGCGGCAGCCCTCGCTGTCATCCTCA TTGCTACTGCCCTCTGCGCTCCTGCATCTGCCTCCCCATATTCCTCGGACACCA CACCCTGCTGCTTTGCCTACATTGCCCGCCCACTGCCCCGTGCCCACATCAAG GAGTATTTCTACACCAGTGGCAAGTGCTCCAACCCAGCAGTCGTCTTTGTCAC CCGAAAGAACCGCCAAGTGTGTGCCAACCCAGAGAAGAAATGGGTTCGGGAG TACATCAACTCTTTGGAGATGAGCTAGGATGGAGAGTCCTTGAACCTGAACTT ACACAAATTTGCCTGTTTCTGCTTGCTCTTGTCCTAGCTTGGGAGGCTTCCCCT CACTATCCTACCCCACCCGCTCCTTGAAGGGCCCAGATTCTACCACACAGCAG CAGTTACAAAAACCTTCCCCAGGCTGGACGTGGTGGCTCACGCCTGTAATCCC	SEQ ID NO: 140 NG_015990.1

			AGCACTTTGGGAGGCCAAGGTGGGTGGATCACTTGAGGTCAGGAGTTCGAGA CCAGCCTGGCCAACATGATGAAACCCCATCTCTACTAAAAATACAAAAAATTA GCCGGGCGTGGTAGCGGGCGCCTGTAGTCCCAGCTACTCGGGAGGCTGAGGC AGGAGAATGGCGTGAACCCGGGAGGCGGAGCTTGCAGTGAGCCGAGATCGCG CCACTGCACTCCAGCCTGGGCGACAGAGCGAGACTCCGTCTCAAAAAAAAAA AAAAAAAAAAAAATACAAAAATTAGCCGGGCGTGGTGGCCCACGCCTGTAAT CCCAGCTACTCGGGAGGCTAAGGCAGGAAAATTGTTTGAACCCAGGAGGTGG AGGCTGCAGTGAGCTGAGATTGTGCCACTTCACTCCAGCCTGGGTGACAAAGT GAGACTCCGTCACAACAACAACAACAAAAAGCTTCCCCAACTAAAGCCTAGA AGAGCTTCTGAGGCGCTGCTTTGTCAAAAGGAAGTCTCTAGGTTCTGAGCTCT GGCTTTGCCTTGGCTTTGCCAGGGCTCTGTGACCAGGAAGGAAGTCAGCATGC CTCTAGAGGCAAGGAGGGGAGGAACACTGCACTCTTAAGCTTCCGCCGTCTCA ACCCCTCACAGGAGCTTACTGGCAAACATGAAAAATCGGCTTACCATTAAAGT TCTCAATGCAACCATAAAAAAAAAA	
63	IL2RG	>NP_000197.1 cytokine receptor common subunit gamma precursor [Homo sapiens] MLKPSLPFTSLLFL QLPLLGVGLNTTI LTPNGNEDTTADF FLTTMPTDSLSVS TLPLPEVQCFVFN VEYMNCTWNSSS EPQPTNLTLHYWY KNSDNDKVQKCS HYLFSEEITSGCQL QKKEIHLYQTFVV QLQDPREPRRQAT QMLKLQNLVIPW APENLTLHKLSES QLELNWNNRFLN HCLEHLVQYRTD WDHSWTEQSVDY RHKFSLPSVDGQK RYTFRVRSRFNPL CGSAQHWSEWSH PIHWGSNTSKENP FLFALEAVVISVGS MGLIISLLCVYFW LERTMPRIPTLKN LEDLVTEYHGNFS AWSGVSKGLAES LQPDYSERLCLVS EIPPKGGALGEGP GASPCNQHSPYW APPCYTLKPET	SEQ ID NO: 113 >NM_000206.2 Homo sapiens interleukin 2 receptor subunit gamma (IL2RG), mRNA AGAGGAAACGTGTGGGTGGGGAGGGGTAGTGGGTGAGGGACCCAGGTTCCTG ACACAGACAGACTACACCCAGGGAATGAAGAGCAAGCGCCATGTTGAAGCCA TCATTACCATTCACATCCCTCTTATTCCTGCAGCTGCCCCTGCTGGGAGTGGGG CTGAACACGACAATTCTGACGCCCAATGGGAATGAAGACACCACAGCTGATT TCTTCCTGACCACTATGCCCACTGACTCCCTCAGTGTTTCCACTCTGCCCCTCC CAGAGGTTCAGTGTTTTGTGTTCAATGTCGAGTACATGAATTGCACTTGGAAC AGCAGCTCTGAGCCCCAGCCTACCAACCTCACTCTGCATTATTGGTACAAGAA CTCGGATAATGATAAAGTCCAGAAGTGCAGCCACTATCTATTCTCTGAAGAAA TCACTTCTGGCTGTCAGTTGCAAAAAAAGGAGATCCACCTCTACCAAACATTT GTTGTTCAGCTCCAGGACCCACGGGAACCCAGGAGACAGGCCACACAGATGC TAAAACTGCAGAATCTGGTGATCCCCTGGGCTCCAGAGAACCTAACACTTCAC AAACTGAGTGAATCCCAGCTAGAACTGAACTGGAACAACAGATTCTTGAACC ACTGTTTGGAGCACTTGGTGCAGTACCGGACTGACTGGGACCACAGCTGGACT GAACAATCAGTGGATTATAGACATAAGTTCTCCTTGCCTAGTGTGGATGGGCA GAAACGCTACACGTTTCGTGTTCGGAGCCGCTTTAACCCACTCTGTGGAAGTG CTCAGCATTGGAGTGAATGGAGCCACCCAATCCACTGGGGGAGCAATACTTC AAAAGAGAATCCTTTCCTGTTTGCATTGGAAGCCGTGGTTATCTCTGTTGGCTC CATGGGATTGATTATCAGCCTTCTCTGTGTGTATTTCTGGCTGGAACGGACGAT GCCCCGAATTCCCACCCTGAAGAACCTAGAGGATCTTGTTACTGAATACCACG GGAACTTTTCGGCCTGGAGTGGTGTGTCTAAGGGACTGGCTGAGAGTCTGCAG CCAGACTACAGTGAACGACTCTGCCTCGTCAGTGAGATTCCCCCAAAAGGAG GGGCCCTTGGGGAGGGGCCTGGGGCCTCCCCATGCAACCAGCATAGCCCCTA CTGGGCCCCCCCATGTTACACCCTAAAGCCTGAAACCTGAACCCCAATCCTCT GACAGAAGAACCCCAGGGTCCTGTAGCCCTAAGTGGTACTAACTTTCCTTCAT TCAACCCACCTGCGTCTCATACTCACCTCACCCCACTGTGGCTGATTTGGAATT TTGTGCCCCCATGTAAGCACCCCTTCATTTGGCATTCCCCACTTGAGAATTACC CTTTTGCCCCGAACATGTTTTTCTTCTCCCTCAGTCTGGCCCTTCCTTTTCGCAG GATTCTTCCTCCCTCCCTCTTTCCCTCCCTTCCTCTTTCCATCTACCCTCCGATT GTTCCTGAACCGATGAGAAATAAAGTTTCTGTTGATAATCATCAAAAAAAAAA AAAAAAAAAAAAAAAAAAAAA	SEQ ID NO: 140 NG_021141.1
64	CD2	>NP_001315538.1 T-cell surface antigen	SEQ ID NO: 114 >NM_001328609.1 Homo sapiens CD2 molecule (CD2), transcript variant 1, mRNA	SEQ ID NO: 141

		CD2 isoform 1 precursor [Homo sapiens] MSFPCKFVASFLLI FNVSSKGAVSKEI TNALETWGALGQ DINLDIPSFQMSDD IDDIKWEKTSDKK KIAQFRKEKETFK EKDTYKLFKNGTL KIKHLKTDDQDIY KVSIYDTKGKNVL EKIFDLKIQERVSK PKISWTCINTTLTC EVMNGTDPELNL YQDGKHLKLSQR VITHKWTTSLSAK FKCTAGNKVSKES SVEPVSCPGGSILG QSNGLSAWTPPSH PTSLPFAEKGLDIY LIIGICGGGSLLMV FVALLVFYITKRK KQRSRRNDEELET RAHRVATEERGR KPHQIPASTPQNP ATSQHPPPPPGHR SQAPSHRPPPPGH RVQHQPQKRPPAP SGTQVHQQKGPPL PRPRVQPKPPHGA AENSLSPSSN	AGTCTCACTTCAGTTCCTTTTGCATGAAGAGCTCAGAATCAAAAGAGGAAACC AACCCCTAAGATGAGCTTTCCATGTAAATTTGTAGCCAGCTTCCTTCTGATTTT CAATGTTTCTTCCAAAGGTGCAGTCTCCAAAGAGATTACGAATGCCTTGGAAA CCTGGGGTGCCTTGGGTCAGGACATCAACTTGGACATTCCTAGTTTTCAAATG AGTGATGATATTGACGATATAAAATGGGAAAAAACTTCAGACAAGAAAAAGA TTGCACAATTCAGAAAAGAGAAAGAGACTTTCAAGGAAAAAGATACATATAA GCTATTTAAAAATGGAACTCTGAAAATTAAGCATCTGAAGACCGATGATCAG GATATCTACAAGGTATCAATATATGATACAAAAGGAAAAAATGTGTTGGAAA AAATATTTGATTTGAAGATTCAAGAGAGGGTCTCAAAACCAAAGATCTCCTGG ACTTGTATCAACACAACCCTGACCTGTGAGGTAATGAATGGAACTGACCCCGA ATTAAACCTGTATCAAGATGGGAAACATCTAAAACTTTCTCAGAGGGTCATCA CACACAAGTGGACCACCAGCCTGAGTGCAAAATTCAAGTGCACAGCAGGGAA CAAAGTCAGCAAGGAATCCAGTGTCGAGCCTGTCAGCTGTCCAGGAGGCAGC ATCCTTGGCCAGAGTAATGGGCTCTCTGCCTGGACCCCTCCCAGCCATCCCAC TTCTCTTCCTTTTGCAGAGAAAGGTCTGGACATCTATCTCATCATTGGCATATG TGGAGGAGGCAGCCTCTTGATGGTCTTTGTGGCACTGCTCGTTTTCTATATCAC CAAAAGGAAAAAACAGAGGAGTCGGAGAAATGATGAGGAGCTGGAGACAAG AGCCCACAGAGTAGCTACTGAAGAAAGGGGCCGGAAGCCCCACCAAATTCCA GCTTCAACCCCTCAGAATCCAGCAACTTCCCAACATCCTCCTCCACCACCTGG TCATCGTTCCCAGGCACCTAGTCATCGTCCCCCGCCTCCTGGACACCGTGTTCA GCACCAGCCTCAGAAGAGGCCTCCTGCTCCGTCGGGCACACAAGTTCACCAGC AGAAAGGCCCGCCCCTCCCCAGACCTCGAGTTCAGCCAAAACCTCCCCATGG GGCAGCAGAAAACTCATTGTCCCCTTCCTCTAATTAAAAAAGATAGAAACTGT CTTTTTCAATAAAAAGCACTGTGGATTTCTGCCCTCCTGATGTGCATATCCGTA CTTCCATGAGGTGTTTTCTGTGTGCAGAACATTGTCACCTCCTGAGGCTGTGGG CCACAGCCACCTCTGCATCTTCGAACTCAGCCATGTGGTCAACATCTGGAGTT TTTGGTCTCCTCAGAGAGCTCCATCACACCAGTAAGGAGAAGCAATATAAGTG TGATTGCAAGAATGGTAGAGGACCGAGCACAGAAATCTTAGAGATTTCTTGTC CCCTCTCAGGTCATGTGTAGATGCGATAAATCAAGTGATTGGTGTGCCTGGGT CTCACTACAAGCAGCCTATCTGCTTAAGAGACTCTGGAGTTTCTTATGTGCCCT GGTGGACACTTGCCCACCATCCTGTGAGTAAAAGTGAAATAAAAGCTTTGACT AGAAAAAAAAAAAAAAAAAA	NG_050908.1
65	SLAMF6	>NP_001171643.1 SLAM family member 6 isoform 1 precursor [Homo sapiens] MLWLFQSLLFVFC FGPGNVVSQSSLT PLMVNGILGESVT LPLEFPAGEKVNFI TWLFNETSLAFIVP HETKSPEIHVTNP KQGKRLNFTQSYS LQLSNLKMEDTGS YRAQISTKTSAKL SSYTLRILRQLRNI QVTNHSQLFQNM TCELHLTCSVEDA	SEQ ID NO: 115 >NM_001184714.1 Homo sapiens SLAM family member 6 (SLAMF6), transcript variant 1, mRNA AGTTTATGACAGAAGGGCAAAAACATTGACTGCCTCAAGGTCTCAAGCACCA GTCTTCACCGCGGAAAGCATGTTGTGGCTGTTCCAATCGCTCCTGTTTGTCTTC TGCTTTGGCCCAGGGAATGTAGTTTCACAAAGCAGCTTAACCCCATTGATGGT GAACGGGATTCTGGGGGAGTCAGTAACTCTTCCCCTGGAGTTTCCTGCAGGAG AGAAGGTCAACTTCATCACTTGGCTTTTCAATGAAACATCTCTTGCCTTCATAG TACCCCATGAAACCAAAAGTCCAGAAATCCACGTGACTAATCCGAAACAGGG AAAGCGACTGAACTTCACCCAGTCCTACTCCCTGCAACTCAGCAACCTGAAGA TGGAAGACACAGGCTCTTACAGAGCCCAGATATCCACAAAGACCTCTGCAAA GCTGTCCAGTTACACTCTGAGGATATTAAGACAACTGAGGAACATACAAGTTA CCAATCACAGTCAGCTATTTCAGAATATGACCTGTGAGCTCCATCTGACTTGC TCTGTGGAGGATGCAGATGACAATGTCTCATTCAGATGGGAGGCCTTGGGAA ACACACTTTCAAGTCAGCCAAACCTCACTGTCTCCTGGGACCCCAGGATTTCC AGTGAACAGGACTACACCTGCATAGCAGAGAATGCTGTCAGTAATTTATCCTT CTCTGTCTCTGCCCAGAAGCTTTGCGAAGATGTTAAAATTCAATATACAGATA CCAAAATGATTCTGTTTATGGTTTCTGGGATATGCATAGTCTTCGGTTTCATCA	

		DDNVSFRWEALG NTLSSQPNLTVSW DPRISSEQDYTCIA ENAVSNLSFSVSA QKLCEDVKIQYTD TKMILFMVSGICIV FGFIILLLLVLRKR RDSLSLSTQRTQG PAESARNLEYVSV SPTNNTVYASVTH SNRETEIWTPREN DTITIYSTINHSKES KPTFSRATALDNV V	TACTGCTGTTACTTGTTTTGAGGAAAAGAAGAGATTCCCTATCTTTGTCTACTC AGCGAACACAGGGCCCCGCAGAGTCCGCAAGGAACCTAGAGTATGTTTCAGT GTCTCCAACGAACAACACTGTGTATGCTTCAGTCACTCATTCAAACAGGGAAA CAGAAATCTGGACACCTAGAGAAAATGATACTATCACAATTTACTCCACAATT AATCATTCCAAAGAGAGTAAACCCACTTTTTCCAGGGCAACTGCCCTTGACAA TGTCGTGTAAGTTGCTGAAAGGCCTCAGAGGAATTCGGGAATGACACGTCTTC TGATCCCATGAGACAGAACAAAGAACAGGAAGCTTGGTTCCTGTTGTTCCTGG CAACAGAATTTGAATATCTAGGATAGGATGATCACCTCCAGTCCTTCGGACTT AAACCTGCCTACCTGAGTCAAACACCTAAGGATAACATCATTTCCAGCATGTG GTTCAAATAATATTTTCCAATCCACTTCAGGCCAAAACATGCTAAAGATAACA CACCAGCACATTGACTCTCTCTTTGATAACTAAGCAAATGGAATTATGGTTGA CAGAGAGTTTATGATCCAGAAGACAACCACTTCTCTCCTTTTAGAAAGCAGCA GGATTGACTTATTGAGAAATAATGCAGTGTGTTGGTTACATGTGTAGTCTCTG GAGTTGGATGGGCCCATCCTGATACAAGTTGAGCATCCCTTGTCTGAAATGCT TGGGATTAGAAATGTTTCAGATTTCAATTTTTTTTTCAGATTTTGGAATATTTGC ATTATATTTAGCGGTTGAGTATCCAAATCCAAAAATCCAAAATTCAAAATGCT CCAATAAGCATTTCCCTTGAGTTTCATTGATGTCGATGCAGTGCTCAAAATCTC AGATTTTGGAGCATTTTGGATATTGGATTTTTGGATTTGGGATGCTCAACTTGT ACAATGTTTATTAGACACATCTCCTGGGACATACTGCCTAACCTTTTGGAGCCT TAGTCTCCCAGACTGAAAAAGGAAGAGGATGGTATTACATCAGCTCCATTGTT TGAGCCAAGAATCTAAGTCATCCCTGACTCCAGTGTCTTTGTCACCAGGCCCT TTGGACTCTACCTCAGAAATATTTCTTGGACCTTCCACTTCTCCTCCAACTCCT TGACCACCATCCTGTATCCAACCATCACCACCTCTAACCTGAATCCTACCTTAA GATCAGAACAGTTGTCCTCACTTTTGTTCTTGTCCCTCTCCAACCCACTCTCCA CAAGATGGCCAGAGTAATGTTTTTAATATAAATTGGATCCTTCAGTTTCCTGCT TAAAACCCTGCAGGTTTCCCAATGCACTCAGAAAGAAATCCAGTTTCCATGGC CCTGGATGGTCTGGCCCACCTCCAGCCTCAGCTAGCATTACCCTTCTGACACTC TCTATGTAGCCTCCCTGATCTTCTTTCAGCTCCTCTATTAAAGGAAAAGTTCTT TATGTTAATTATTTACATCTTCCTGCAGGCCCTTCCTCTGCCTGCTGGGGTCCT CCTATTCTTTAGGTTTAATTTTAAATATGTCACCTCCTAAGAGAAACCTTCCCA GACCACTCTTTCTAAAATGAATCTTCTAGGCTGGGCATGGTGGCTCACACCTG TAATCCCTGTACTTTGGGAGGCCAAGGGGGGAGATCACTTGAGGTCAGGAGTT CAAGACCAGCCTGGCCAACTTGGTGAAACCCCGTCTTTACTAAAAATACAAAA AAATTAGCCAGGCGTGGTGGTGCACCCCTAAAATCCCAGCTACTTGAGAGACT GAGGCAGGAGAATCGCTTGAACCCAGGAGGTGGAGGTTCCAGTGAGCCAAAA TCATGCCAATGTATTCCAGTCTGGGTGACAGAGTGAGACTCTGTCTCAAAAAA TAAATAAATAAAATAAAATGAAATAGATCTTATAAAAAAAA	
66	GZMA	>NP_006135.1 granzyme A precursor [Homo sapiens] MRNSYRFLASSLS VVVSLLLIPEDVC EKIIGGNEVTPHSR PYMVLLSLDRKTI CAGALIAKDWVL TAAHCNLNKRSQ VILGAHSITREEPT KQIMLVKKEFPYP CYDPATREGDLKL	SEQ ID NO: 116 >NM_006144.3 Homo sapiens granzyme A (GZMA), mRNA AGATTTTCAGGTTGATTGATGTGGGACAGCAGCCACAATGAGGAACTCCTATA GATTTCTGGCATCCTCTCTCTCAGTTGTCGTTTCTCTCCTGCTAATTCCTGAAG ATGTCTGTGAAAAAATTATTGGAGGAAATGAAGTAACTCCTCATTCAAGACCC TACATGGTCCTACTTAGTCTTGACAGAAAAACCATCTGTGCTGGGGCTTTGAT TGCAAAAGACTGGGTGTTGACTGCAGCTCACTGTAACTTGAACAAAAGGTCCC AGGTCATTCTTGGGGCTCACTCAATAACCAGGGAAGAGCCAACAAAACAGAT AATGCTTGTTAAGAAAGAGTTTCCCTATCCATGCTATGACCCAGCCACACGCG AAGGTGACCTTAAACTTTTACAGCTGACGGAAAAAGCAAAAATTAACAAATA TGTGACTATCCTTCATCTACCTAAAAAGGGGGATGATGTGAAACCAGGAACCA TGTGCCAAGTTGCAGGGTGGGGCAGGACTCACAATAGTGCATCTTGGTCCGAT ACTCTGAGAGAAGTCAATATCACCATCATAGACAGAAAAGTCTGCAATGATC GAAATCACTATAATTTTAACCCTGTGATTGGAATGAATATGGTTTGTGCTGGA	SEQ ID NO: 142 NG_027996.1

		LQLTEKAKINKYV TILHLPKKGDDVK PGTMCQVAGWGR THNSASWSDTLRE VNITIIDRKVCNDR NHYNFNPVIGMN MVCAGSLRGGRD SCNGDSGSPLLCE GVFRGVTSFGLEN KCGDPRGPGVYIL LSKKHLNWIIMTI KGAV	AGCCTCCGAGGTGGAAGAGACTCGTGCAATGGAGATTCTGGAAGCCCTTTGTT GTGCGAGGGTGTTTTCCGAGGGGTCACTTCCTTTGGCCTTGAAAATAAATGCG GAGACCCTCGTGGGCCTGGTGTCTATATTCTTCTCTCAAAGAAACACCTCAAC TGGATAATTATGACTATCAAGGGAGCAGTTTAAATAACCGTTTCCTTTCATTTA CTGTGGCTTCTTAATCTTTTCACAAATAAAATCAATTTGCATGACTGTAAAAA AAAAAAAAAAAAA	
67	CD30	>NP_001234.3 tumor necrosis factor receptor superfamily member 8 isoform 1 precursor [Homo sapiens] MRVLLAALGLLFL GALRAFPQDRPFE DTCHGNPSHYYD KAVRRCCYRCPM GLFPTQQCPQRPT DCRKQCEPDYYL DEADRCTACVTCS RDDLVEKTPCAW NSSRVCECRPGMF CSTSAVNSCARCF FHSVCPAGMIVKF PGTAQKNTVCEPA SPGVSPACASPEN CKEPSSGTIPQAKP TPVSPATSSASTM PVRGGTRLAQEA ASKLTRAPDSPSS VGRPSSDPGLSPT QPCPEGSGDCRKQ CEPDYYLDEAGRC TACVSCSRDDLVE KTPCAWNSSRTCE CRPGMICATSATN SCARCVPYPICAA ETVTKPQDMAEK DTTFEAPPLGTQP DCNPTPENGEAPA STSPTQSLLVDSQ ASKTLPIPTSAPVA LSSTGKPVLDAGP VLFWVILVLVVVV GSSAFLLCHRRAC	SEQ ID NO: 117 >NM_001243.4 Homo sapiens TNF receptor superfamily member 8 (TNFRSF8), transcript variant 1, mRNA ATACGGGAGAACTAAGGCTGAAACCTCGGAGGAACAACCACTTTTGAAGTGA CTTCGCGGCGTGCGTTGGGTGCGGACTAGGTGGCCGCGGCGGGAGTGTGCTG GAGCCTGAAGTCCACGCGCGCGGCTGAGAACCGCCGGGACCGCACGTGGGCG CCGCGCGCTTCCCCCGCTTCCCAGGTGGGCGCCGGCCGCCAGGCCACCTCACG TCCGGCCCCGGGGATGCGCGTCCTCCTCGCCGCGCTGGGACTGCTGTTCCTGG GGGCGCTACGAGCCTTCCCACAGGATCGACCCTTCGAGGACACCTGTCATGGA AACCCCAGCCACTACTATGACAAGGCTGTCAGGAGGTGCTGTTACCGCTGCCC CATGGGGCTGTTCCCGACACAGCAGTGCCCACAGAGGCCTACTGACTGCAGG AAGCAGTGTGAGCCTGACTACTACCTGGATGAGGCCGACCGCTGTACAGCCTG CGTGACTTGTTCTCGAGACGACCTCGTGGAGAAGACGCCGTGTGCATGGAACT CCTCCCGTGTCTGCGAATGTCGACCCGGCATGTTCTGTTCCACGTCTGCCGTCA ACTCCTGTGCCCGCTGCTTCTTCCATTCTGTCTGTCCGGCAGGGATGATTGTCA AGTTCCCAGGCACGGCGCAGAAGAACACGGTCTGTGAGCCGGCTTCCCCAGG GGTCAGCCCTGCCTGTGCCAGCCCAGAGAACTGCAAGGAACCCTCCAGTGGC ACCATCCCCCAGGCCAAGCCCACCCCGGTGTCCCCAGCAACCTCCAGTGCCAG CACCATGCCTGTAAGAGGGGGCACCCGCCTCGCCCAGGAAGCTGCTTCTAAAC TGACGAGGGCTCCCGACTCTCCCTCCTCTGTGGGAAGGCCTAGTTCAGATCCA GGTCTGTCCCCAACACAGCCATGCCCAGAGGGGTCTGGTGATTGCAGAAAGC AGTGTGAGCCCGACTACTACCTGGACGAGGCCGGCCGCTGCACGGCCTGCGT GAGCTGTTCTCGAGATGACCTTGTGGAGAAGACGCCATGTGCATGGAACTCCT CCCGCACCTGCGAATGTCGACCTGGCATGATCTGTGCCACATCAGCCACCAAC TCCTGTGCCCGCTGTGTCCCCTACCCAATCTGTGCAGCAGAGACGGTCACCAA GCCCCAGGATATGGCTGAGAAGGACACCACCTTTGAGGCGCCACCCCTGGGG ACCCAGCCGGACTGCAACCCCACCCCAGAGAATGGCGAGGCGCCTGCCAGCA CCAGCCCCACTCAGAGCTTGCTGGTGGACTCCCAGGCCAGTAAGACGCTGCCC ATCCCAACCAGCGCTCCCGTCGCTCTCTCCTCCACGGGGAAGCCCGTTCTGGA TGCAGGGCCAGTGCTCTTCTGGGTGATCCTGGTGTTGGTTGTGGTGGTCGGCT CCAGCGCCTTCCTCCTGTGCCACCGGAGGGCCTGCAGGAAGCGAATTCGGCAG AAGCTCCACCTGTGCTACCCGGTCCAGACCTCCCAGCCCAAGCTAGAGCTTGT GGATTCCAGACCCAGGAGGAGCTCAACGCAGCTGAGGAGTGGTGCGTCGGTG ACAGAACCCGTCGCGGAAGAGCGAGGGTTAATGAGCCAGCCACTGATGGAGA CCTGCCACAGCGTGGGGGCAGCCTACCTGGAGAGCCTGCCGCTGCAGGATGC CAGCCCGGCCGGGGGCCCCTCGTCCCCCAGGGACCTTCCTGAGCCCCGGGTGT CCACGGAGCACACCAATAACAAGATTGAGAAAATCTACATCATGAAGGCTGA CACCGTGATCGTGGGGACCGTGAAGGCTGAGCTGCCGGAGGGCCGGGGCCTG GCGGGGCCAGCAGAGCCCGAGTTGGAGGAGGAGCTGGAGGCGGACCATACCC	SEQ ID NO: 143 NG_029573.2

		RKRIRQKLHLCYP VQTSQPKLELVDS RPRRSSTQLRSGA SVTEPVAEERGLM SQPLMETCHSVGA AYLESLPLQDASP AGGPSSPRDLPEP RVSTEHTNNKIEKI YIMKADTVIVGTV KAELPEGRGLAGP AEPELEEELEADH TPHYPEQETEPPL GSCSDVMLSVEEE GKEDPLPTAASGK	CCCACTACCCCGAGCAGGAGACAGAACCGCCTCTGGGCAGCTGCAGCGATGT CATGCTCTCAGTGGAAGAGGAAGGGAAAGAAGACCCCTTGCCCACAGCTGCC TCTGGAAAGTGAGGCCTGGGCTGGGCTGGGGCTAGGAGGGCAGCAGGGTGGC CTCTGGGAGGCCAGGATGGCACTGTTGGCACCGAGGTTGGGGGCAGAGGCCC ATCTGGCCTGAACTGAGGCTCCAGCATCTAGTGGTGGACCGGCCGGTCACTGC AGGGGTCTGGTGGTCTCTGCTTGCATCCCCAACTTAGCTGTCCCCTGACCCAG AGCCTAGGGGATCCGGGGCTTGTACAGAAGAGACAGTCCAAGGGGACTGGAT CCCAGCAGTGATGTTGGTTGAGGCAGCAAACAGATGGCAGGATGGGCACTGC CGAGAACAGCATTGGTCCCAGAGCCCTGGGCATCAGACCTTAACCACCAGGC CCACAGCCCAGCGAGGGAGAGGTCGTGAGGCCAGCTCCCGGGGCCCCTGTAA CCCTACTCTCCTCTCTCCCTGGACCTCAGAGGTGACACCCATTGGGCCCTTCCG GCATGCCCCCAGTTACTGTAAATGTGGCCCCCAGTGGGCATGGAGCCAGTGCC TGTGGTTGTTTCTCCAGAGTCAAAAGGGAAGTCGAGGGATGGGGCGTCGTCA GCTGGCACTGTCTCTGCTGCAGCGGCCACACTGTACTCTGCACTGGTGTGAGG GCCCCTGCCTGGACTGTGGGACCCTCCTGGTGCTGCCCACCTTCCCTGTCCTGT AGCCCCCTCGGTGGGCCCAGGGCCTAGGGCCCAGGATCAAGTCACTCATCTCA GAATGTCCCCACCAATCCCCGCCACAGCAGGCGCCTCGGGTCCCAGATGTCTG CAGCCCTCAGCAGCTGCAGACCGCCCCTCACCAACCCAGAGAACCTGCTTTAC TTTGCCCAGGGACTTCCTCCCCATGTGAACATGGGGAACTTCGGGCCCTGCCT GGAGTCCTTGACCGCTCTCTGTGGGCCCCACCCACTCTGTCCTGGGAAATGAA GAAGCATCTTCCTTAGGTCTGCCCTGCTTGCAAATCCACTAGCACCGACCCCA CCACCTGGTTCCGGCTCTGCACGCTTTGGGGTGTGGATGTCGAGAGGCACCAC GGCCTCACCCAGGCATCTGCTTTACTCTGGACCATAGGAAACAAGACCGTTTG GAGGTTTCATCAGGATTTTGGGTTTTTCACATTTCACGCTAAGGAGTAGTGGC CCTGACTTCCGGTCGGCTGGCCAGCTGACTCCCTAGGGCCTTCAGACGTGTAT GCAAATGAGTGATGGATAAGGATGAGTCTTGGAGTTGCGGGCAGCCTGGAGA CTCGTGGACTTACCGCCTGGAGGCAGGCCCGGGAAGGCTGCTGTTTACTCATC GGGCAGCCACGTGCTCTCTGGAGGAAGTGATAGTTTCTGAAACCGCTCAGATG TTTTGGGGAAAGTTGGAGAAGCCGTGGCCTTGCGAGAGGTGGTTACACCAGA ACCTGGACATTGGCCAGAAGAAGCTTAAGTGGGCAGACACTGTTTGCCCAGT GTTTGTGCAAGGATGGAGTGGGTGTCTCTGCATCACCCACAGCCGCAGCTGTA AGGCACGCTGGAAGGCACACGCCTGCCAGGCAGGGCAGTCTGGCGCCCATGA TGGGAGGGATTGACATGTTTCAACAAAATAATGCACTTCCTTACCTAGTGGCC CTTCACACAACTTTTGAATCTCTAAAAATCCATAAAATCCTTAAAGAACTGTA AAAAAAAAAAAAAAAAAAAAA	
68	CD3E	>NP_000724.1 T-cell surface glycoprotein CD3 epsilon chain precursor [Homo sapiens] MQSGTHWRVLGL CLLSVGVWGQDG NEEMGGITQTPYK VSISGTTVILTCPQ YPGSEILWQHNDK NIGGDEDDKNIGS DEDHLSLKEFSEL EQSGYYVCYPRGS KPEDANFYLYLRA RVCENCMEMDV	SEQ ID NO: 118 >NM_000733.3 Homo sapiens CD3e molecule (CD3E), mRNA TATTGTCAGAGTCCTCTTGTTTGGCCTTCTAGGAAGGCTGTGGGACCCAGCTTT CTTCAACCAGTCCAGGTGGAGGCCTCTGCCTTGAACGTTTCCAAGTGAGGTAA AACCCGCAGGCCCAGAGGCCTCTCTACTTCCTGTGTGGGGTTCAGAAACCCTC CTCCCCTCCCAGCCTCAGGTGCCTGCTTCAGAAAATGAAGTAGTAAGTCTGCT GGCCTCCGCCATCTTAGTAAAGTAACAGTCCCATGAAACAAAGATGCAGTCG GGCACTCACTGGAGAGTTCTGGGCCTCTGCCTCTTATCAGTTGGCGTTTGGGG GCAAGATGGTAATGAAGAAATGGGTGGTATTACACAGACACCATATAAAGTC TCCATCTCTGGAACCACAGTAATATTGACATGCCCTCAGTATCCTGGATCTGA AATACTATGGCAACACAATGATAAAAACATAGGCGGTGATGAGGATGATAAA AACATAGGCAGTGATGAGGATCACCTGTCACTGAAGGAATTTTCAGAATTGG AGCAAAGTGGTTATTATGTCTGCTACCCCAGAGGAAGCAAACCAGAAGATGC GAACTTTTATCTCTACCTGAGGGCAAGAGTGTGTGAGAACTGCATGGAGATGG ATGTGATGTCGGTGGCCACAATTGTCATAGTGGACATCTGCATCACTGGGGGC TTGCTGCTGCTGGTTTACTACTGGAGCAAGAATAGAAAGGCCAAGGCCAAGC	SEQ ID NO: 144 NG_007383.1

		MSVATIVIVDICIT GGLLLLVYYWSK NRKAKAKPVTRG AGAGGRQRGQNK ERPPPVPNPDYEPI RKGQRDLYSGLN QRRI	CTGTGACACGAGGAGCGGGTGCTGGCGGCAGGCAAAGGGGACAAAACAAGG AGAGGCCACCACCTGTTCCCAACCCAGACTATGAGCCCATCCGGAAAGGCCA GCGGGACCTGTATTCTGGCCTGAATCAGAGACGCATCTGACCCTCTGGAGAAC ACTGCCTCCCGCTGGCCCAGGTCTCCTCTCCAGTCCCCCTGCGACTCCCTGTTT CCTGGGCTAGTCTTGGACCCCACGAGAGAGAATCGTTCCTCAGCCTCATGGTG AACTCGCGCCCTCCAGCCTGATCCCCCGCTCCCTCCTCCCTGCCTTCTCTGCTG GTACCCAGTCCTAAAATATTGCTGCTTCCTCTTCCTTTGAAGCATCATCAGTAG TCACACCCTCACAGCTGGCCTGCCCTCTTGCCAGGATATTTATTTGTGCTATTC ACTCCCTTCCCTTTGGATGTAACTTCTCCGTTCAGTTCCCTCCTTTTCTTGCATG TAAGTTGTCCCCCATCCCAAAGTATTCCATCTACTTTTCTATCGCCGTCCCCTT TTGCAGCCCTCTCTGGGGATGGACTGGGTAAATGTTGACAGAGGCCCTGCCCC GTTCACAGATCCTGGCCCTGAGCCAGCCCTGTGCTCCTCCCTCCCCCAACACT CCCTACCAACCCCCTAATCCCCTACTCCCTCCACCCCCCCTCCACTGTAGGCCA CTGGATGGTCATTTGCATCTCCGTAAATGTGCTCTGCTCCTCAGCTGAGAGAG AAAAAAATAAACTGTATTTGGCTGCAAGAAAAAAAAAAAAAAAAAAAAA	
69	CXCR6	>NP_006555.1 C-X-C chemokine receptor type 6 [Homo sapiens] MAEHDYHEDYGF SSFNDSSQEEHQD FLQFSKVFLPCMY LVVFVCGLVGNSL VLVISIFYHKLQSL TDVFLVNLPLADL VFVCTLPFWAYA GIHEWVFGQVMC KSLLGIYTINFYTS MLILTCITVDRFIV VVKATKAYNQQA KRMTWGKVTSLLI WVISLLVSLPQIIY GNVFNLDKLICGY HDEAISTVVLATQ MTLGFFLPLLTMI VCYSVIIKTLLHA GGFQKHRSLKIIFL VMAVFLLTQMPF NLMKFIRSTHWEY YAMTSFHYTIMVT EAIAYLRACLNPV LYAFVSLKFRKNF WKLVKDIGCLPYL GVSHQWKSSEDN SKTFSASHNVEAT SMFQL	SEQ ID NO: 119 >NM_006564.1 Homo sapiens C-X-C motif chemokine receptor 6 (CXCR6), mRNA GCAGACCTTGCTTCATGAGCAAGCTCATCTCTGGAACAAACTGGCAAAGCATC TCTGCTGGTGTTCATCAGAACAGACACCATGGCAGAGCATGATTACCATGAAG ACTATGGGTTCAGCAGTTTCAATGACAGCAGCCAGGAGGAGCATCAAGACTT CCTGCAGTTCAGCAAGGTCTTTCTGCCCTGCATGTACCTGGTGGTGTTTGTCTG TGGTCTGGTGGGGAACTCTCTGGTGCTGGTCATATCCATCTTCTACCATAAGTT GCAGAGCCTGACGGATGTGTTCCTGGTGAACCTACCCCTGGCTGACCTGGTGT TTGTCTGCACTCTGCCCTTCTGGGCCTATGCAGGCATCCATGAATGGGTGTTTG GCCAGGTCATGTGCAAGAGCCTACTGGGCATCTACACTATTAACTTCTACACG TCCATGCTCATCCTCACCTGCATCACTGTGGATCGTTTCATTGTAGTGGTTAAG GCCACCAAGGCCTACAACCAGCAAGCCAAGAGGATGACCTGGGGCAAGGTCA CCAGCTTGCTCATCTGGGTGATATCCCTGCTGGTTTCCTTGCCCCAAATTATCT ATGGCAATGTCTTTAATCTCGACAAGCTCATATGTGGTTACCATGACGAGGCA ATTTCCACTGTGGTTCTTGCCACCCAGATGACACTGGGGTTCTTCTTGCCACTG CTCACCATGATTGTCTGCTATTCAGTCATAATCAAAACACTGCTTCATGCTGGA GGCTTCCAGAAGCACAGATCTCTAAAGATCATCTTCCTGGTGATGGCTGTGTT CCTGCTGACCCAGATGCCCTTCAACCTCATGAAGTTCATCCGCAGCACACACT GGGAATACTATGCCATGACCAGCTTTCACTACACCATCATGGTGACAGAGGCC ATCGCATACCTGAGGGCCTGCCTTAACCCTGTGCTCTATGCCTTTGTCAGCCTG AAGTTTCGAAAGAACTTCTGGAAACTTGTGAAGGACATTGGTTGCCTCCCTTA CCTTGGGGTCTCACATCAATGGAAATCTTCTGAGGACAATTCCAAGACTTTTT CTGCCTCCCACAATGTGGAGGCCACCAGCATGTTCCAGTTATAGGCCTTGCCA GGGTTTCGAGAAGCTGCTCTGGAATTTGCAAGTCATGGCTGTGCCCTCTTGAT GTGGTGAGGCAGGCTTTGTTTATAGCTTGCGCATTCTCATGGAGAAGTTATCA GACACTCTGGCTGGTTTGGAATGCTTCTTCTCAGGCATGAACATGTACTGTTCT CTTCTTGAACACTCATGCTGAAAGCCCAAGTAGGGGGTCTAAAATTTTTAAGG ACTTTCCTTCCTCCATCTCCAAGAATGCTGAAACCAAGGGGGATGACATGTGA CTCCTATGATCTCAGGTTCTCCTTGATTGGGACTGGGGCTGAAGGTTGAAGAG GTGAGCACGGCCAACAAAGCTGTTGATGGTAGGTGGCACACTGGGTGCCCAA GCTCAGAAGGCTCTTCTGACTACTGGGCAAAGAGTGTAGATCAGAGCAGCAG TGAAAACAAGTGCTGGCACCACCAGGCACCTCACAGAAATGAGATCAGGCTC TGCCTCACCTTGGGGCTTGACTTTTGTATAGGTAGATGTTCAGATTGCTTTGAT TAATCCAGAATAACTAGCACCAGGGACTATGAATGGGCAAAACTGAATTATA AGAGGCTGATAATTCCAGTGGTCCATGGAATGCTTGAAAAATGTGCAAAACA GCGTTTAAGACTGTAATGAATCTAAGCAGCATTTCTGAAGTGGACTCTTTGGT	SEQ ID NO: 145 NG_031955.1

			GGCTTTGCATTTTAAAAATGAAATTTTCCAATGTCTGCCACACAAACGTATGT AAATGTATATACCCACACACATACACACATATGTCATATATTACTAGCATATG AGTTTCATAGCTAAGAAATAAAACTGTTAAAGTCTCCAAACT	
70	CCR5	>NP_001093638.1 C-C chemokine receptor type 5 [Homo sapiens] MDYQVSSPIYDIN YYTSEPCQKINVK QIAARLLPPLYSLV FIFGFVGNMLVILI LINCKRLKSMTDI YLLNLAISDLFFLL TVPFWAHYAAAQ WDFGNTMCQLLT GLYFIGFFSGIFFII LLTIDRYLAVVHA VFALKARTVTFGV VTSVITWVVAVFA SLPGIIFTRSQKEG LHYTCSSHFPYSQ YQFWKNFQTLKIV ILGLVLPLLVMVIC YSGILKTLLRCRN EKKRHRAVRLIFTI MIVYFLFWAPYNI VLLLNTFQEFFGL NNCSSSNRLDQA MQVTETLGMTHC CINPIIYAFVGEKF RNYLLVFFQKHIA KRFCKCCSIFQQE APERASSVYTRST GEQEISVGL	SEQ ID NO: 120 >NM_001100168.1 Homo sapiens C-C motif chemokine receptor 5 (gene/pseudogene) (CCR5), transcript variant B, mRNA CTTCAGATAGATTATATCTGGAGTGAAGAATCCTGCCACCTATGTATCTGGCA TAGTCTCATCTGGCCAGAAGAGCTGAGACATCCGTTCCCCTACAAGAAACTCT CCCCGGGTGGAACAAGATGGATTATCAAGTGTCAAGTCCAATCTATGACATCA ATTATTATACATCGGAGCCCTGCCAAAAAATCAATGTGAAGCAAATCGCAGCC CGCCTCCTGCCTCCGCTCTACTCACTGGTGTTCATCTTTGGTTTTGTGGGCAAC ATGCTGGTCATCCTCATCCTGATAAACTGCAAAAGGCTGAAGAGCATGACTGA CATCTACCTGCTCAACCTGGCCATCTCTGACCTGTTTTTCCTTCTTACTGTCCCC TTCTGGGCTCACTATGCTGCCGCCCAGTGGGACTTTGGAAATACAATGTGTCA ACTCTTGACAGGGCTCTATTTTATAGGCTTCTTCTCTGGAATCTTCTTCATCAT CCTCCTGACAATCGATAGGTACCTGGCTGTCGTCCATGCTGTGTTTGCTTTAAA AGCCAGGACGGTCACCTTTGGGGTGGTGACAAGTGTGATCACTTGGGTGGTGG CTGTGTTTGCGTCTCTCCCAGGAATCATCTTTACCAGATCTCAAAAAGAAGGT CTTCATTACACCTGCAGCTCTCATTTTCCATACAGTCAGTATCAATTCTGGAAG AATTTCCAGACATTAAAGATAGTCATCTTGGGGCTGGTCCTGCCGCTGCTTGT CATGGTCATCTGCTACTCGGGAATCCTAAAAACTCTGCTTCGGTGTCGAAATG AGAAGAAGAGGCACAGGGCTGTGAGGCTTATCTTCACCATCATGATTGTTTAT TTTCTCTTCTGGGCTCCCTACAACATTGTCCTTCTCCTGAACACCTTCCAGGAA TTCTTTGGCCTGAATAATTGCAGTAGCTCTAACAGGTTGGACCAAGCTATGCA GGTGACAGAGACTCTTGGGATGACGCACTGCTGCATCAACCCCATCATCTATG CCTTTGTCGGGGAGAAGTTCAGAAACTACCTCTTAGTCTTCTTCCAAAAGCAC ATTGCCAAACGCTTCTGCAAATGCTGTTCTATTTTCCAGCAAGAGGCTCCCGA GCGAGCAAGCTCAGTTTACACCCGATCCACTGGGGAGCAGGAAATATCTGTG GGCTTGTGACACGGACTCAAGTGGGCTGGTGACCCAGTCAGAGTTGTGCACAT GGCTTAGTTTTCATACACAGCCTGGGCTGGGGGTGGGGTGGGAGAGGTCTTTT TTAAAAGGAAGTTACTGTTATAGAGGGTCTAAGATTCATCCATTTATTTGGCA TCTGTTTAAAGTAGATTAGATCTTTTAAGCCCATCAATTATAGAAAGCCAAAT CAAAATATGTTGATGAAAAATAGCAACCTTTTTATCTCCCCTTCACATGCATC AAGTTATTGACAAACTCTCCCTTCACTCCGAAAGTTCCTTATGTATATTTAAAA GAAAGCCTCAGAGAATTGCTGATTCTTGAGTTTAGTGATCTGAACAGAAATAC CAAAATTATTTCAGAAATGTACAACTTTTTACCTAGTACAAGGCAACATATAG GTTGTAAATGTGTTTAAAACAGGTCTTTGTCTTGCTATGGGGAGAAAAGACAT GAATATGATTAGTAAAGAAATGACACTTTTCATGTGTGATTTCCCCTCCAAGG TATGGTTAATAAGTTTCACTGACTTAGAACCAGGCGAGAGACTTGTGGCCTGG GAGAGCTGGGGAAGCTTCTTAAATGAGAAGGAATTTGAGTTGGATCATCTATT GCTGGCAAAGACAGAAGCCTCACTGCAAGCACTGCATGGGCAAGCTTGGCTG TAGAAGGAGACAGAGCTGGTTGGGAAGACATGGGGAGGAAGGACAAGGCTA GATCATGAAGAACCTTGACGGCATTGCTCCGTCTAAGTCATGAGCTGAGCAGG GAGATCCTGGTTGGTGTTGCAGAAGGTTTACTCTGTGGCCAAAGGAGGGTCAG GAAGGATGAGCATTTAGGGCAAGGAGACCACCAACAGCCCTCAGGTCAGGGT GAGGATGGCCTCTGCTAAGCTCAAGGCGTGAGGATGGGAAGGAGGGAGGTAT TCGTAAGGATGGGAAGGAGGGAGGTATTCGTGCAGCATATGAGGATGCAGAG TCAGCAGAACTGGGGTGGATTTGGGTTGGAAGTGAGGGTCAGAGAGGAGTCA GAGAGAATCCCTAGTCTTCAAGCAGATTGGAGAAACCCTTGAAAAGACATCA AGCACAGAAGGAGGAGGAGGAGGTTTAGGTCAAGAAGAAGATGGATTGGTG TAAAAGGATGGGTCTGGTTTGCAGAGCTTGAACACAGTCTCACCCAGACTCCA	SEQ ID NO: 146 NG_012637.1

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71	PDCD1	>NP_005009.2 programmed cell death protein 1 precursor [Homo sapiens] MQIPQAPWPVVW AVLQLGWRPGWF LDSPDRPWNPPTF SPALLVVTEGDNA TFTCSFSNTSESFV LNWYRMSPSNQT DKLAAFPEDRSQP GQDCRFRVTQLPN GRDFHMSVVRAR RNDSGTYLCGAIS LAPKAQIKESLRA ELRVTERRAEVPT AHPSPSPRPAGQF QTLVVGVVGGLL GSLVLLVWVLAVI CSRAARGTIGARR TGQPLKEDPSAVP VFSVDYGELDFQ WREKTPEPPVPCV PEQTEYATIVFPSG MGTSSPARRGSAD GPRSAQPLRPEDG HCSWPL	SEQ ID NO: 121 >NM_005018.2 Homo sapiens programmed cell death 1 (PDCD1), mRNA AGTTTCCCTTCCGCTCACCTCCGCCTGAGCAGTGGAGAAGGCGGCACTCTGGT GGGGCTGCTCCAGGCATGCAGATCCCACAGGCGCCCTGGCCAGTCGTCTGGGC GGTGCTACAACTGGGCTGGCGGCCAGGATGGTTCTTAGACTCCCCAGACAGGC CCTGGAACCCCCCCACCTTCTCCCCAGCCCTGCTCGTGGTGACCGAAGGGGAC AACGCCACCTTCACCTGCAGCTTCTCCAACACATCGGAGAGCTTCGTGCTAAA CTGGTACCGCATGAGCCCCAGCAACCAGACGGACAAGCTGGCCGCCTTCCCC GAGGACCGCAGCCAGCCCGGCCAGGACTGCCGCTTCCGTGTCACACAACTGC CCAACGGGCGTGACTTCCACATGAGCGTGGTCAGGGCCCGGCGCAATGACAG CGGCACCTACCTCTGTGGGGCCATCTCCCTGGCCCCCAAGGCGCAGATCAAAG AGAGCCTGCGGGCAGAGCTCAGGGTGACAGAGAGAAGGGCAGAAGTGCCCA CAGCCCACCCCAGCCCCTCACCCAGGCCAGCCGGCCAGTTCCAAACCCTGGTG GTTGGTGTCGTGGGCGGCCTGCTGGGCAGCCTGGTGCTGCTAGTCTGGGTCCT GGCCGTCATCTGCTCCCGGGCCGCACGAGGGACAATAGGAGCCAGGCGCACC GGCCAGCCCCTGAAGGAGGACCCCTCAGCCGTGCCTGTGTTCTCTGTGGACTA TGGGGAGCTGGATTTCCAGTGGCGAGAGAAGACCCCGGAGCCCCCCGTGCCC TGTGTCCCTGAGCAGACGGAGTATGCCACCATTGTCTTTCCTAGCGGAATGGG CACCTCATCCCCCGCCCGCAGGGGCTCAGCTGACGGCCCTCGGAGTGCCCAGC CACTGAGGCCTGAGGATGGACACTGCTCTTGGCCCCTCTGACCGGCTTCCTTG GCCACCAGTGTTCTGCAGACCCTCCACCATGAGCCCGGGTCAGCGCATTTCCT CAGGAGAAGCAGGCAGGGTGCAGGCCATTGCAGGCCGTCCAGGGGCTGAGCT GCCTGGGGGCGACCGGGGCTCCAGCCTGCACCTGCACCAGGCACAGCCCCAC CACAGGACTCATGTCTCAATGCCCACAGTGAGCCCAGGCAGCAGGTGTCACC GTCCCCTACAGGGAGGGCCAGATGCAGTCACTGCTTCAGGTCCTGCCAGCACA GAGCTGCCTGCGTCCAGCTCCCTGAATCTCTGCTGCTGCTGCTGCTGCTGC TGCTGCCTGCGGCCCGGGGCTGAAGGCGCCGTGGCCCTGCCTGACGCCCCGGA GCCTCCTGCCTGAACTTGGGGGCTGGTTGGAGATGGCCTTGGAGCAGCCAAGG TGCCCCTGGCAGTGGCATCCCGAAACGCCCTGGACGCAGGGCCCAAGACTGG GCACAGGAGTGGGAGGTACATGGGGCTGGGGACTCCCCAGGAGTTATCTGCT	SEQ ID NO: 147 NG_012110.1

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72	GZMK	>NP_002095.1 granzyme K precursor [Homo sapiens] MTKFSSFSLFFLIV GAYMTHVCFNME IIGGKEVSPHSRPF MASIQYGGHHVC GGVLIDPQWVLTA AHCQYRFTKGQSP TVVLGAHSLSKNE ASKQTLEIKKFIPF SRVTSDPQSNDIM LVKLQTAAKLNK HVKMLHIRSKTSL RSGTKCKVTGWG ATDPDSLRPSDTL REVTVTVLSRKLC NSQSYYNGDPFIT KDMVCAGDAKG QKDSCKGDSGGPL ICKGVFHAIVSGG HECGVATKPGIYT LLTKKYQTWIKSN LVPPHTN	SEQ ID NO: 122 >NM_002104.2 Homo sapiens granzyme K (GZMK), mRNA GATCAACACATTTCATCTGGGCTTCTTAAATCTAAATCTTTAAAATGACTAAGT TTTCTTCCTTTTCTCTGTTTTTCCTAATAGTTGGGGCTTATATGACTCATGTGTG TTTCAATATGGAAATTATTGGAGGGAAAGAAGTGTCACCTCATTCCAGGCCAT TTATGGCCTCCATCCAGTATGGCGGACATCACGTTTGTGGAGGTGTTCTGATT GATCCACAGTGGGTGCTGACAGCAGCCCACTGCCAATATCGGTTTACCAAAGG CCAGTCTCCCACTGTGGTTTTAGGCGCACACTCTCTCTCAAAGAATGAGGCCT CCAAACAAACACTGGAGATCAAAAAATTTATACCATTCTCAAGAGTTACATCA GATCCTCAATCAAATGATATCATGCTGGTTAAGCTTCAAACAGCCGCAAAACT CAATAAACATGTCAAGATGCTCCACATAAGATCCAAAACCTCTCTTAGATCTG GAACCAAATGCAAGGTTACTGGCTGGGGAGCCACCGATCCAGATTCATTAAG ACCTTCTGACACCCTGCGAGAAGTCACTGTTACTGTCCTAAGTCGAAAACTTT GCAACAGCCAAAGTTACTACAACGGCGACCCTTTTATCACCAAAGACATGGTC TGTGCAGGAGATGCCAAAGGCCAGAAGGATTCCTGTAAGGGTGACTCAGGGG GCCCCTTGATCTGTAAAGGTGTCTTCCACGCTATAGTCTCTGGAGGTCATGAA TGTGGTGTTGCCACAAAGCCTGGAATCTACACCCTGTTAACCAAGAAATACCA GACTTGGATCAAAAGCAACCTTGTCCCGCCTCATACAAATTAAGTTACAAATA ATTTTATTGGATGCACTTGCTTCTTTTTTCCTAATATGCTCGCAGGTTAGAGTT GGGTGTAAGTAAAGCAGAGCACATATGGGGTCCATTTTTGCACTTGTAAGTCA TTTTATTAAGGAATCAAGTTCTTTTTCACTTGTATCACTGATGTATTTCTACCAT GCTGGTTTTATTCTAAATAAAATTTAGAAGACTCAAAAAAAAAAAAAAAAAA AAAAAAAAAAA	
73	CD8A	>NP_001759.3 T-cell surface glycoprotein CD8 alpha chain isoform 1 precursor [Homo sapiens] MALPVTALLLPLA LLLHAARPSQFRV SPLDRTWNLGETV ELKCQVLLSNPTS GCSWLFQPRGAA ASPTFLLYLSQNK	SEQ ID NO: 123 >NM_001768.6 Homo sapiens CD8a molecule (CD8A), transcript variant 1, mRNA AGCACCCAAGGGCTGGTCAACCAAGCTGGGGGTTGAATTTCCATCCAGCAAT GCAGGCCATGGGAGGCTGCAGCAGTGACGCTGTCAGATCCCCTTTGTGAGAAT AATAATTTTTATAACAACGTGGCTGGAGGACTGATCAGGAGAGAGACTGGTG TGAATTGAAGGCTGTTGCAATGGCTCCAAGAAGAGATGAGGCTGTGTGGTGA GTTTAGCCGCTGGATGAAAGGCCGGAAGAATGAGGTCAGCAGCGCACTGACA CCGACACCCAAAGCTTCGGCTGCTGCCGCTCTCATGGAAATCTCCTGGGGGAA GGGAGAGGGTCCTTCCTCGGTGAAAACTGGGGCTGCTCTAGCGAGTTCCTCAG AAGCGGGCAGGTCGCTAGTTCCTCTTCCTTTTCAGCCCTCAGTGCCCATTTTGC CAATAAAAAGTCCCAAGGTGACAGTACAAGAGACGCCTTTAGTGAAGGCAAA GGAAGGGACACTCCCCTCCTTTGCTGCCTACTCTCGCCCTCACTTCTTGAAATC	SEQ ID NO: 148 NG_011608.2

		PKAAEGLDTQRFS	TTTGGTCTCCCTTCACCCACTCTGTCACTCTCACAAGACAACCATTTCCAAGGA	
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		PVFLPAKPTTTPAP	GCTTCGGGTGACATCACATCCTCCAAATGCGAAATCAGGCTCCGGGCCGGCCG	
		RPPTPAPTIASQPL	AAGGGCGCAACTTTCCCCCCTCGGCGCCCCACCGGCTCCCGCGCGCCTCCCCT	
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		AVHTRGLDFACDI	CAGTGACCGCCTTGCTCCTGCCGCTGGCCTTGCTGCTCCACGCCGCCAGGCCG	
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			GGAACAAGTACTTCTTGATACCTGGGATACTGTGCCCAGAGCCTCGAGGAGGT	
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			TTTAATGAATAAACATTTGTAGCATCCTCTTTAATGGGTAAACAGCATCCGAA	
			AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
			AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
			AAAAAAAAAAAAAAAAAAAAA	

CLAIMS

WHAT IS CLAIMED IS:

1. A method comprising:

   administering to a subject, a therapeutically effective amount of a B-cell activating factor (BAFF) inhibitor or a salt thereof and a therapeutically effective amount of an immune checkpoint inhibitor or salt thereof.
2. The method of claim 1, wherein said BAFF inhibitor or said salt thereof comprises an antibody, single chain antibody molecule, or an active fragment thereof.
3. The method of claim 2, wherein said antibody or said active fragment thereof is a monoclonal antibody or an active fragment thereof or a polyclonal antibody or an active fragment thereof.
4. The method of claim 3, wherein said antibody or said active fragment thereof is said monoclonal antibody or said active fragment thereof.
5. The method of any one of claims 2-4, wherein said antibody or said active fragment thereof is bispecific.
6. The method of any one of claims 5, wherein said antibody or said active fragment thereof comprises a first domain that binds BAFF or B-cell activating factor receptor (BAFF-R).
7. The method of claim 5 or 6, wherein said antibody or said active fragment thereof comprises a second domain that binds PD-1 or PD-L1.
8. The method of any one of claims 2-7, wherein said antibody or said active fragment thereof is humanized.
9. The method of any one of claims 2-7, wherein said antibody or said active fragment thereof is an IgG, IgE, IgM, IgD, IgA or IgY.
10. The method of any one of claims 2-9, wherein said antibody or said active fragment thereof is a recombinant protein.
11. The method of any one of claims 1-10, wherein said BAFF inhibitor or said salt thereof comprises a heavy chain having at least 80% sequence identity with a sequence shown in SEQ ID NO:150.
12. The method of any one of claims 1-11, wherein said BAFF inhibitor or said salt thereof comprises a heavy chain having at least 90% sequence identity with a sequence shown in SEQ ID NO:150.

13. The method of any one of claims 1-12, wherein said BAFF inhibitor or said salt thereof comprises a light chain having at least 80% sequence identity with a sequence shown in SEQ ID NO: 151.
14. The method of any one of claims 1-13, wherein said BAFF inhibitor or said salt thereof comprises a light chain having at least 90% sequence identity with a sequence shown in SEQ ID NO:151.
15. The method of any one of claims 1-14, wherein said BAFF inhibitor or said salt thereof comprises a light chain variable region having at least 80% sequence identity with a sequence shown in SEQ ID NO:153.
16. The method of any one of claims 1-15, wherein said BAFF inhibitor or said salt thereof comprises a heavy chain variable region having at least 80% sequence identity with a sequence shown in SEQ ID NO:152.
17. The method of any one of claims 1-10, wherein said BAFF inhibitor or said salt thereof comprises a heavy chain having at least 80% sequence identity with a sequence shown in SEQ ID NO:154.
18. The method of any one of claims 1-10 or 17, wherein said BAFF inhibitor or said salt thereof comprises a heavy chain having at least 90% sequence identity with a sequence shown in SEQ ID NO:154.
19. The method of any one of claims 1-10 or 17-18, wherein said BAFF inhibitor or said salt thereof comprises a light chain having at least 80% sequence identity with a sequence shown in SEQ ID NO:155.
20. The method of any one of claims 1-10 or 17-19, wherein said BAFF inhibitor or said salt thereof comprises a light chain having at least 90% sequence identity with a sequence shown in SEQ ID NO: 155.
21. The method of any one of claims 1-10 or 17-20, wherein said BAFF inhibitor or said salt thereof comprises a light chain variable region having at least 80% sequence identity with a sequence shown in SEQ ID NO:157.
22. The method of any one of claims 1-10 or 17-21, wherein said BAFF inhibitor or said salt thereof comprises a heavy chain variable having at least 90% sequence identity with a sequence shown in SEQ ID NO:156.
23. The method of any one of claims 1-10, wherein said BAFF inhibitor said salt thereof comprises as sequence having at least 80% length homology to a sequence shown in SEQ ID NO:1 –16 or SEQ ID NO:150-163.

24. The method of any one of claims 1-10, wherein said BAFF inhibitor or said salt thereof is a biosimilar product to a reference product, wherein said reference product comprises tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, MEDI-700, NOV-5, rGel/BlyS, a salt of any one thereof, and any combination thereof.
25. The method of any one of claims 1-10, wherein said BAFF inhibitor or said salt thereof is an interchangeable product to a reference product, wherein said reference product comprises tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, MEDI-700, NOV-5, rGel/BlyS, a salt of any one thereof, and any combination thereof.
26. The method of any one of claims 1-25, wherein said BAFF inhibitor or said salt thereof comprises a post translational modification.
27. The method of claim 26, wherein said post translational modification comprises glycosylation, methylation, phosphorylation, lipidation, acetylation, nitrosylation, or any combination thereof.
28. The method of clam 27, wherein said post translational modification comprises said glycosylation.
29. The method of any one of claims 1-28, wherein said BAFF inhibitor or said salt thereof binds a polypeptide having at least 80% sequence identity with a sequence shown in SEQ ID NOs: 31, 32 or 33.
30. The method of any one of claims 1-28, wherein said BAFF inhibitor or said salt thereof binds a polypeptide having at least 80% sequence identity with a sequence shown in SEQ ID NOs: 149.
31. The method of any one of claims 1-30, wherein said subject have a cancer or is suspected of having said cancer.
32. The method of claim 31, wherein said cancer comprises leukemia, melanoma, prostate cancer, bladder cancer, osteosarcoma, cervical cancer, liver cancer, multiple myeloma, testicular, renal cancer or a combination thereof.
33. The method of any one of claims 31-32, wherein said cancer was at least partially refractive to an immune checkpoint inhibitor or a salt thereof.
34. The method of any one of claims 31-33, wherein said cancer was diagnosed by an assay.
35. The method of claim 34, wherein said assay is a companion diagnostic.

36. The method of any one of claims 1-35, wherein said immune checkpoint inhibitor inhibits PD-1,PD-L1, PD-L2, CTLA-4, A2AR, B7-H3, B7-H4, BTLA, IDO, KIR, LAG3, TIM-3, VISTA, CD160, TIGIT or PSGL-1.
37. The method of claim 36, wherein said immune checkpoint inhibitor or said salt thereof comprises a PD-1 inhibitor or a salt thereof.
38. The method of claim 37, wherein said PD-1 inhibitor or a salt thereof comprises nivolumab, pembrolizumab, pidilizumab, BGB-A31, AMP-224, MEDI0680 (AMP-514), PDR001, Cemiplimab or a salt of any one thereof.
39. The method of claim 36, wherein said immune checkpoint inhibitor or a salt thereof comprises a PD-L1 inhibitor or a salt thereof.
40. The method of claim 39, wherein said PD-L1 inhibitor or said salt thereof comprises nivolumab, docetaxel, pembrolizumab, pidilizumab, BGB-A31, MEDI0680 (AMP-514), or a salt of any one thereof.
41. The method of any one of claims 1-40, wherein said BAFF inhibitor or said salt thereof is administered intra-arterially, intravenously, intramuscularly, orally, subcutaneously, via inhalation, or any combination thereof.
42. The method of claim 41, wherein said BAFF inhibitor or said salt thereof is administered intravenously.
43. The method of any one of claims 1-42, wherein said therapeutically effective amount of said BAFF inhibitor or said salt thereof comprises a dose of about 0.04 mg/kg to about 20 mg/kg relative to a body weight of said subject.
44. The method of any one of claims 1-43, wherein said immune checkpoint inhibitor or said salt thereof is administered intra-arterially, intravenously, intramuscularly, orally, subcutaneously, via inhalation, or any combination thereof.
45. The method of claim 44, wherein said immune checkpoint inhibitor or said salt thereof is administered intravenously.
46. The method of any one of claims 1-45, wherein said therapeutically effective amount of said immune checkpoint inhibitor or said salt thereof comprises a dose of about 0.04 mg/kg to about 20 mg/kg relative to a body weight of said subject.
47. The method of any one of claims 1-46, wherein said BAFF inhibitor or said salt thereof and said immune checkpoint inhibitor or said salt thereof are administered concurrently.
48. The method of claim 47, wherein said BAFF inhibitor or said salt thereof and said immune checkpoint inhibitor or said salt thereof are administered together in a single composition.

49. The method of any one of claims 1-46, wherein said BAFF inhibitor or said salt thereof and said immune checkpoint inhibitor or said salt thereof are administered sequentially.
50. The method of claim 49, wherein said BAFF inhibitor or said salt thereof is first administered and said immune checkpoint inhibitor or said salt thereof is administered second.
51. The method of claim 49, wherein said immune checkpoint inhibitor or said salt thereof is first administered and said BAFF inhibitor or said salt thereof is administered second.
52. The method of any one of claims 1-51, wherein said administering is performed at least once a month.
53. The method of any one of claims 1-52, wherein said administering is performed at least twice a month.
54. The method of any one of claims 1-53, wherein said subject is a human.
55. The method of any one of claims 1-54, wherein said subject is in need thereof.
56. A pharmaceutical composition for use in the method of any one of claims 1-55, wherein said pharmaceutical composition comprises
    a. said BAFF inhibitor or said salt thereof; and
    b. said immune checkpoint inhibitor or said salt thereof.
57. The pharmaceutical composition of claim 56, wherein said pharmaceutical composition further comprises a pharmaceutically acceptable excipient.
58. The pharmaceutical composition of any one of claims 56-57, wherein said pharmaceutical composition is in unit dose form.
59. A bispecific antibody comprising:
    a. a first domain, wherein said first domain binds BAFF, BAFF-R or a portion thereof; and
    b. a second domain, wherein said second domain binds PD-1, PD-L1 or a portion thereof.
60. The bispecific antibody of claim 59, wherein said first domain comprises a heavy chain variable region, light chain variable region, light chain or heavy chain of tabalumab, atacicept, RCT-18, BAFF/IL-17 bispecific antibody, ardenermin, briobacept, blisibimod, belimumab, MEDI-700, NOV-5, rGel/BlyS or a combination thereof.
61. The bispecific antibody of any one of claims 59-60, wherein said second domain comprises a heavy chain variable region, light chain variable region, light chain or heavy chain of nivolumab, docetaxel, pembrolizumab, pidilizumab, BGB-A31, MEDI0680, AMP-224, MEDI0680, PDR001, Cemiplimab or a combination thereof.

62. A composition comprising the bispecific antibody of any one of claims 59-61, and a pharmaceutically acceptable carrier.
63. The composition of claim 62 for use in the method of any one of claims 1-55.

```
[0 1 1 0 0 0 0 0 0]
[1 0 1 1 0 1 1 1 0]
[1 0 0 1 1 0 0 0 1]
[1 0 0 0 1 0 0 0 1]
[1 0 0 1 0 1 0 1 1]
[1 1 1 0 0 1 1 1 0]
[1 0 0 1 1 0 0 1 0]
[1 0 1 0 1 0 0 1 0]
[1 1 1 1 1 1 1 1 0]
```

FIG. 1

```
[0 0 0 0 0 0 0 0 0]
[0 0 0 0 0 0 0 0 0]
[0 0 0 0 0 5 2 0 0]
[0 0 1 0 0 4 6 0 0]
[0 0 0 0 4 0 8 0 0]
[0 0 0 0 9 0 0 0 0]
[0 0 0 0 0 0 3 0 0]
[0 0 0 0 0 5 7 0 0]
[0 0 0 0 0 0 0 0 0]
```

FIG. 2

```
[0    1    1    0      0      0      0    0    0]
[1    1    1    1      0      2      2    2    0]
[1    1    1    1      1|2    2      2    2    2]
[1    1    1    1      1|2|3  2      2    2    2]
[1    1    1    1|3    3      2|3    2    2    2]
[1|4  1|4  1|3  3      3      2|3|6  2|6  2|6  0]
[4    4    4    3|4|5  3|5|6  6      6    6    0]
[4    4    4|5  5      5|6    6      6    6    0]
[4    4    4|5  5      5|6    6      6    6    0]
```

FIG. 3

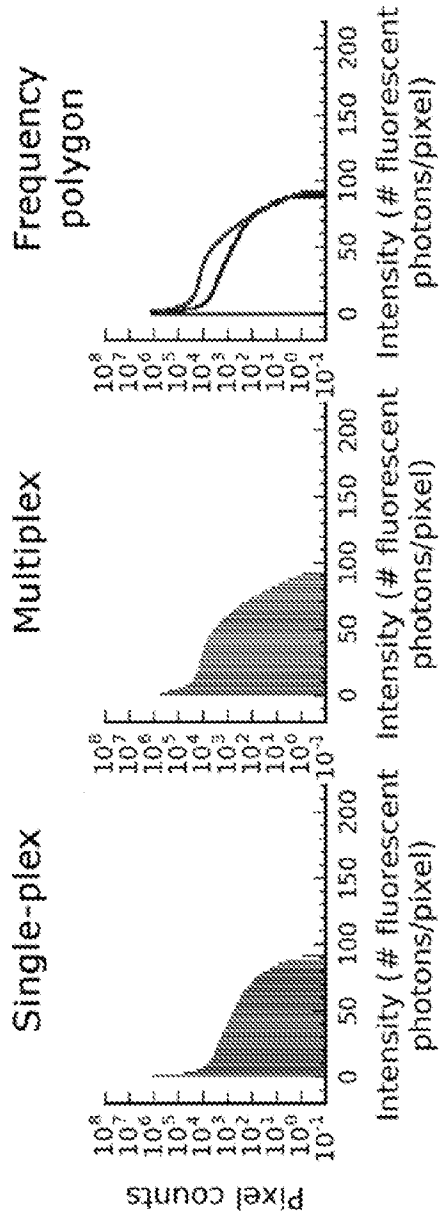

Single-plex
Multiplex
Frequency polygon
Pixel counts
Intensity (# fluorescent photons/pixel)
Intensity (# fluorescent photons/pixel)
Intensity (# fluorescent photons/pixel)

FIG. 4

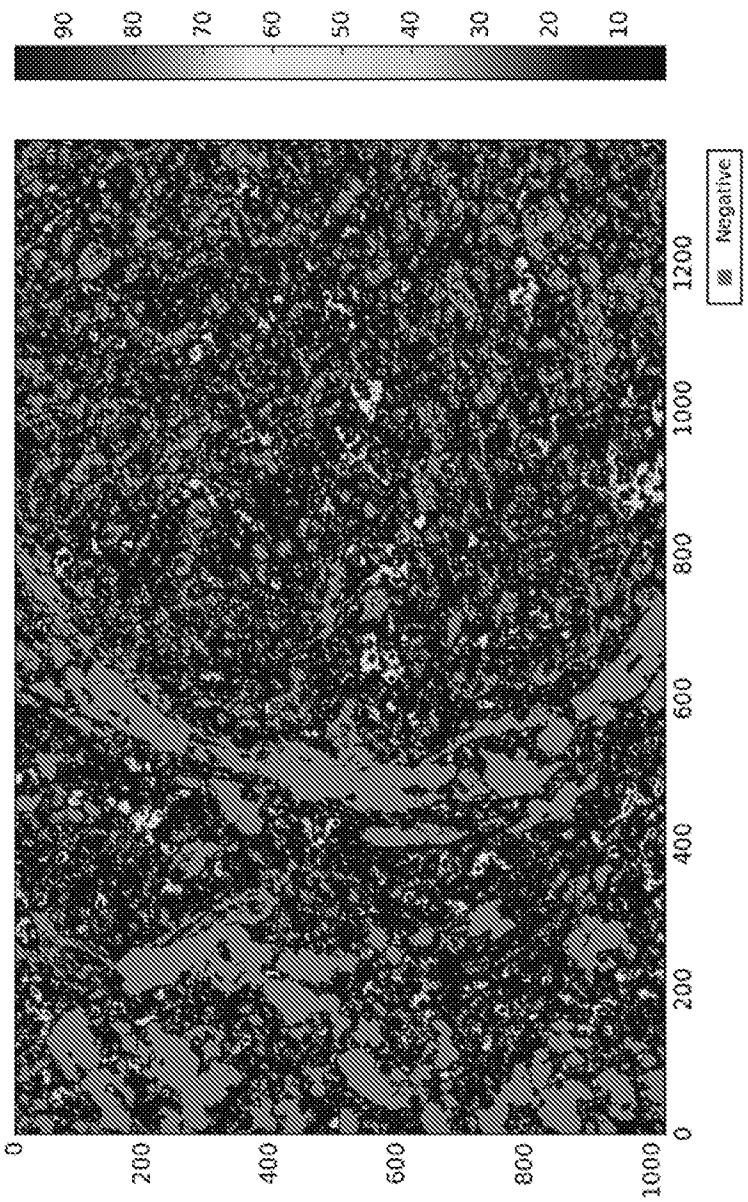


FIG. 5

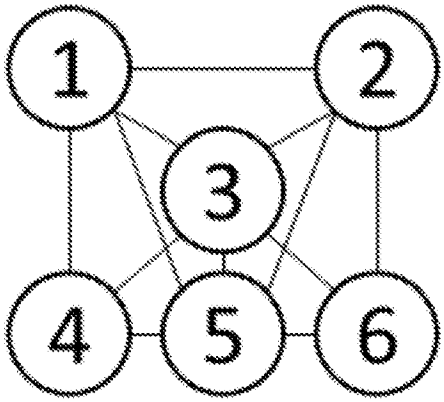


FIG. 6

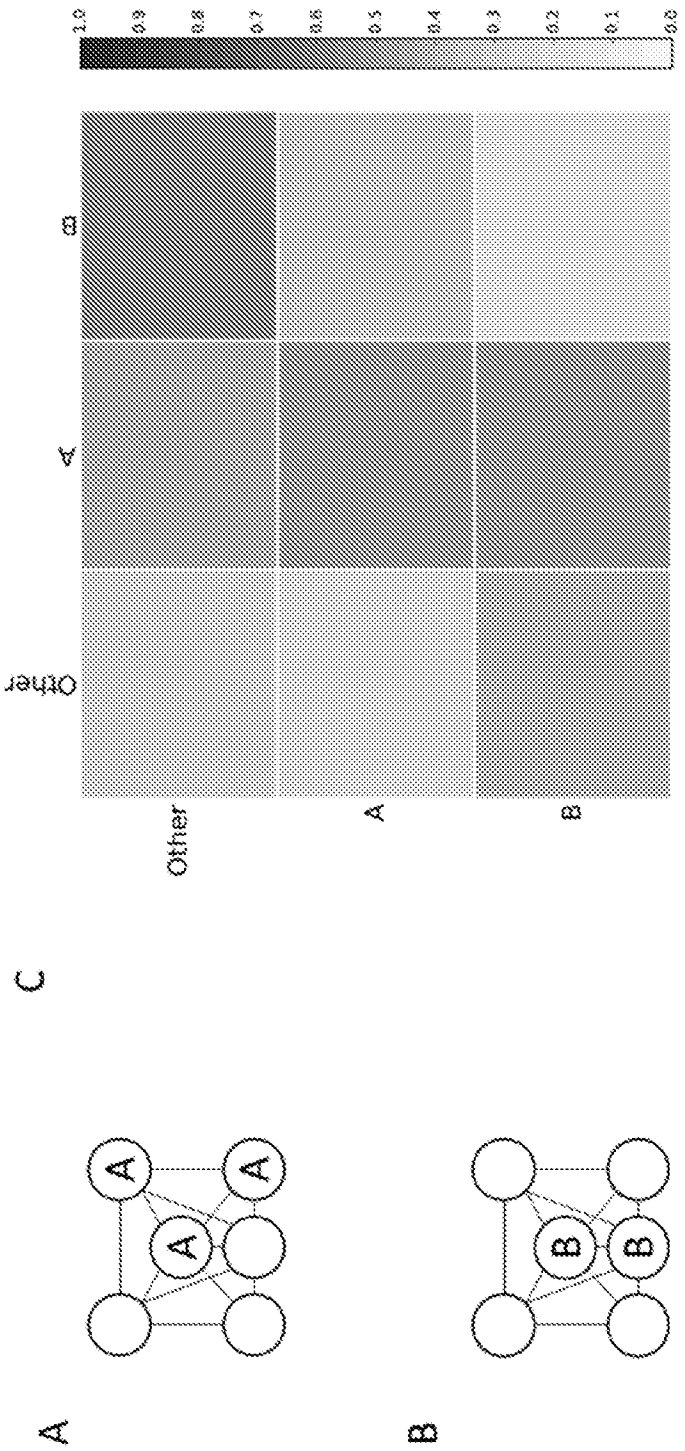


FIG. 7

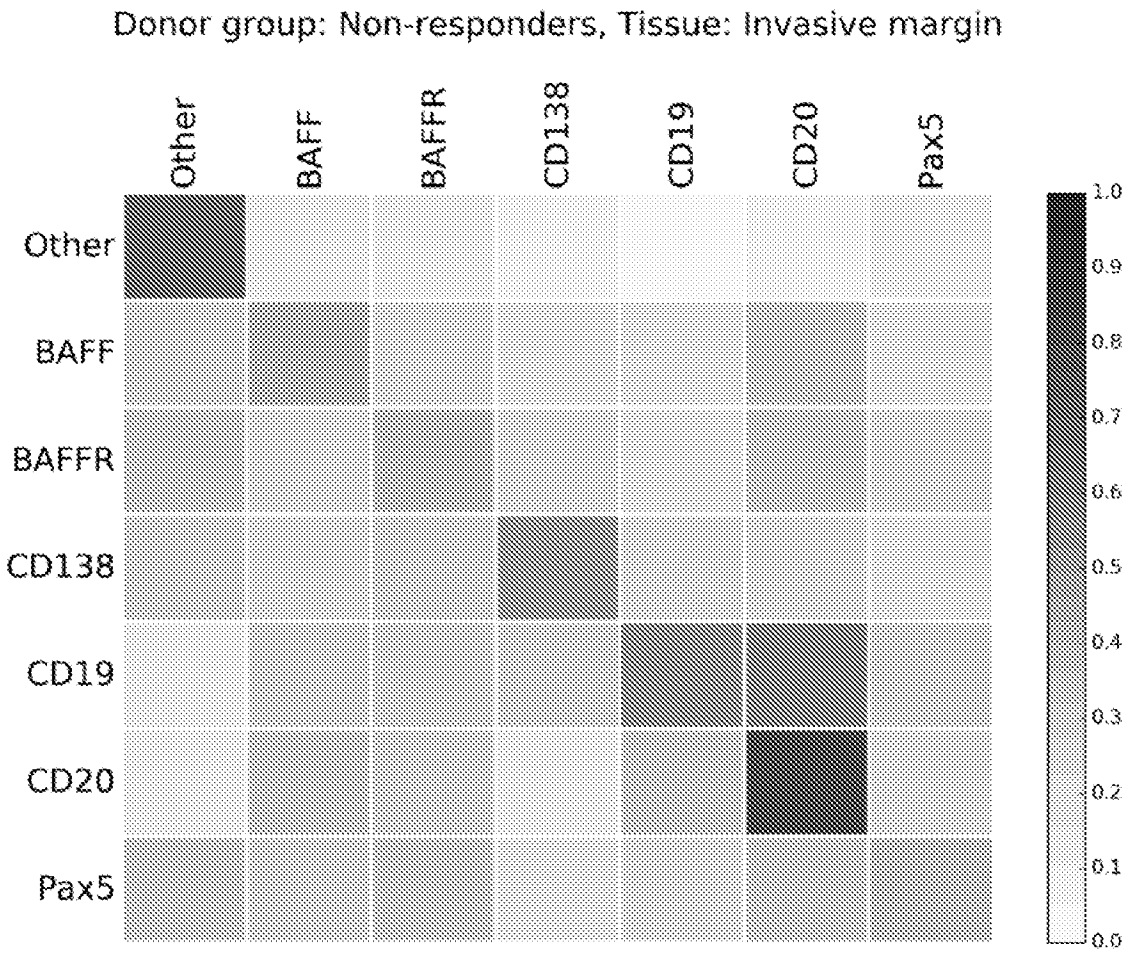

Donor group: Non-responders, Tissue: Invasive margin
Other
BAFF
BAFFR
CD138
CD19
CD20
Pax5
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

FIG. 8

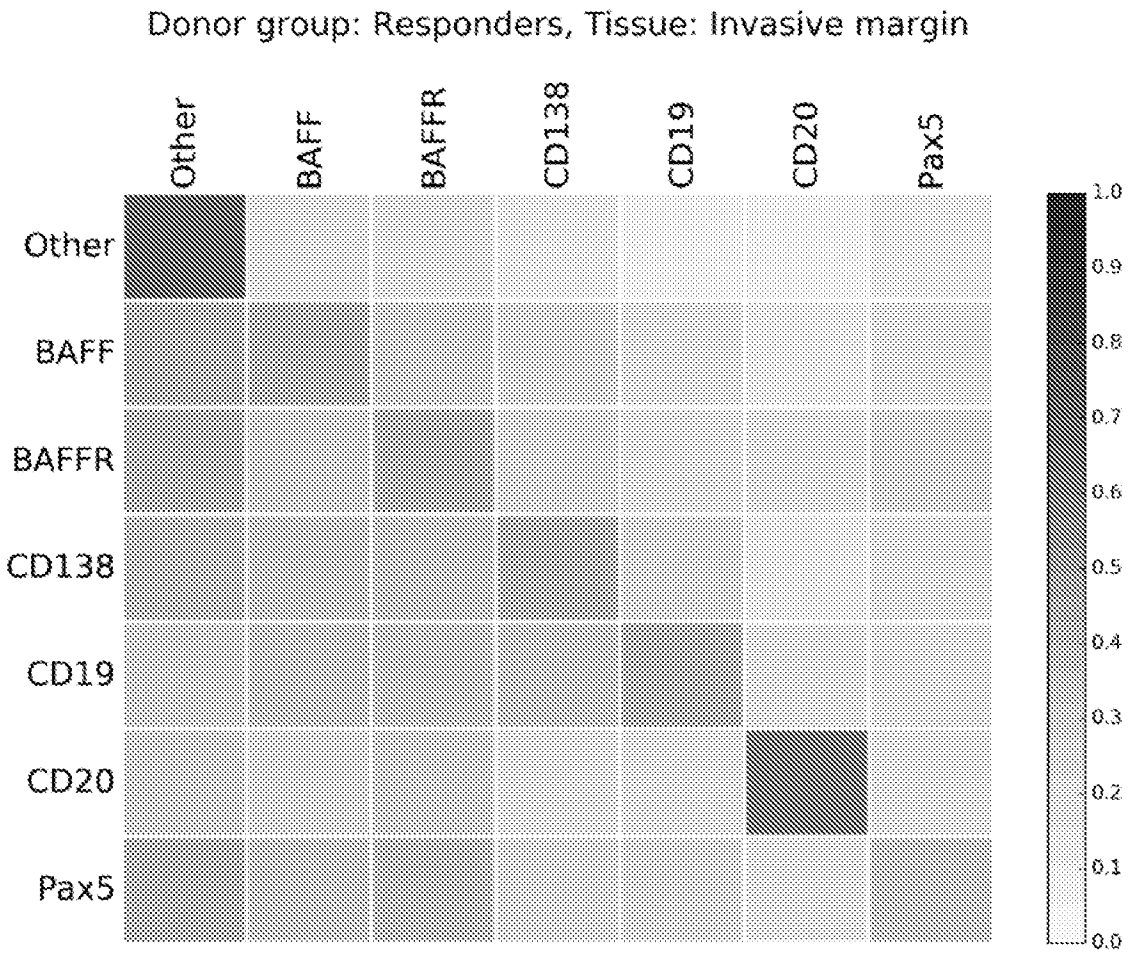

Donor group: Responders, Tissue: Invasive margin
Other
BAFF
BAFFR
CD138
CD19
CD20
Pax5
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

FIG. 9

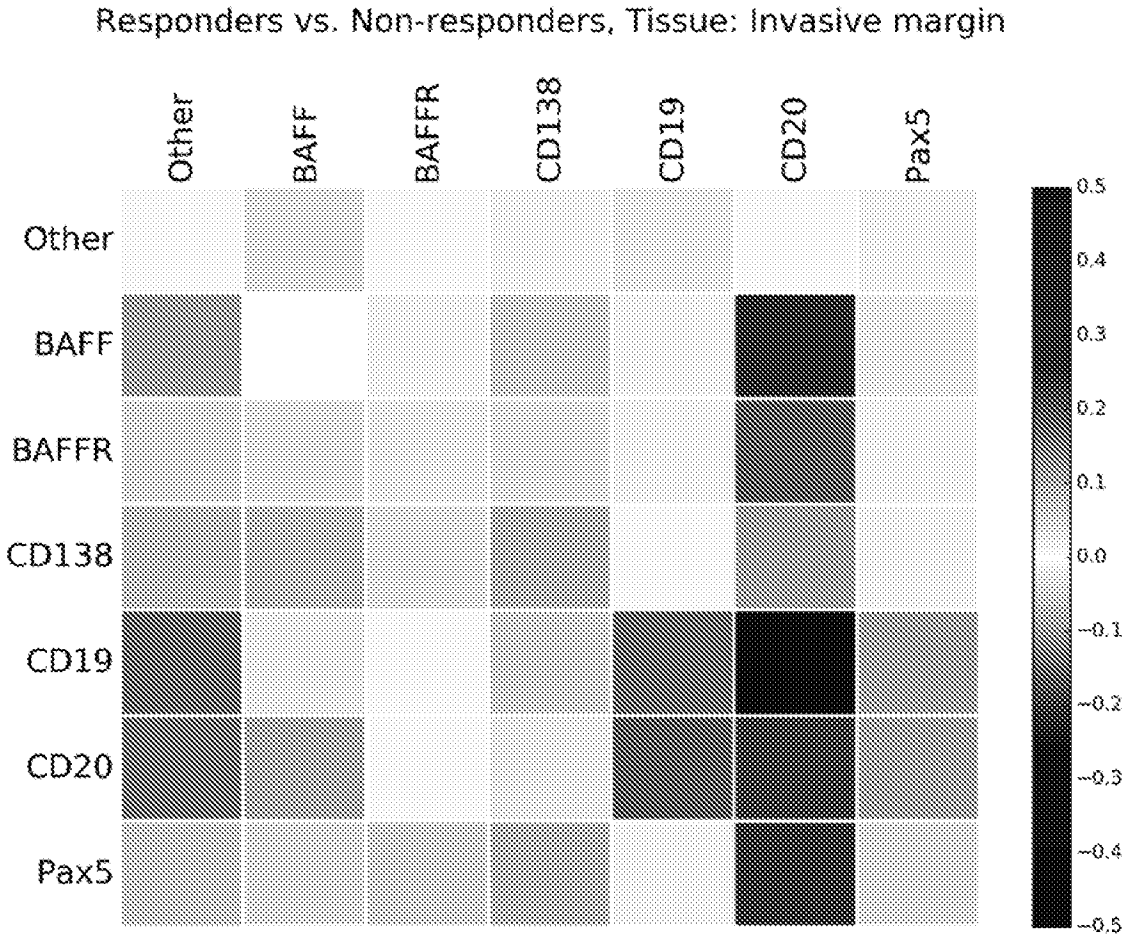

Responders vs. Non-responders, Tissue: Invasive margin
Other
BAFF
BAFFR
CD138
CD19
CD20
Pax5
0.5
0.4
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
−0.4
−0.5

FIG. 10

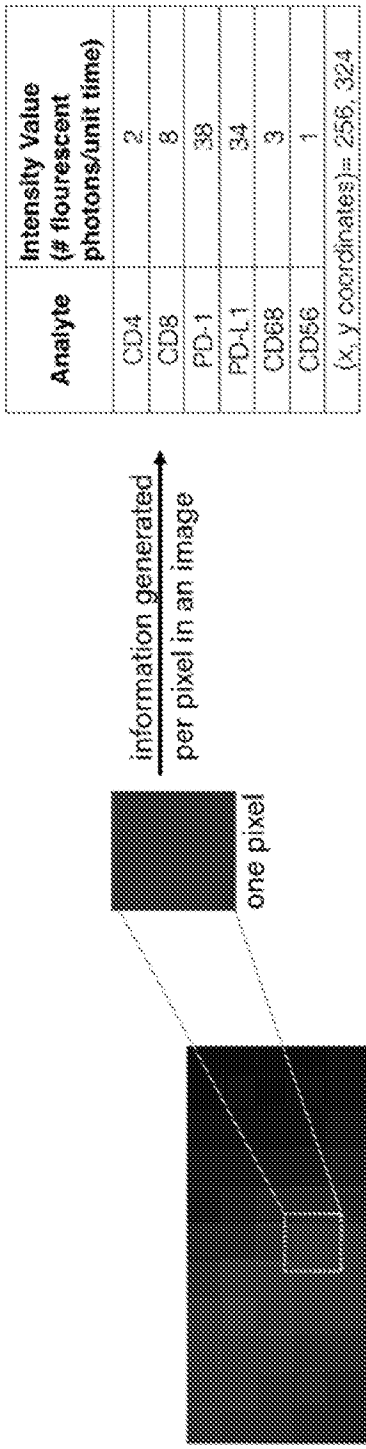

Analyte
Intensity Value (# flourescent photons/unit time)
CD4
2
CD8
8
PD-1
38
PD-L1
34
CD68
3
CD56
1
(x, y coordinates) = 256, 324
information generated per pixel in an image
one pixel

FIG. 11

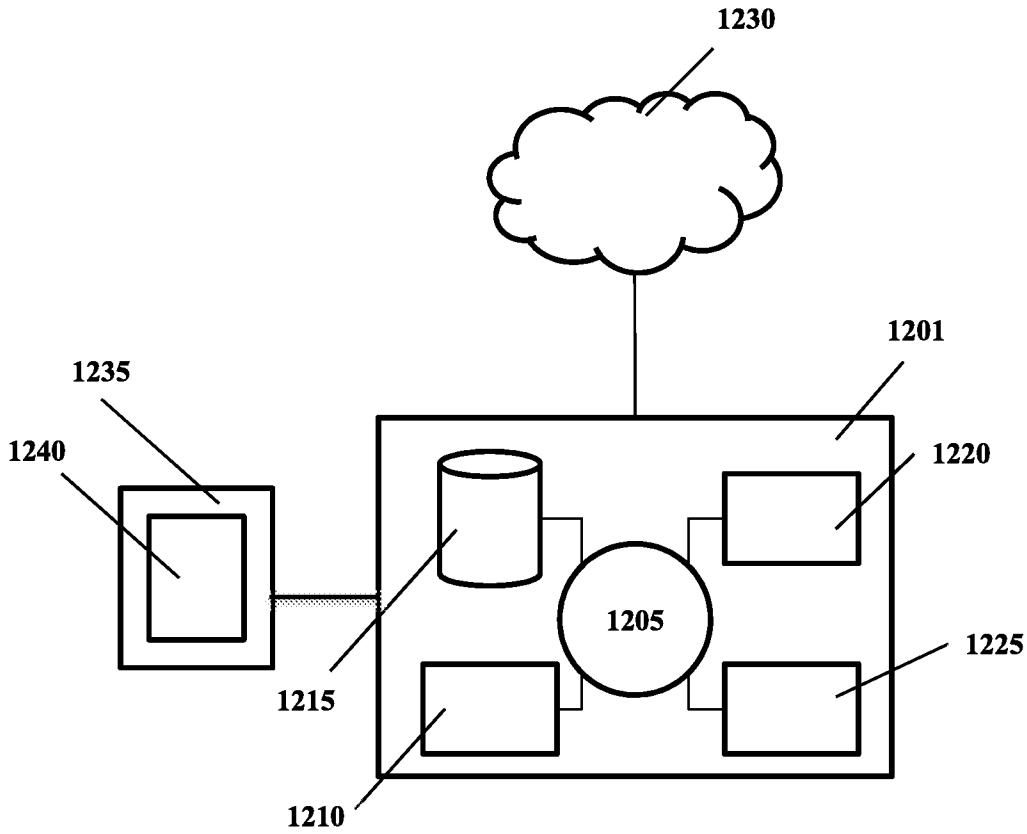


FIG. 12

FIG. 13A

FIG. 13B

FIG. 13C

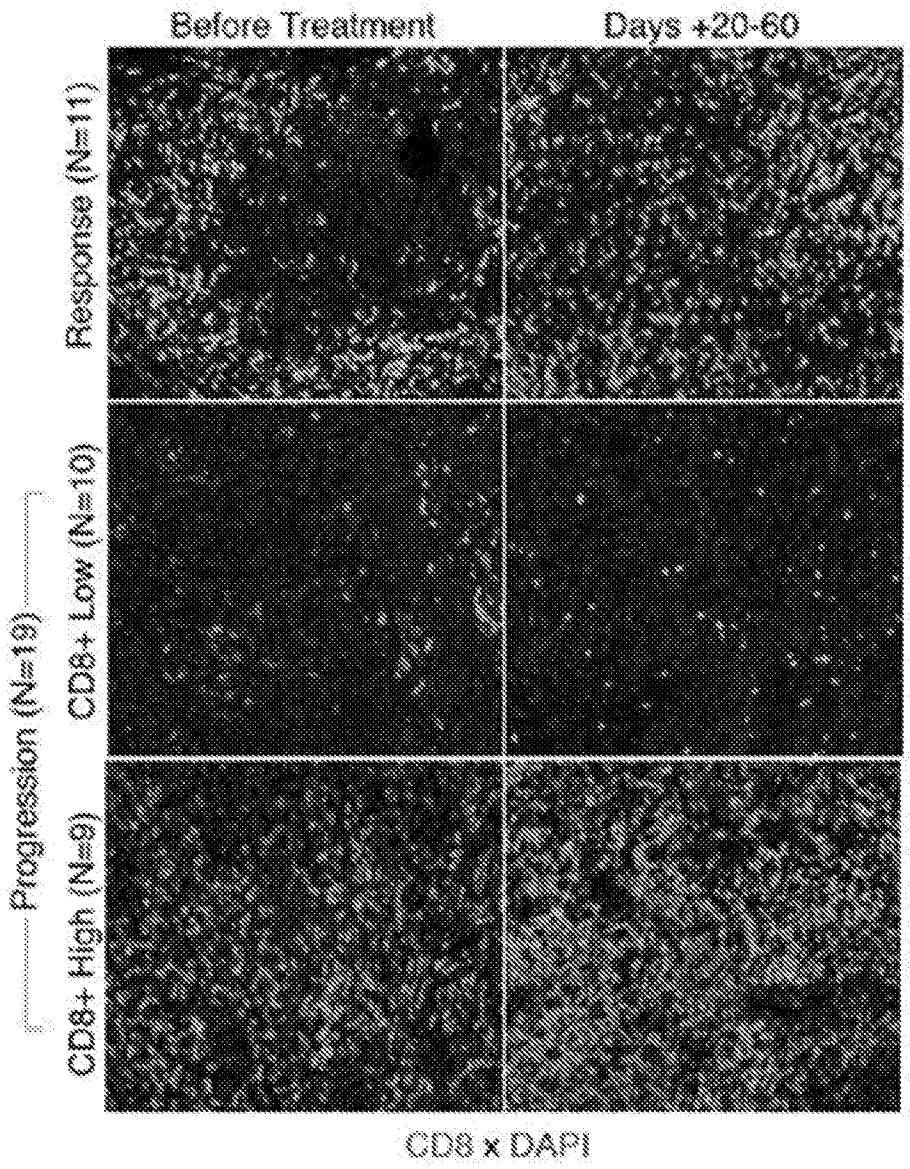


FIG. 14A

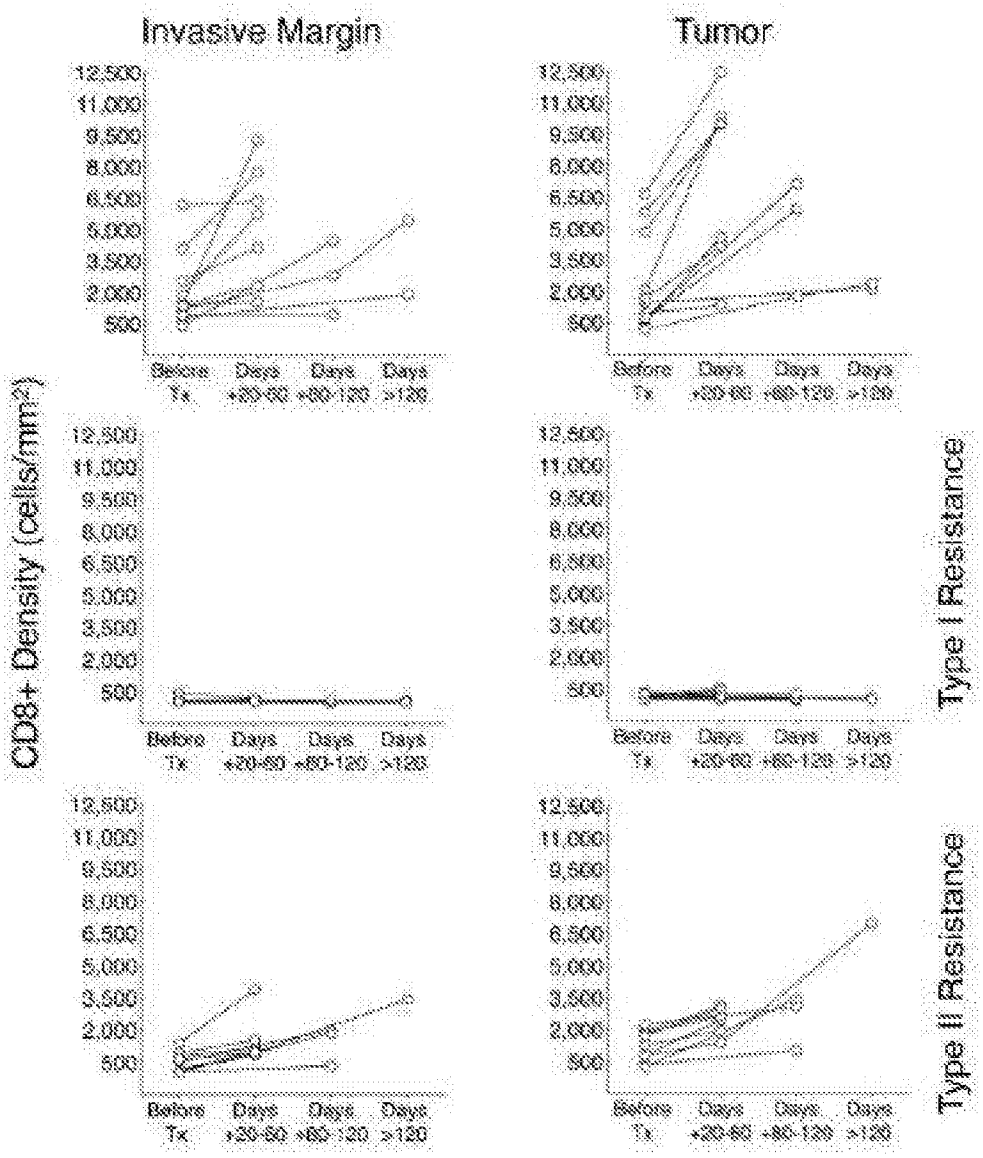


FIG. 14B

FIG. 14C

FIG. 15A

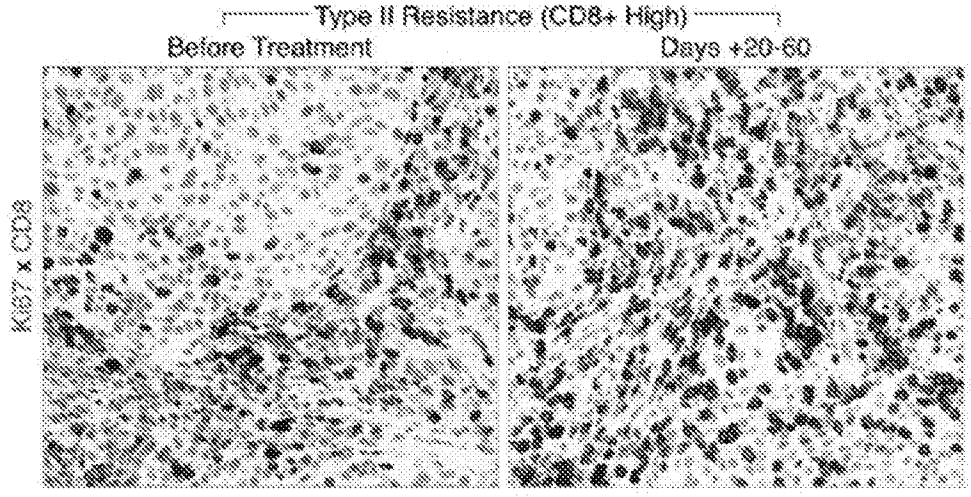
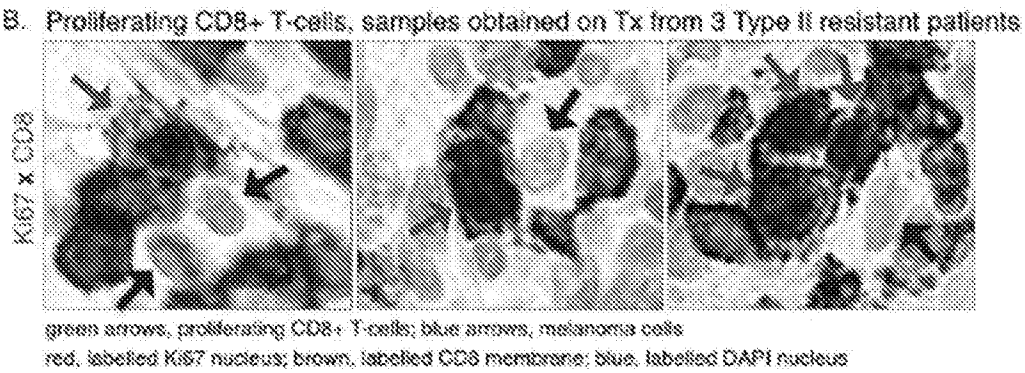


FIG. 15B



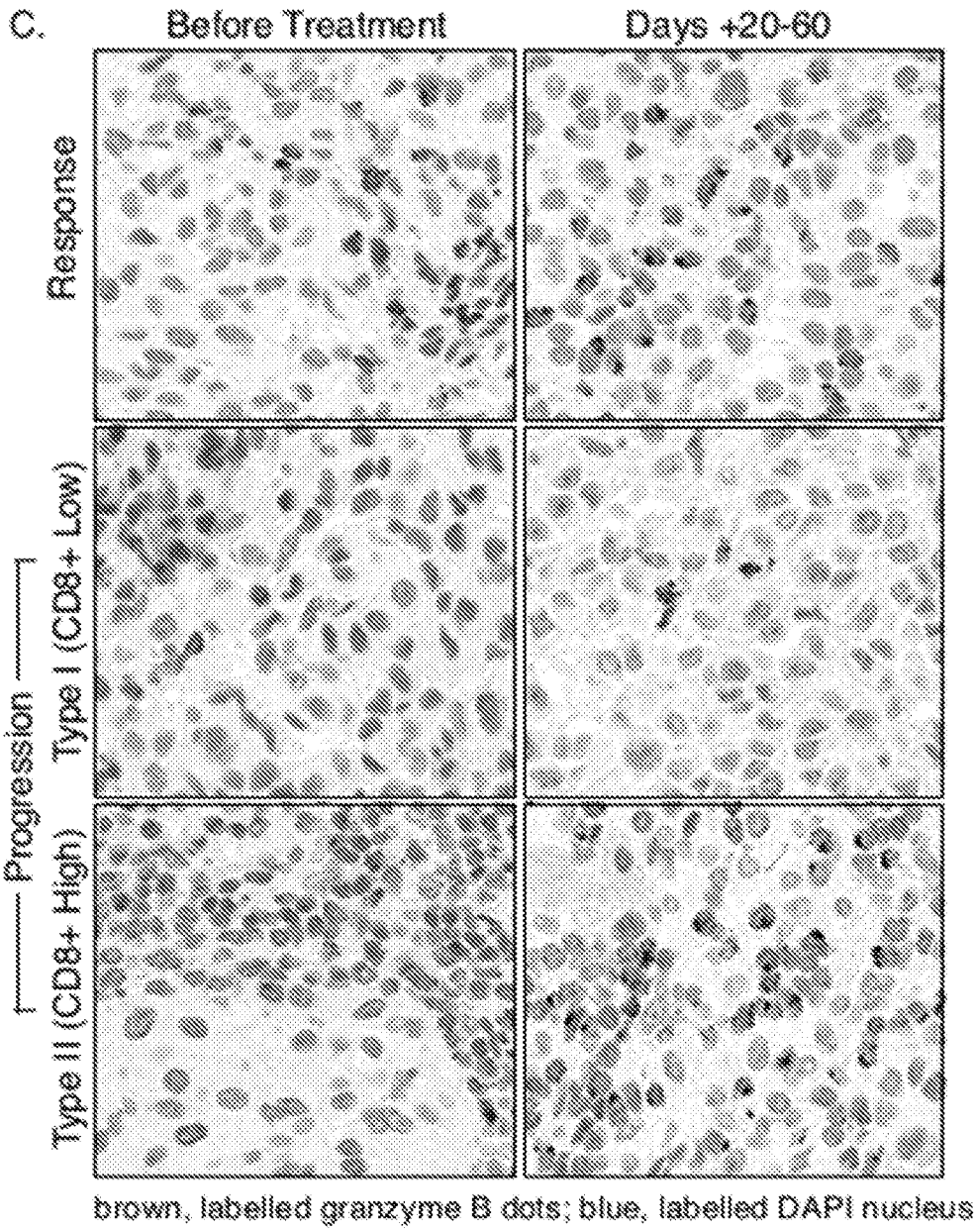

C.
Before Treatment
Days +20-60
Response
Progression
Type I (CD8+ Low)
Type II (CD8+ High)
brown, labelled granzyme B dots; blue, labelled DAPI nucleus

FIG. 16

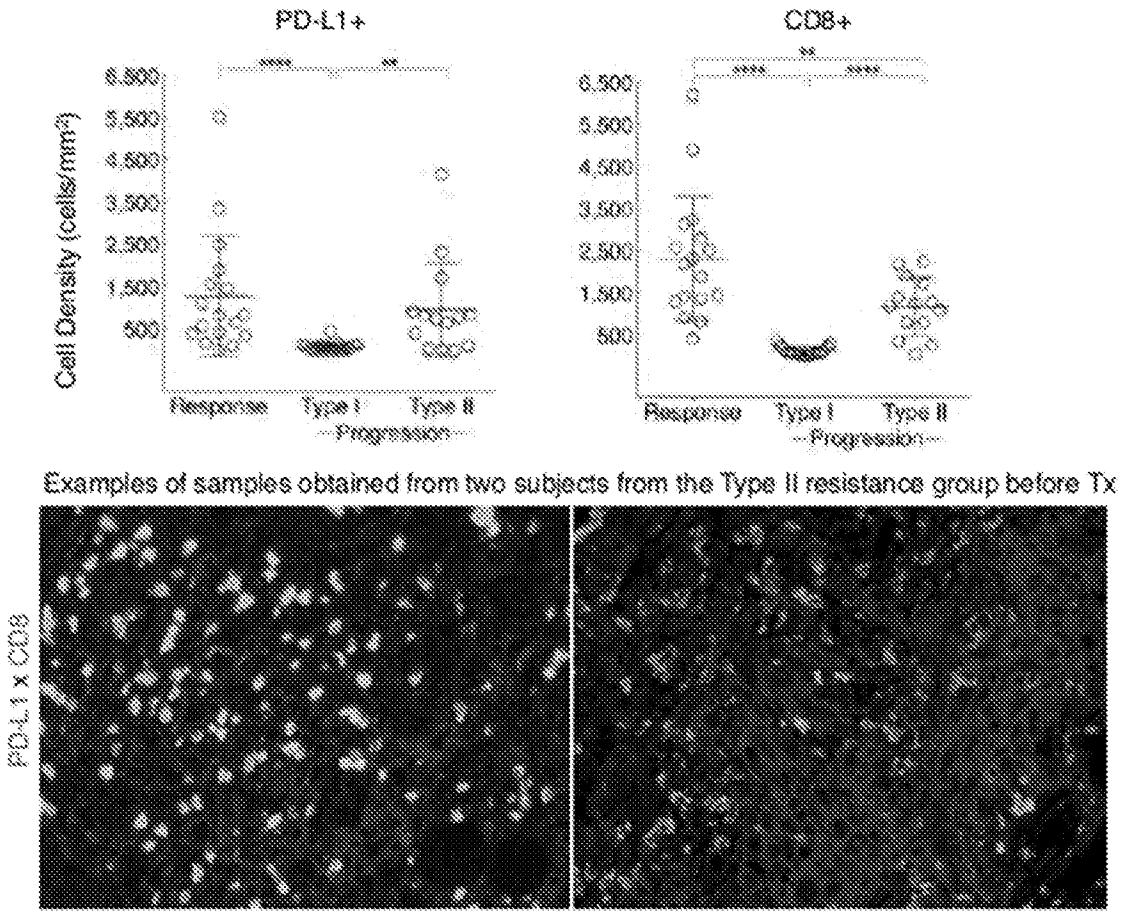

PD-L1+
CD8+
Cell Density (cells/mm²)
6,500
5,500
4,500
3,500
2,500
1,500
500
****
**
Response
Type I
Type II
Progression
Examples of samples obtained from two subjects from the Type II resistance group before Tx
PD-L1 x CD8

FIG. 17

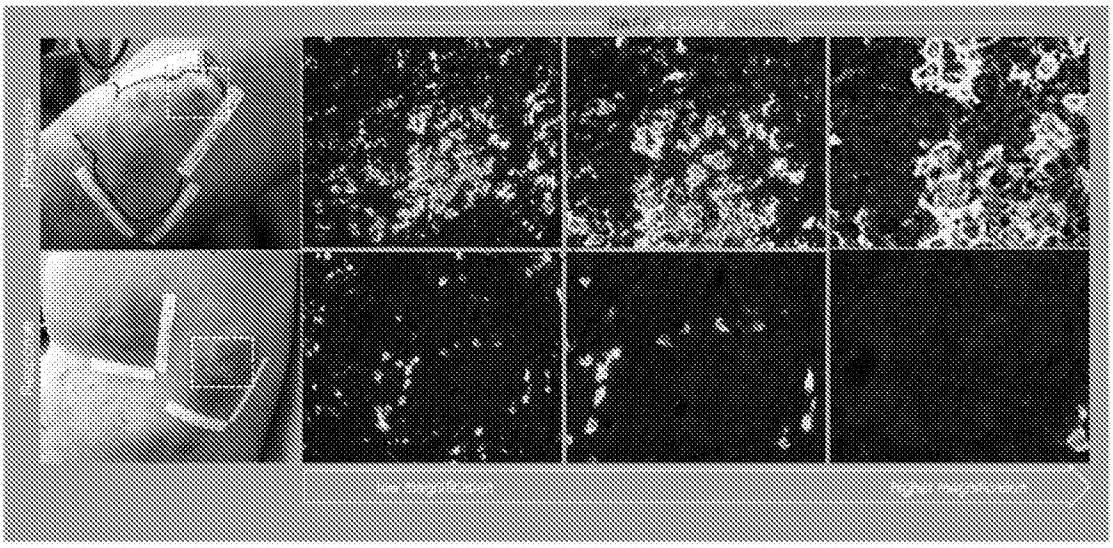


FIG. 18

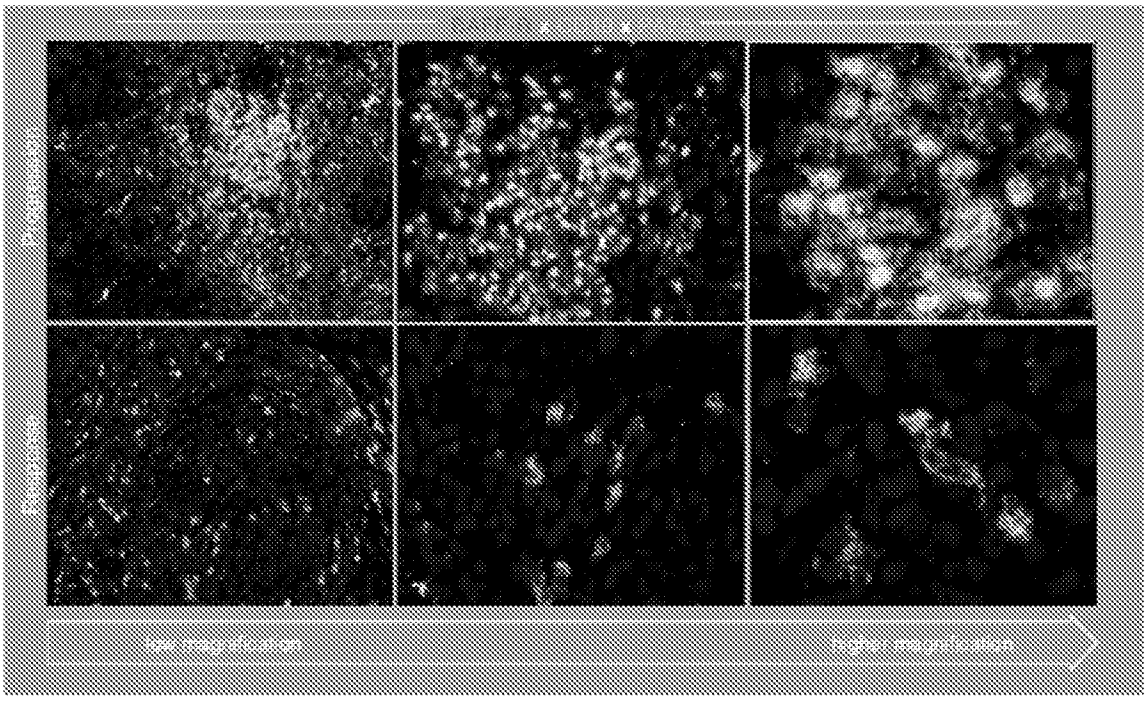


FIG. 19

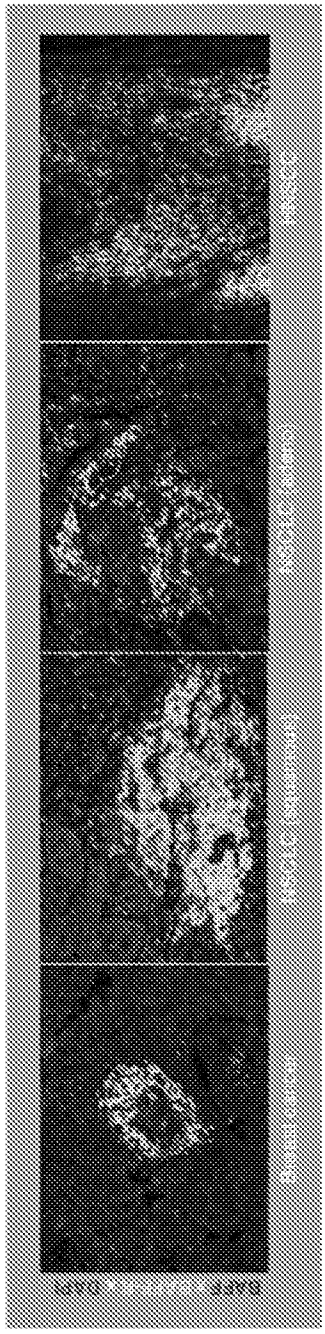


FIG. 20

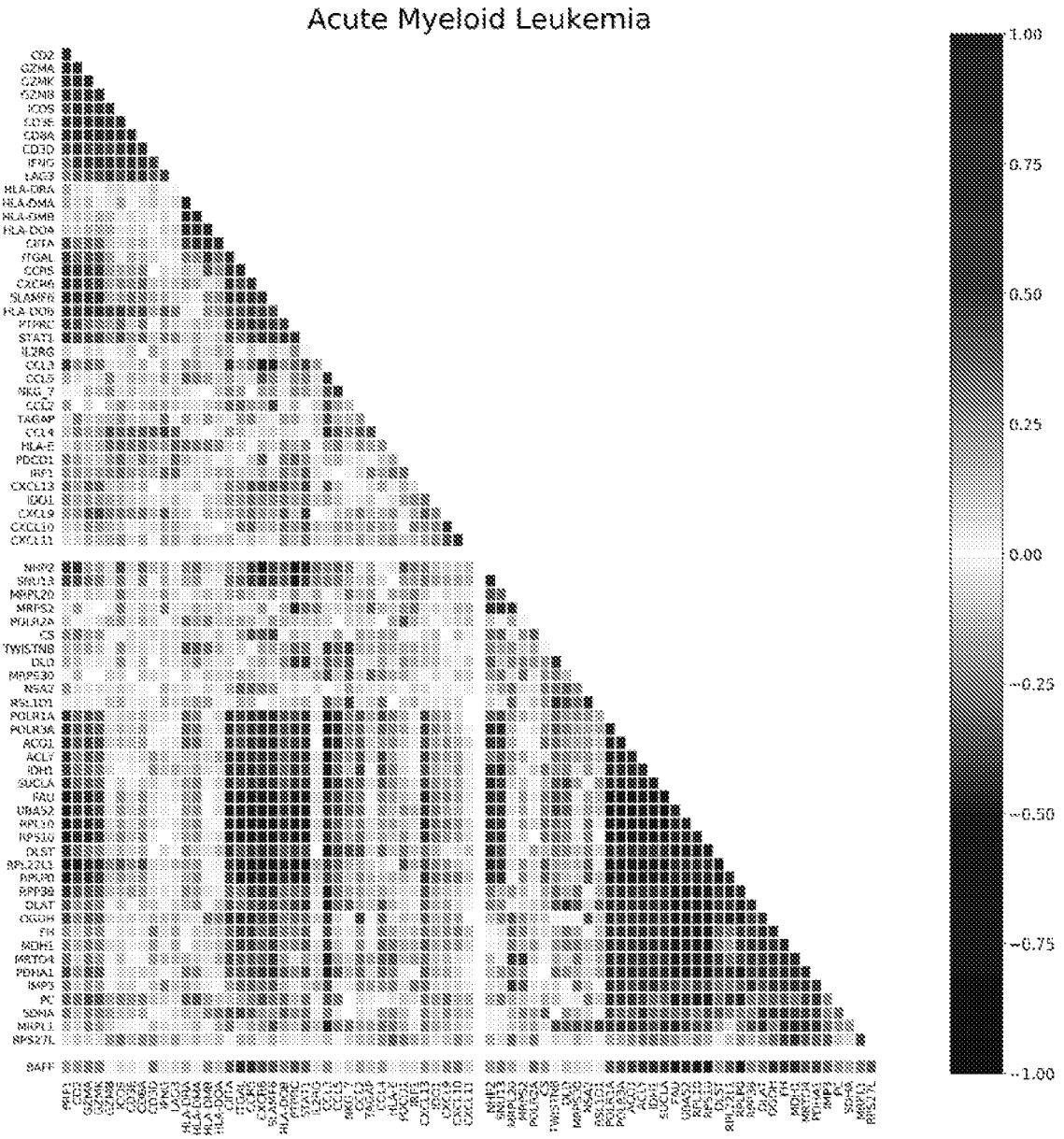


FIG. 21

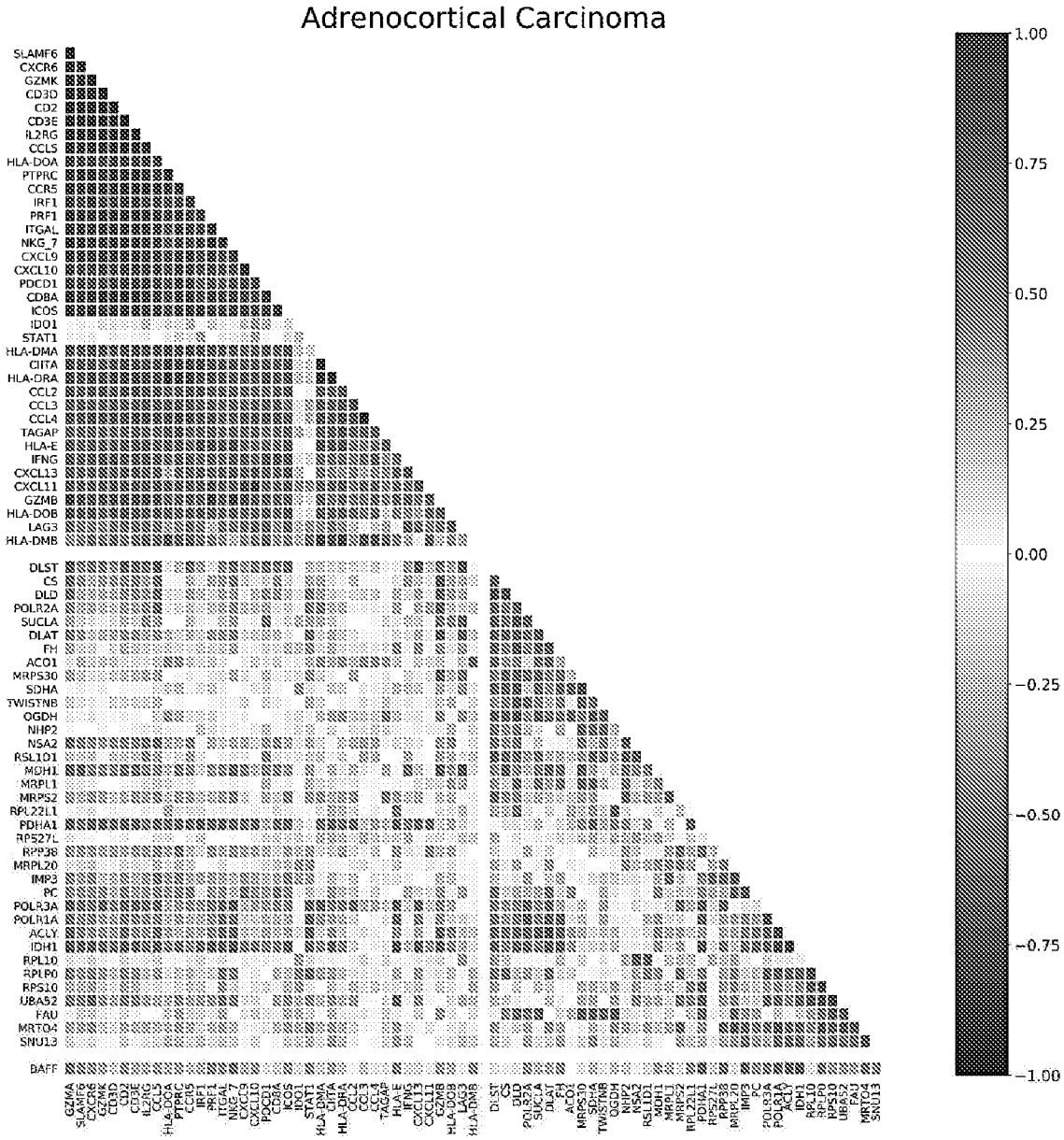

Adrenocortical Carcinoma
SLAMF6
CXCR6
GZMK
CD3D
CD2
CD3E
IL2RG
CCL5
HLA-DOA
PTPRC
CCR5
IRF1
PRF1
ITGAL
NKG_7
CXCL9
CXCL10
PDCD1
CD8A
ICOS
IDO1
STAT1
HLA-DMA
CIITA
HLA-DRA
CCL2
CCL3
CCL4
TAGAP
HLA-E
IFNG
CXCL13
CXCL11
GZMB
HLA-DOB
LAG3
HLA-DMB
DLST
CS
DLD
POLR2A
SUCLA
DLAT
FH
ACO1
MRPS30
SDHA
TWISTNB
OGDH
NHP2
NSA2
RSL1D1
MDH1
MRPL1
MRPS2
RPL22L1
PDHA1
RPS27L
RPP38
MRPL20
IMP3
PC
POLR3A
POLR1A
ACLY
IDH1
RPL10
RPLP0
RPS10
UBA52
FAU
MRTO4
SNU13
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 22

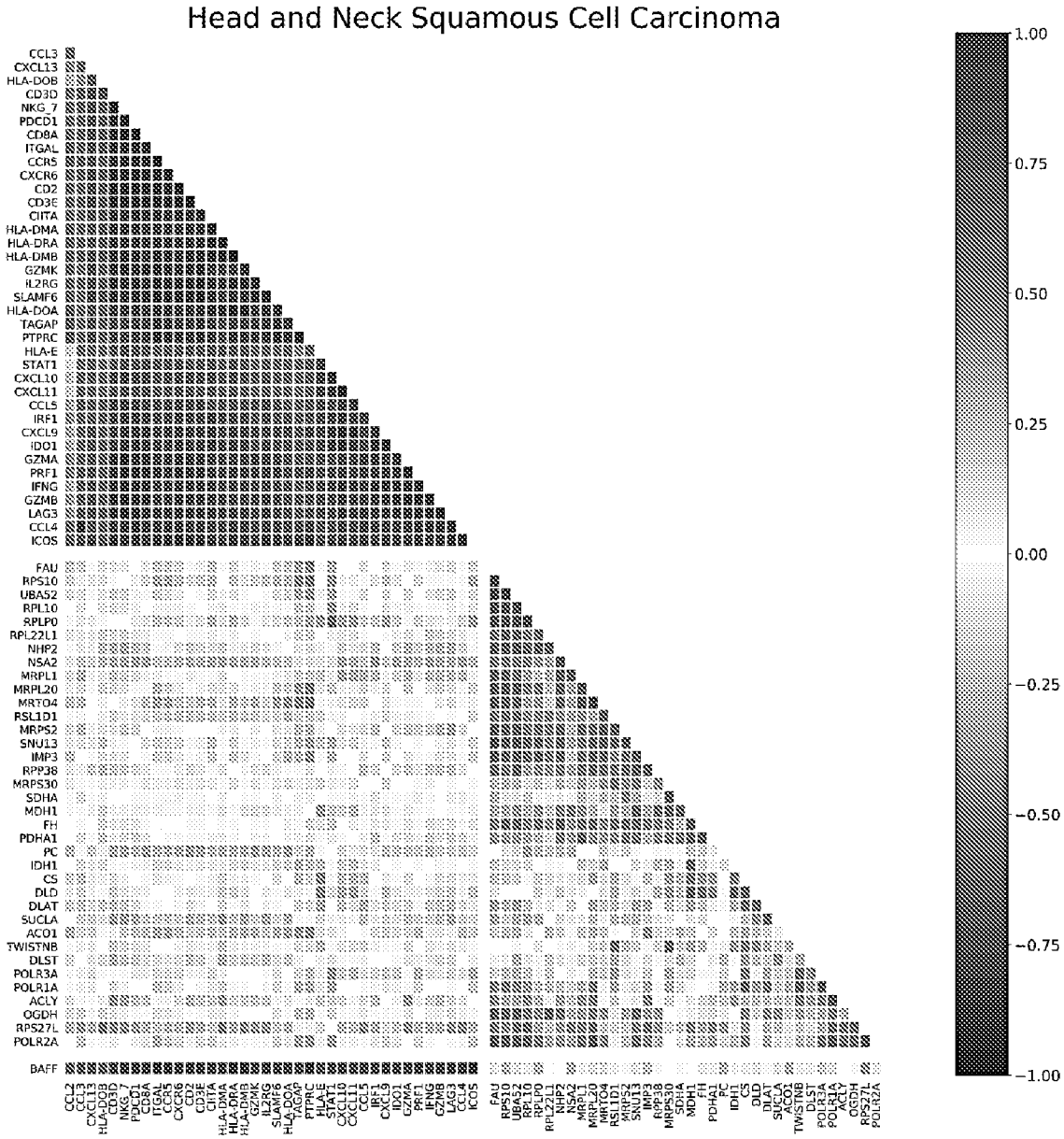

Head and Neck Squamous Cell Carcinoma
CCL3
CXCL13
HLA-DOB
CD3D
NKG7
PDCD1
CD8A
ITGAL
CCR5
CXCR6
CD2
CD3E
CIITA
HLA-DMA
HLA-DRA
HLA-DMB
GZMK
IL2RG
SLAMF6
HLA-DOA
TAGAP
PTPRC
HLA-E
STAT1
CXCL10
CXCL11
CCL5
IRF1
CXCL9
IDO1
GZMA
PRF1
IFNG
GZMB
LAG3
CCL4
ICOS
FAU
RPS10
UBA52
RPL10
RPLP0
RPL22L1
NHP2
N5A2
MRPL1
MRPL20
MRTO4
RSL1D1
MRPS2
SNU13
IMP3
RPP38
MRPS30
SDHA
MDH1
FH
PDHA1
PC
IDH1
CS
DLD
DLAT
SUCLA
ACO1
TWISTNB
DLST
POLR3A
POLR1A
ACLY
OGDH
RPS27L
POLR2A
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 23

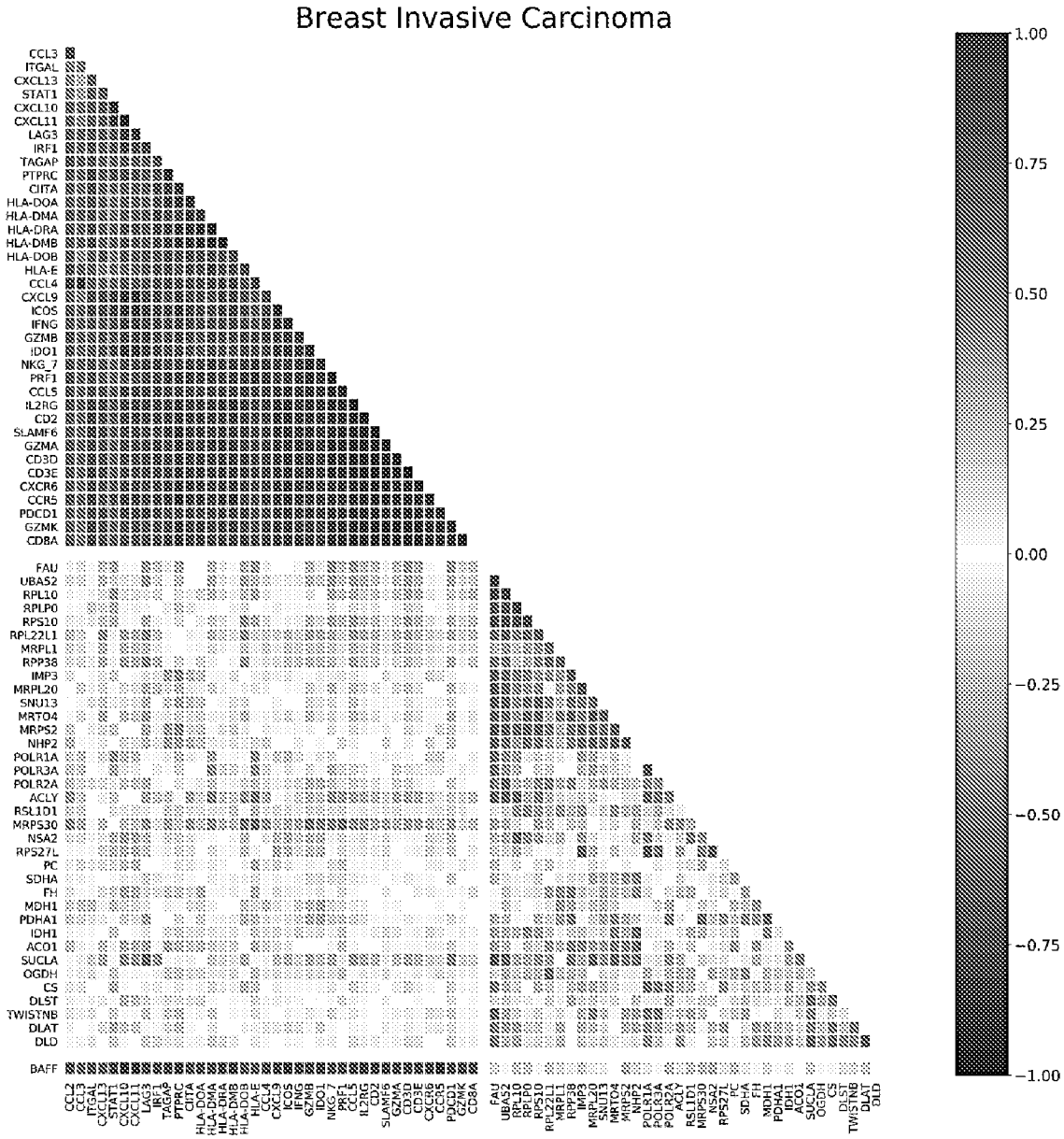

Breast Invasive Carcinoma
CCL3
ITGAL
CXCL13
STAT1
CXCL10
CXCL11
LAG3
IRF1
TAGAP
PTPRC
CIITA
HLA-DOA
HLA-DMA
HLA-DRA
HLA-DMB
HLA-DOB
HLA-E
CCL4
CXCL9
ICOS
IFNG
GZMB
IDO1
NKG_7
PRF1
CCL5
IL2RG
CD2
SLAMF6
GZMA
CD3D
CD3E
CXCR6
CCR5
PDCD1
GZMK
CD8A
FAU
UBAS2
RPL10
RPLP0
RPS10
RPL22L1
MRPL1
RPP38
IMP3
MRPL20
SNU13
MRTO4
MRPS2
NHP2
POLR1A
POLR3A
POLR2A
ACLY
RSL1D1
MRPS30
NSA2
RPS27L
PC
SDHA
FH
MDH1
PDHA1
IDH1
ACO1
SUCLA
OGDH
CS
DLST
TWISTNB
DLAT
DLD
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 24

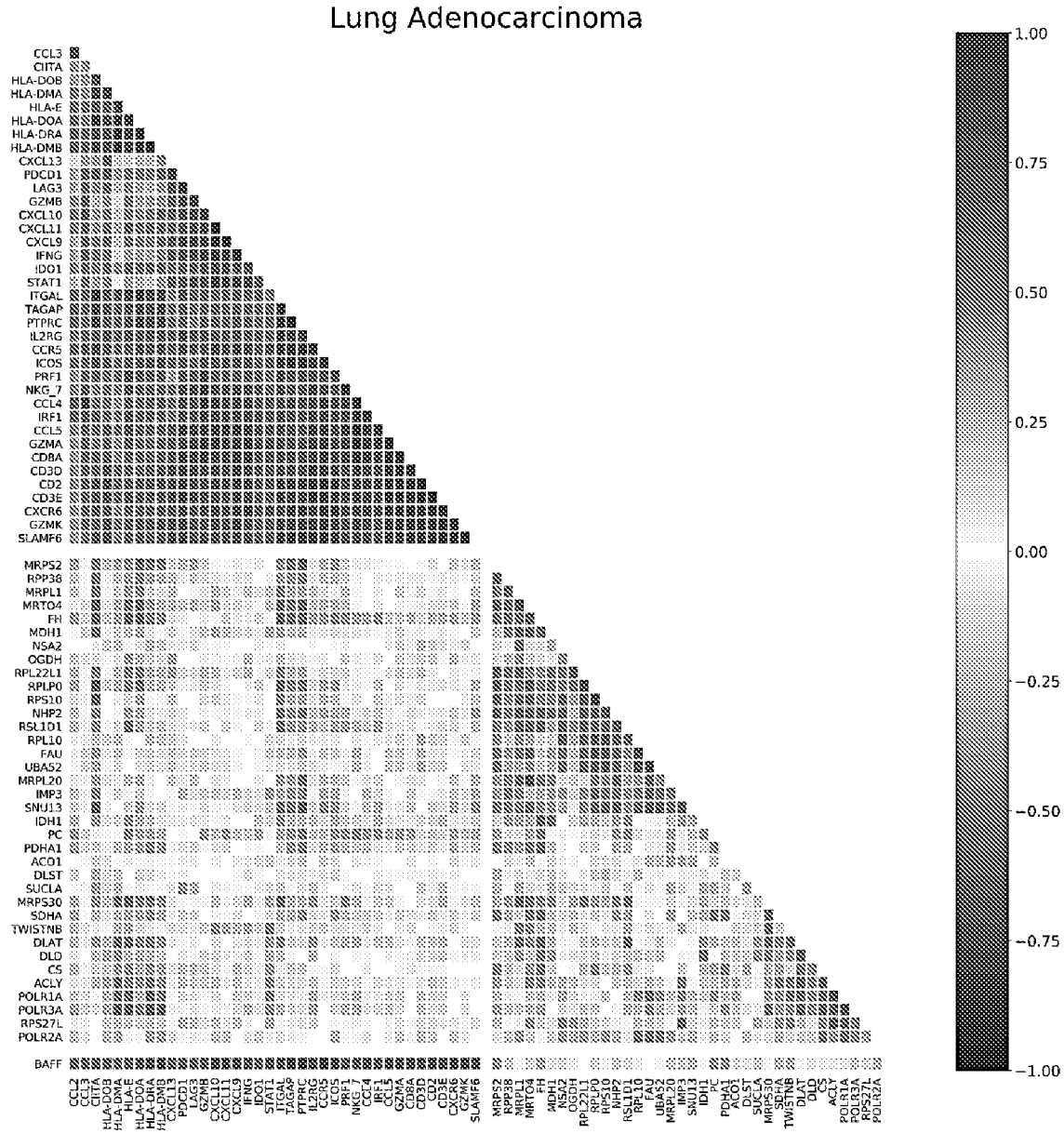

Lung Adenocarcinoma
CCL3
CIITA
HLA-DOB
HLA-DMA
HLA-E
HLA-DOA
HLA-DRA
HLA-DMB
CXCL13
PDCD1
LAG3
GZMB
CXCL10
CXCL11
CXCL9
IFNG
IDO1
STAT1
ITGAL
TAGAP
PTPRC
IL2RG
CCR5
ICOS
PRF1
NKG_7
CCL4
IRF1
CCL5
GZMA
CD8A
CD3D
CD2
CD3E
CXCR6
GZMK
SLAMF6
MRPS2
RPP38
MRPL1
MRTO4
FH
MDH1
NSA2
OGDH
RPL22L1
RPLP0
RPS10
NHP2
RSL1D1
RPL10
FAU
UBA52
MRPL20
IMP3
SNU13
IDH1
PC
PDHA1
ACO1
DLST
SUCLA
MRPS30
SDHA
TWISTNB
DLAT
DLD
CS
ACLY
POLR1A
POLR3A
RPS27L
POLR2A
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 25

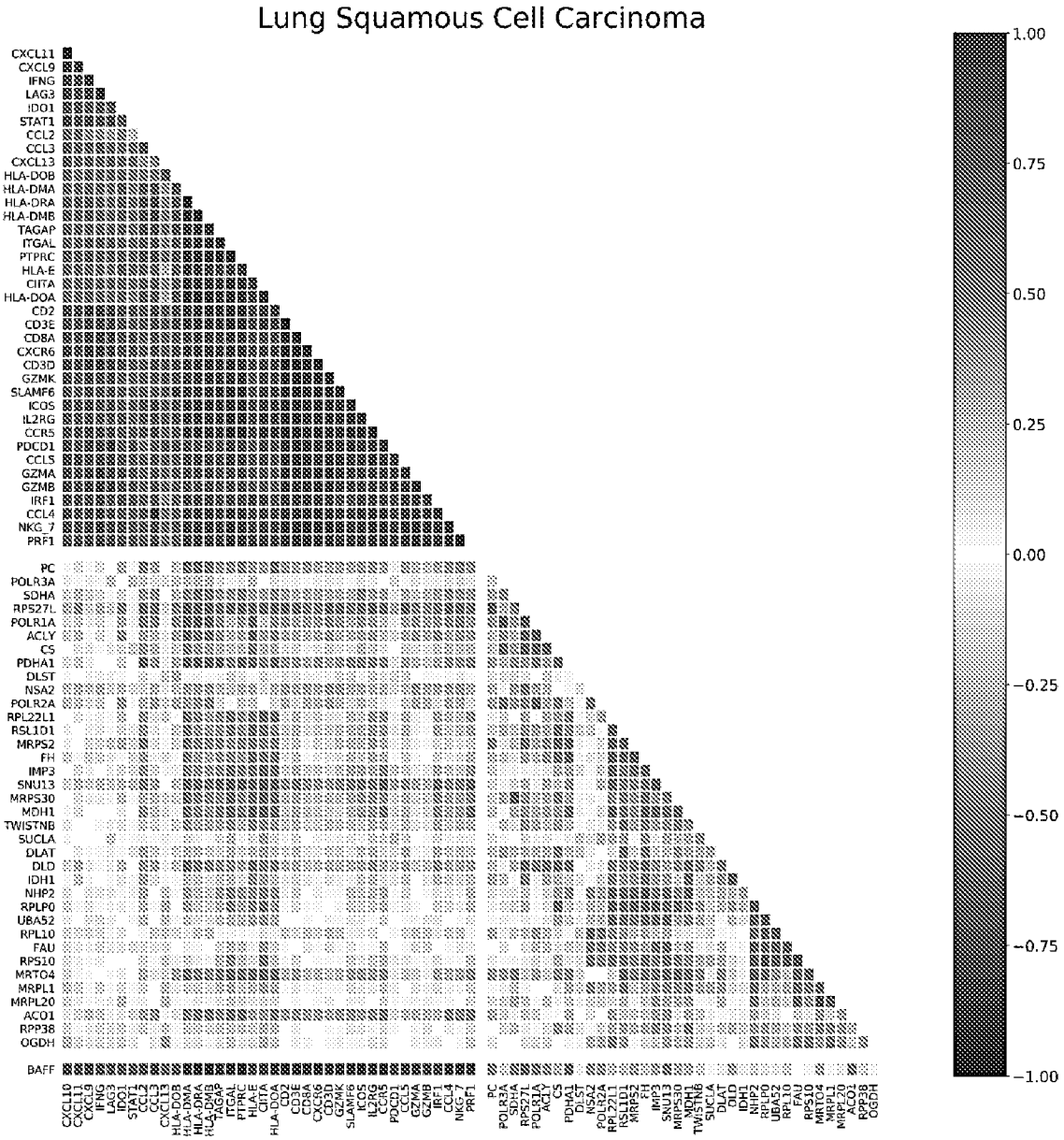

Lung Squamous Cell Carcinoma
CXCL10
CXCL11
CXCL9
IFNG
LAG3
IDO1
STAT1
CCL2
CCL3
CXCL13
HLA-DOB
HLA-DMA
HLA-DRA
HLA-DMB
TAGAP
ITGAL
PTPRC
HLA-E
CIITA
HLA-DOA
CD2
CD3E
CD8A
CXCR6
CD3D
GZMK
SLAMF6
ICOS
IL2RG
CCR5
PDCD1
CCL5
GZMA
GZMB
IRF1
CCL4
NKG7
PRF1
PC
POLR3A
SDHA
RPS27L
POLR1A
ACLY
CS
PDHA1
DLST
NSA2
POLR2A
RPL22L1
RSL1D1
MRPS2
FH
IMP3
SNU13
MRPS30
MDH1
TWISTNB
SUCLA
DLAT
DLD
IDH1
NHP2
RPLP0
UBA52
RPL10
FAU
RPS10
MRTO4
MRPL1
MRPL20
ACO1
RPP38
OGDH
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 26

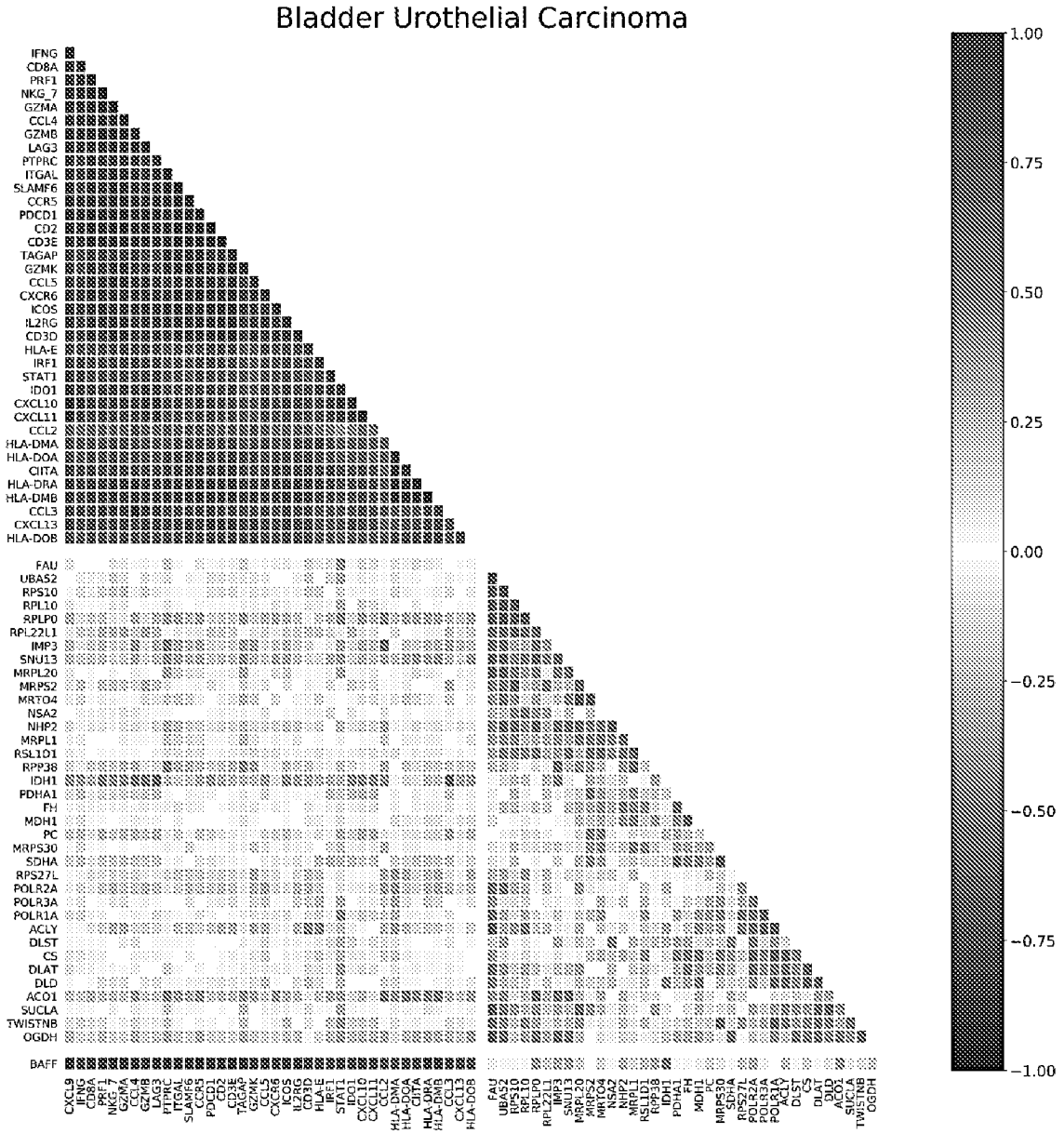

Bladder Urothelial Carcinoma
IFNG
CD8A
PRF1
NKG7
GZMA
CCL4
GZMB
LAG3
PTPRC
ITGAL
SLAMF6
CCR5
PDCD1
CD2
CD3E
TAGAP
GZMK
CCL5
CXCR6
ICOS
IL2RG
CD3D
HLA-E
IRF1
STAT1
IDO1
CXCL10
CXCL11
CCL2
HLA-DMA
HLA-DOA
CIITA
HLA-DRA
HLA-DMB
CCL3
CXCL13
HLA-DOB
FAU
UBAS2
RPS10
RPL10
RPLP0
RPL22L1
IMP3
SNU13
MRPL20
MRPS2
MRTO4
NSA2
NHP2
MRPL1
RSL1D1
RPP38
IDH1
PDHA1
FH
MDH1
PC
MRPS30
SDHA
RPS27L
POLR2A
POLR3A
POLR1A
ACLY
DLST
CS
DLAT
DLD
ACO1
SUCLA
TWISTNB
OGDH
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 27

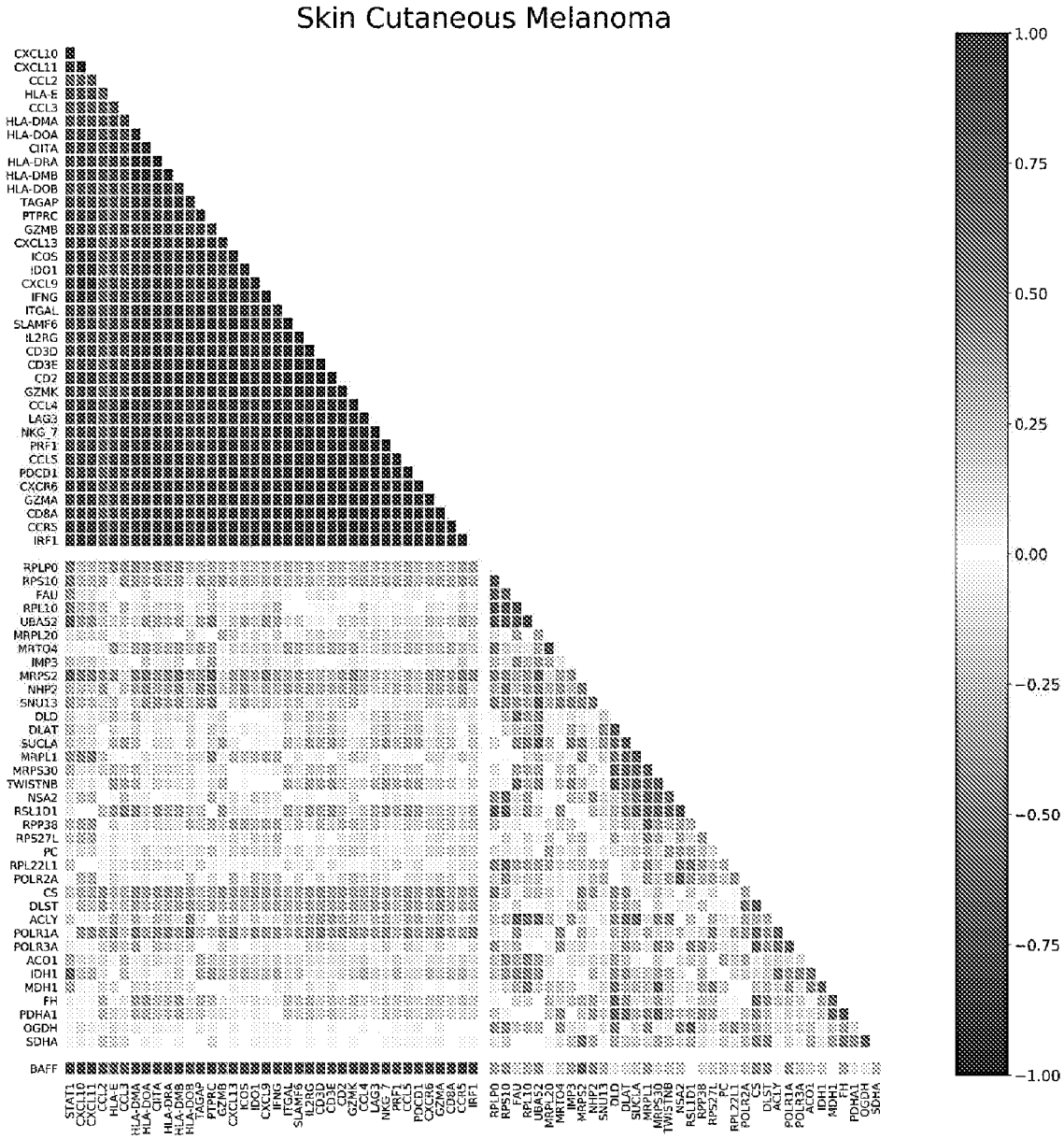

Skin Cutaneous Melanoma
CXCL10
CXCL11
CCL2
HLA-E
CCL3
HLA-DMA
HLA-DOA
CIITA
HLA-DRA
HLA-DMB
HLA-DOB
TAGAP
PTPRC
GZMB
CXCL13
ICOS
IDO1
CXCL9
IFNG
ITGAL
SLAMF6
IL2RG
CD3D
CD3E
CD2
GZMK
CCL4
LAG3
NKG7
PRF1
CCL5
PDCD1
CXCR6
GZMA
CD8A
CCR5
IRF1
RPLP0
RPS10
FAU
RPL10
UBA52
MRPL20
MRTO4
IMP3
MRPS2
NHP2
SNU13
DLD
DLAT
SUCLA
MRPL1
MRPS30
TWISTNB
NSA2
RSL1D1
RPP38
RPS27L
PC
RPL22L1
POLR2A
CS
DLST
ACLY
POLR1A
POLR3A
ACO1
IDH1
MDH1
FH
PDHA1
OGDH
SDHA
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 28

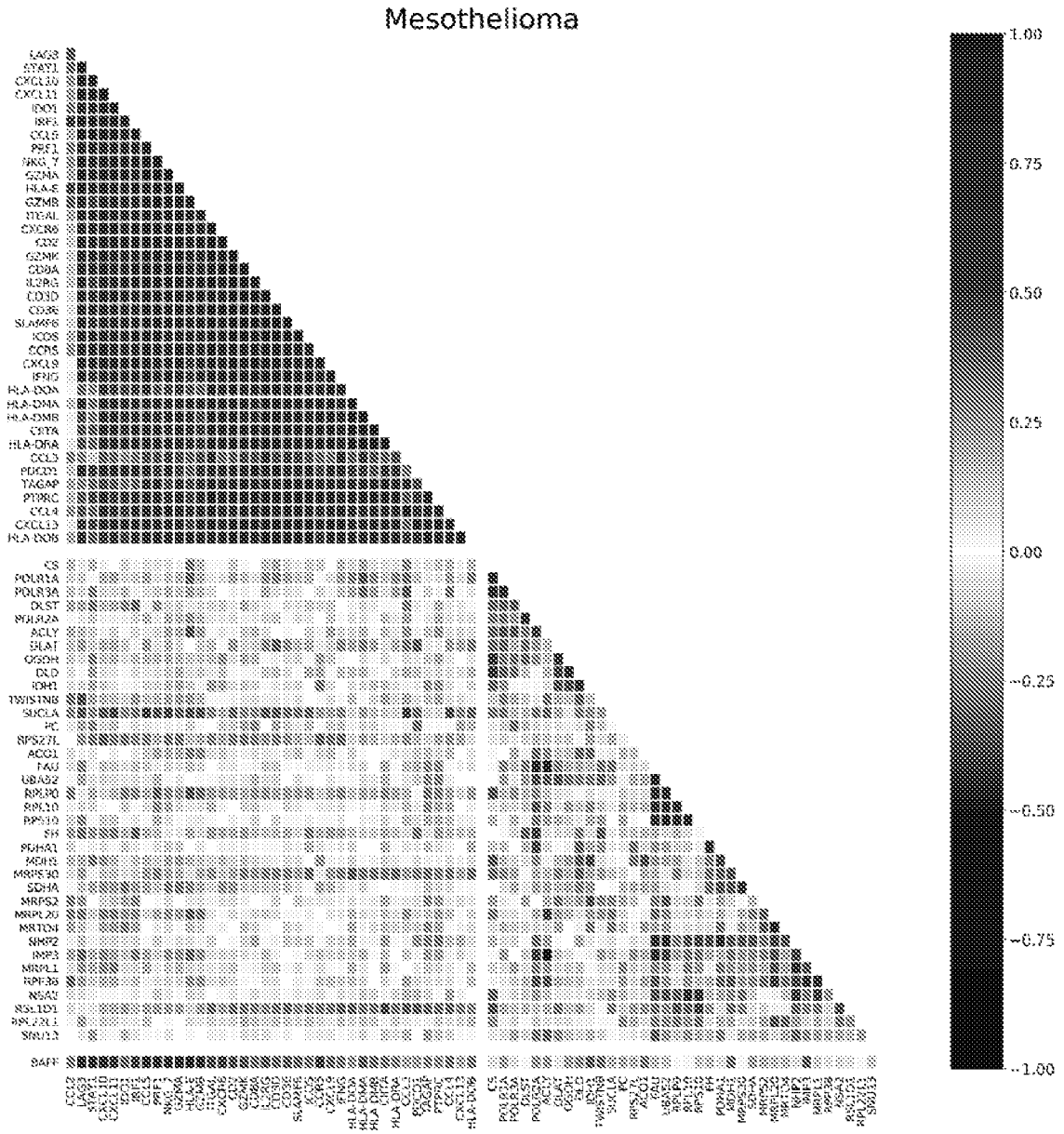


FIG. 29

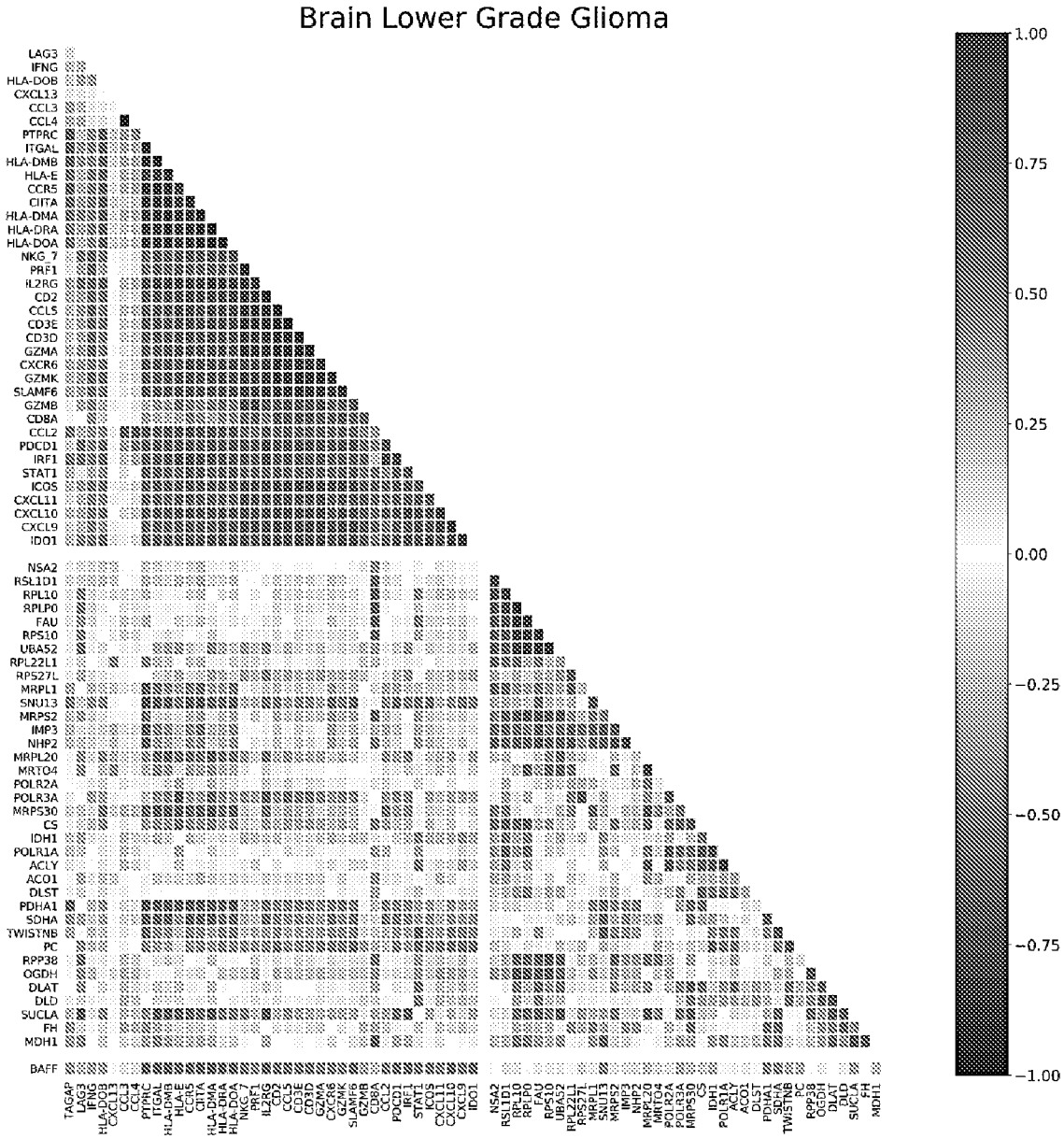


FIG. 30

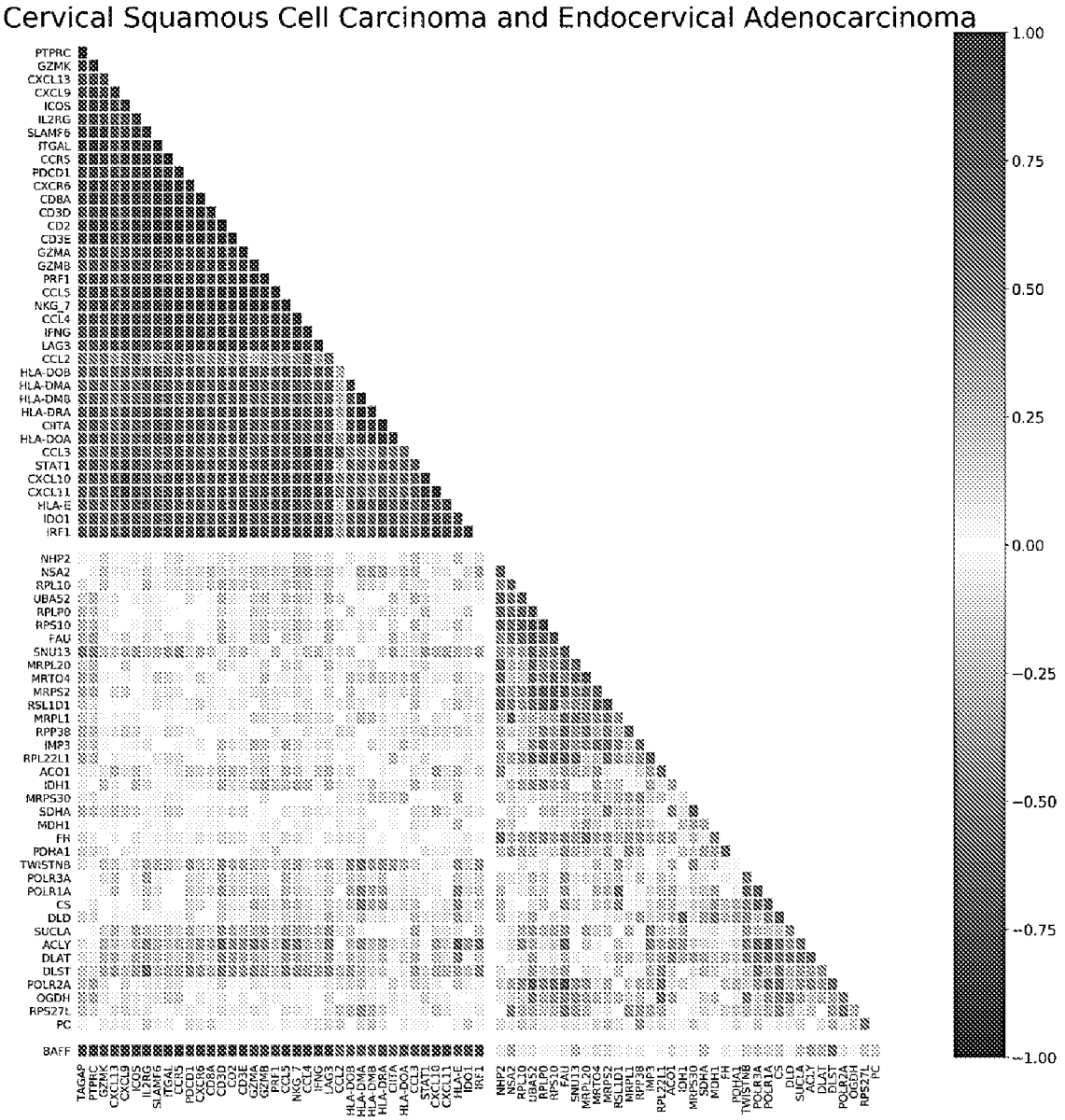

Cervical Squamous Cell Carcinoma and Endocervical Adenocarcinoma
PTPRC
GZMK
CXCL13
CXCL9
ICOS
IL2RG
SLAMF6
ITGAL
CCR5
PDCD1
CXCR6
CD8A
CD3D
CD2
CD3E
GZMA
GZMB
PRF1
CCL5
NKG_7
CCL4
IFNG
LAG3
CCL2
HLA-DOB
HLA-DMA
HLA-DMB
HLA-DRA
CIITA
HLA-DOA
CCL3
STAT1
CXCL10
CXCL11
HLA-E
IDO1
IRF1
NHP2
NSA2
RPL10
UBA52
RPLP0
RPS10
FAU
SNU13
MRPL20
MRTO4
MRPS2
RSL1D1
MRPL1
RPP38
IMP3
RPL22L1
ACO1
IDH1
MRPS30
SDHA
MDH1
FH
PDHA1
TWISTNB
POLR3A
POLR1A
CS
DLD
SUCLA
ACLY
DLAT
DLST
POLR2A
OGDH
RPS27L
PC
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 31

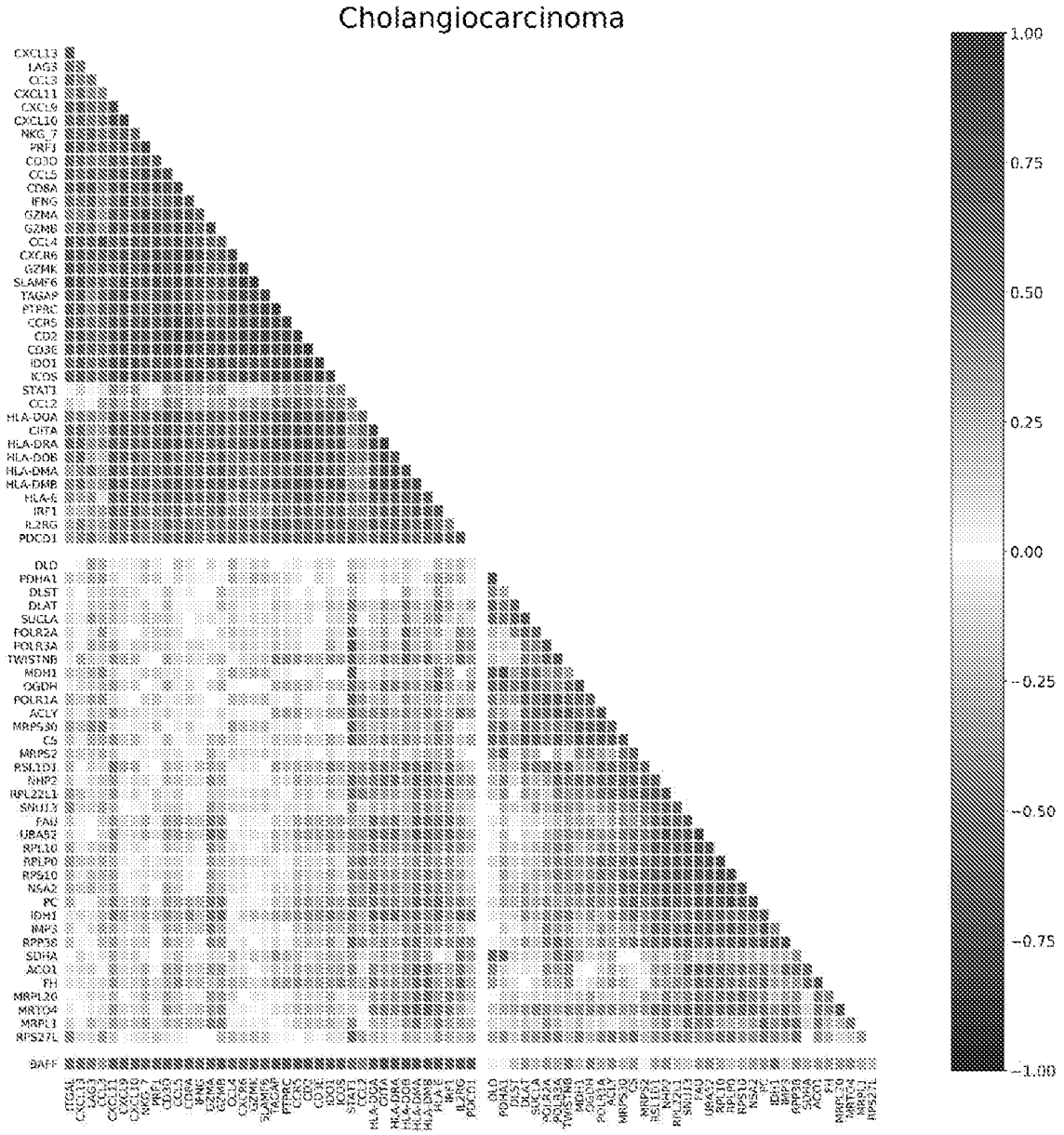


FIG. 32

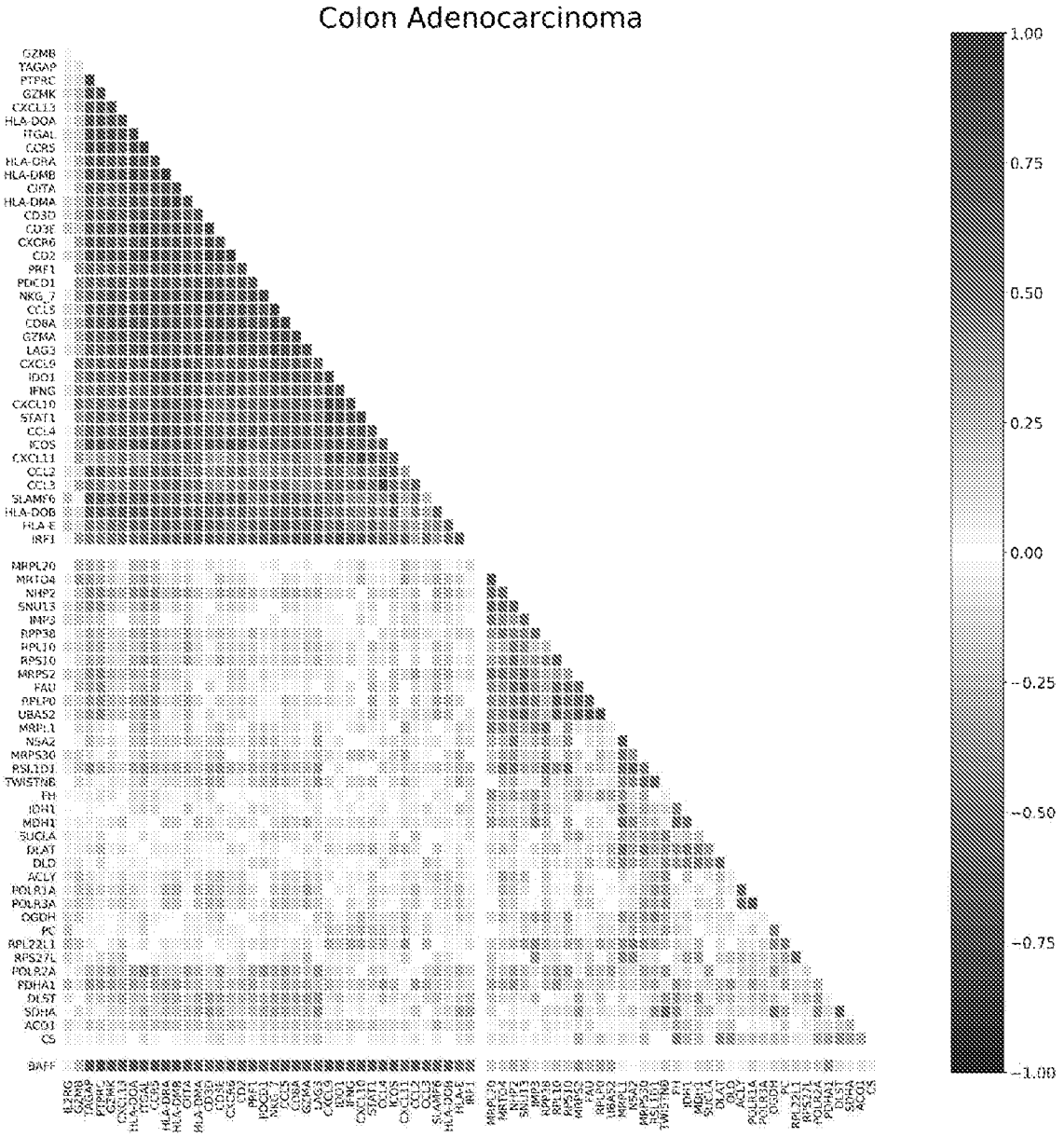


FIG. 33

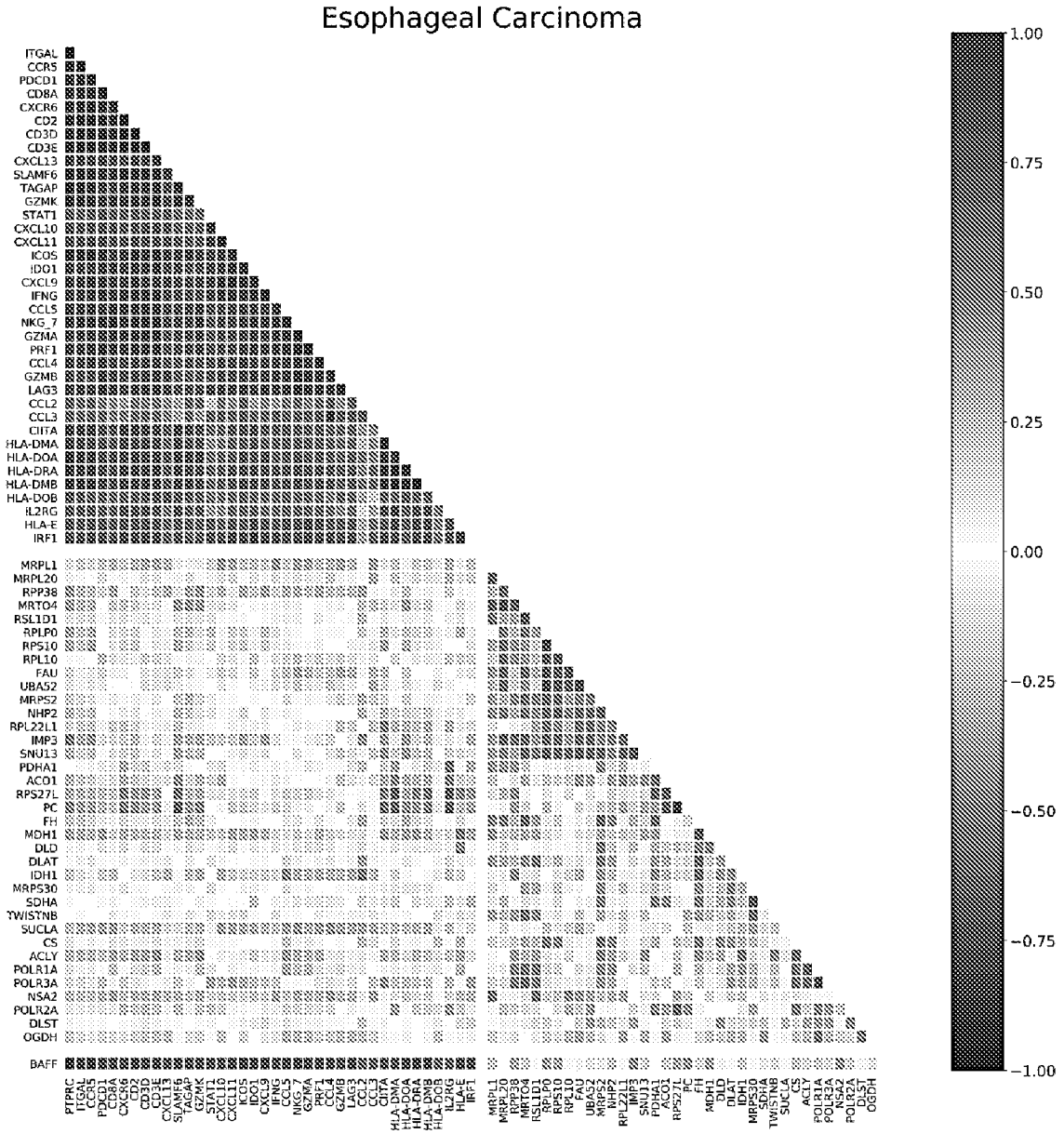

Esophageal Carcinoma
ITGAL
CCR5
PDCD1
CD8A
CXCR6
CD2
CD3D
CD3E
CXCL13
SLAMF6
TAGAP
GZMK
STAT1
CXCL10
CXCL11
ICOS
IDO1
CXCL9
IFNG
CCL5
NKG7
GZMA
PRF1
CCL4
GZMB
LAG3
CCL2
CCL3
CIITA
HLA-DMA
HLA-DOA
HLA-DRA
HLA-DMB
HLA-DOB
IL2RG
HLA-E
IRF1
MRPL1
MRPL20
RPP38
MRTO4
RSL1D1
RPLP0
RPS10
RPL10
FAU
UBA52
MRPS2
NHP2
RPL22L1
IMP3
SNU13
PDHA1
ACO1
RPS27L
PC
FH
MDH1
DLD
DLAT
IDH1
MRPS30
SDHA
TWISTNB
SUCLA
CS
ACLY
POLR1A
POLR3A
NSA2
POLR2A
DLST
OGDH
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 34

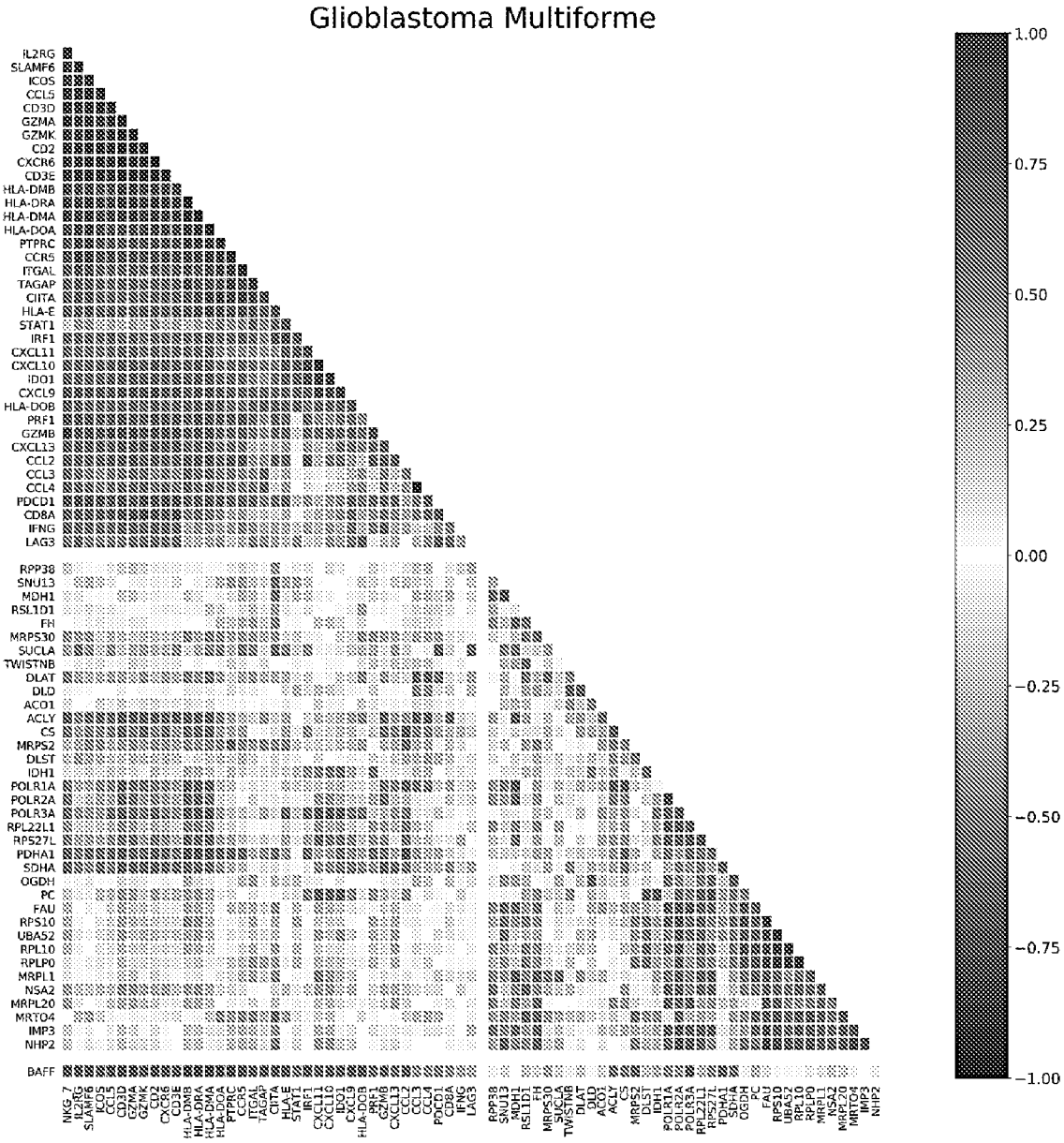

Glioblastoma Multiforme
IL2RG
SLAMF6
ICOS
CCL5
CD3D
GZMA
GZMK
CD2
CXCR6
CD3E
HLA-DMB
HLA-DRA
HLA-DMA
HLA-DOA
PTPRC
CCR5
ITGAL
TAGAP
CIITA
HLA-E
STAT1
IRF1
CXCL11
CXCL10
IDO1
CXCL9
HLA-DOB
PRF1
GZMB
CXCL13
CCL2
CCL3
CCL4
PDCD1
CD8A
IFNG
LAG3
RPP38
SNU13
MDH1
RSL1D1
FH
MRPS30
SUCLA
TWISTNB
DLAT
DLD
ACO1
ACLY
CS
MRPS2
DLST
IDH1
POLR1A
POLR2A
POLR3A
RPL22L1
RPS27L
PDHA1
SDHA
OGDH
PC
FAU
RPS10
UBA52
RPL10
RPLP0
MRPL1
NSA2
MRPL20
MRTO4
IMP3
NHP2
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 35

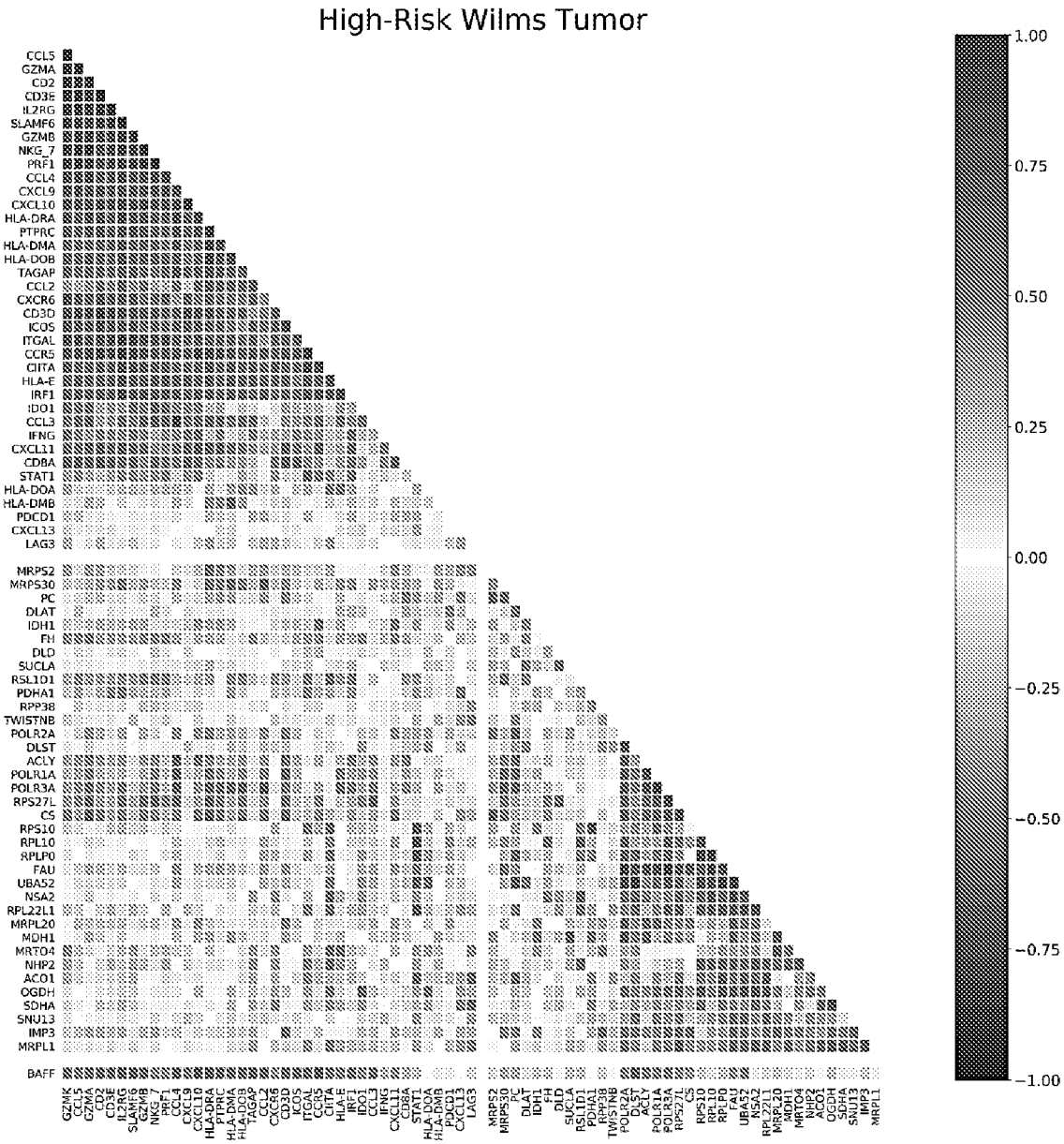


FIG. 36

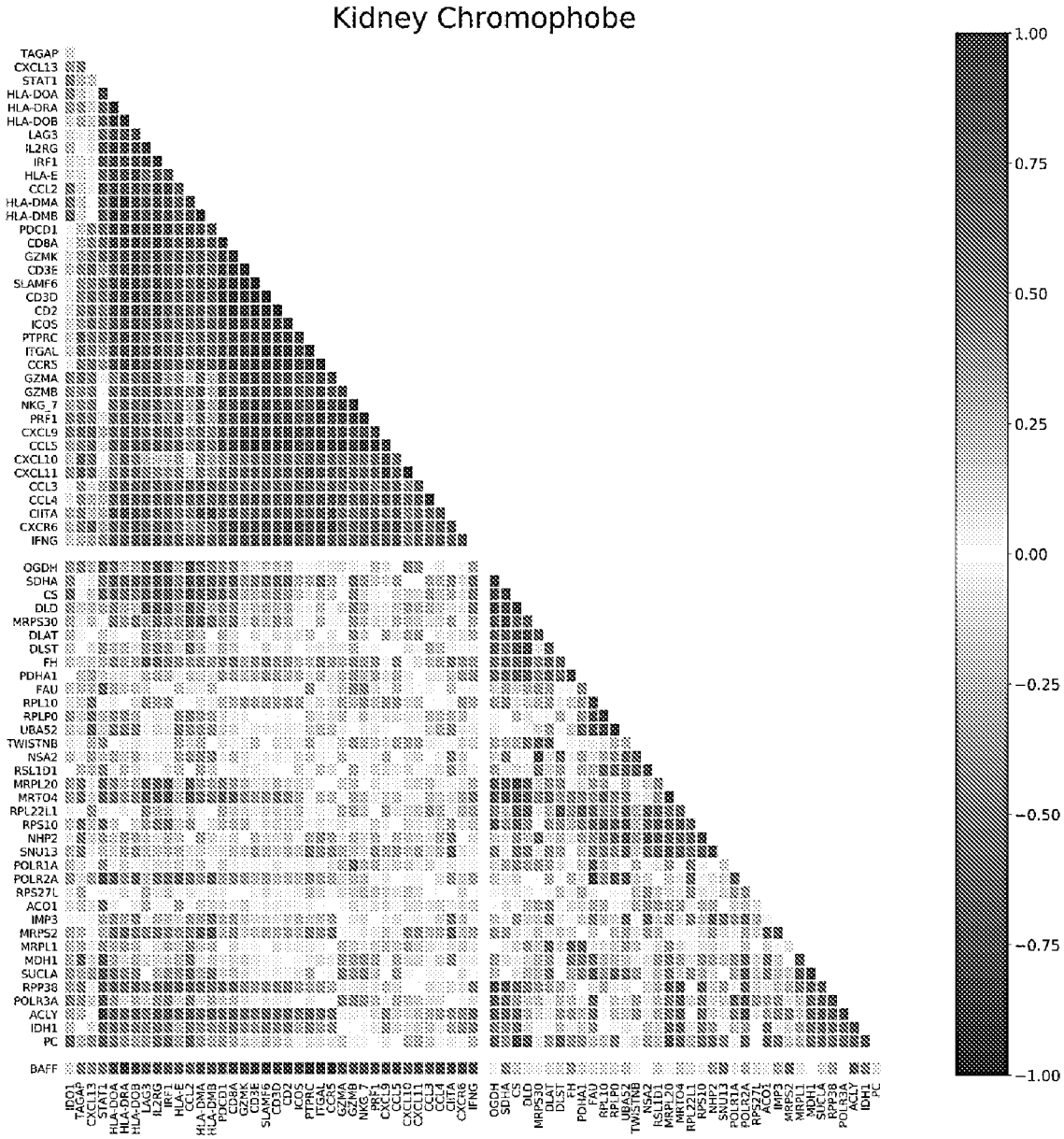

Kidney Chromophobe
TAGAP
CXCL13
STAT1
HLA-DOA
HLA-DRA
HLA-DOB
LAG3
IL2RG
IRF1
HLA-E
CCL2
HLA-DMA
HLA-DMB
PDCD1
CD8A
GZMK
CD3E
SLAMF6
CD3D
CD2
ICOS
PTPRC
ITGAL
CCR5
GZMA
GZMB
NKG7
PRF1
CXCL9
CCL5
CXCL10
CXCL11
CCL3
CCL4
CIITA
CXCR6
IFNG
OGDH
SDHA
CS
DLD
MRPS30
DLAT
DLST
FH
PDHA1
FAU
RPL10
RPLP0
UBA52
TWISTNB
NSA2
RSL1D1
MRPL20
MRTO4
RPL22L1
RPS10
NHP2
SNU13
POLR1A
POLR2A
RPS27L
ACO1
IMP3
MRPS2
MRPL1
MDH1
SUCLA
RPP38
POLR3A
ACLY
IDH1
PC
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 37

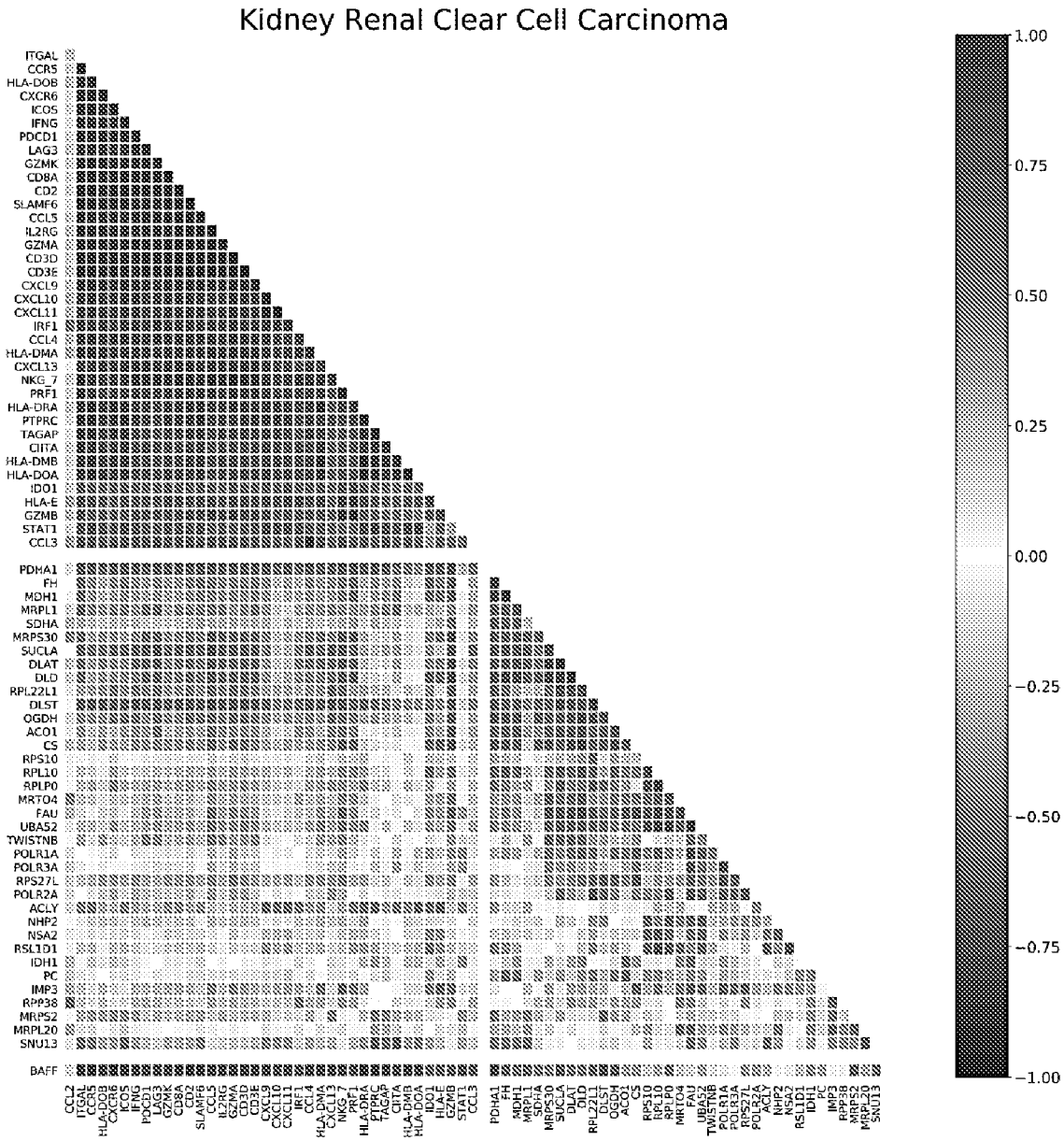

Kidney Renal Clear Cell Carcinoma
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 38

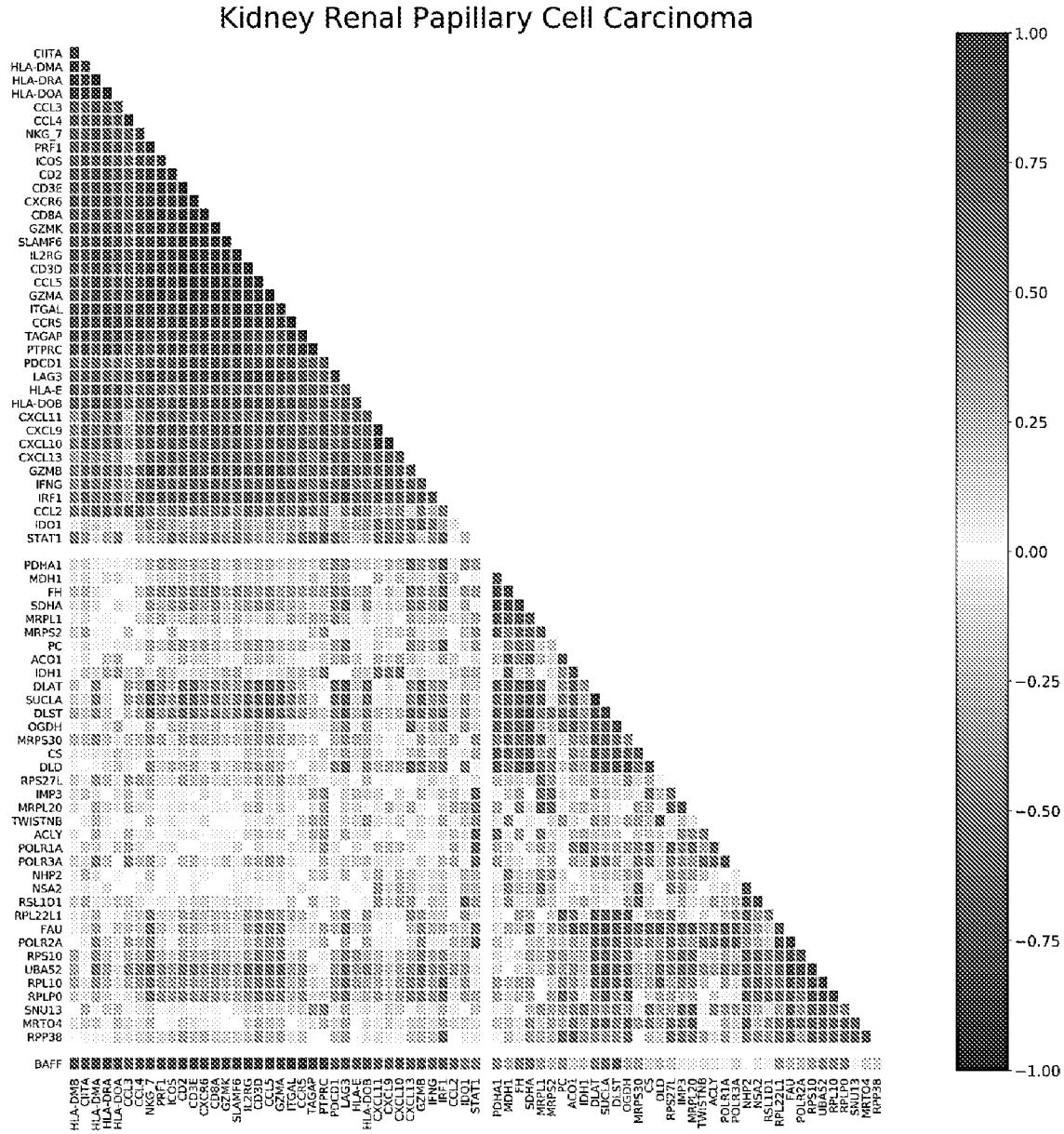

Kidney Renal Papillary Cell Carcinoma
CIITA
HLA-DMA
HLA-DRA
HLA-DOA
CCL3
CCL4
NKG7
PRF1
ICOS
CD2
CD3E
CXCR6
CD8A
GZMK
SLAMF6
IL2RG
CD3D
CCL5
GZMA
ITGAL
CCR5
TAGAP
PTPRC
PDCD1
LAG3
HLA-E
HLA-DOB
CXCL11
CXCL9
CXCL10
CXCL13
GZMB
IFNG
IRF1
CCL2
IDO1
STAT1
PDHA1
MDH1
FH
SDHA
MRPL1
MRPS2
PC
ACO1
IDH1
DLAT
SUCLA
DLST
OGDH
MRPS30
CS
DLD
RPS27L
IMP3
MRPL20
TWISTNB
ACLY
POLR1A
POLR3A
NHP2
NSA2
RSL1D1
RPL22L1
FAU
POLR2A
RPS10
UBA52
RPL10
RPLP0
SNU13
MRTO4
RPP38
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 39

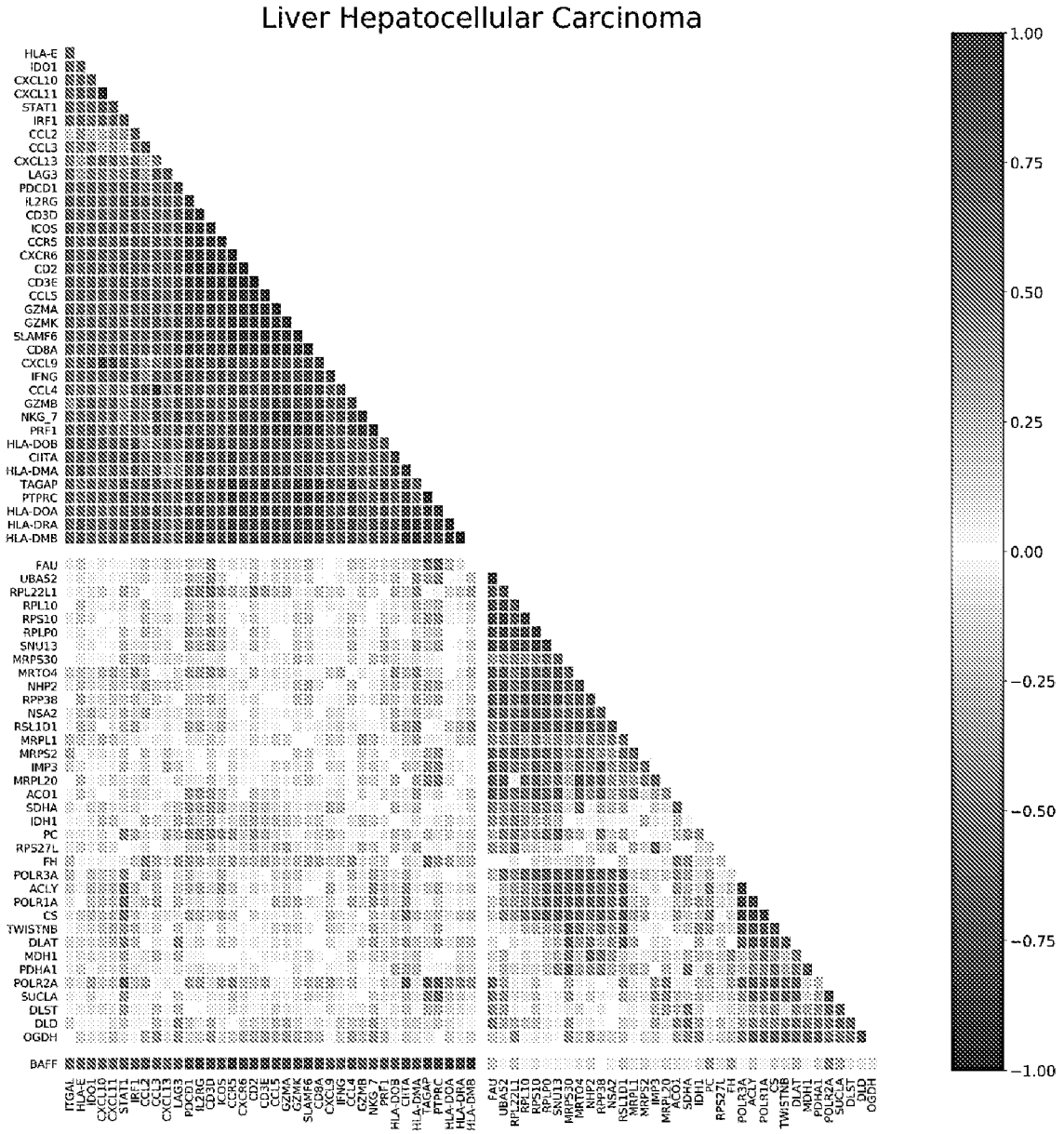

Liver Hepatocellular Carcinoma
HLA-E
IDO1
CXCL10
CXCL11
STAT1
IRF1
CCL2
CCL3
CXCL13
LAG3
PDCD1
IL2RG
CD3D
ICOS
CCR5
CXCR6
CD2
CD3E
CCL5
GZMA
GZMK
SLAMF6
CD8A
CXCL9
IFNG
CCL4
GZMB
NKG_7
PRF1
HLA-DOB
CIITA
HLA-DMA
TAGAP
PTPRC
HLA-DOA
HLA-DRA
HLA-DMB
FAU
UBAS2
RPL22L1
RPL10
RPS10
RPLP0
SNU13
MRPS30
MRTO4
NHP2
RPP38
NSA2
RSL1D1
MRPL1
MRPS2
IMP3
MRPL20
ACO1
SDHA
IDH1
PC
RPS27L
FH
POLR3A
ACLY
POLR1A
CS
TWISTNB
DLAT
MDH1
PDHA1
POLR2A
SUCLA
DLST
DLD
OGDH
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 40

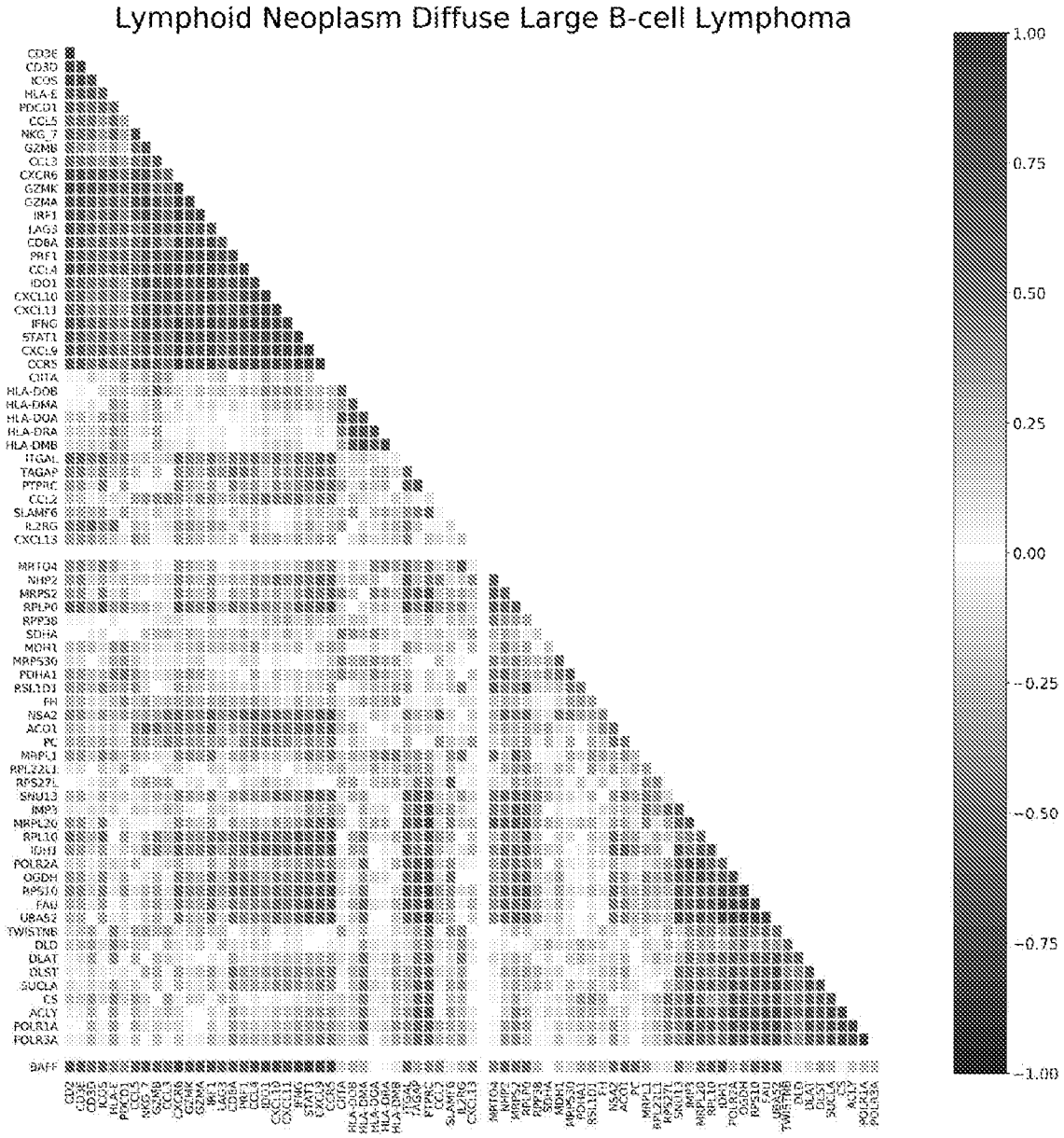

Lymphoid Neoplasm Diffuse Large B-cell Lymphoma
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 41

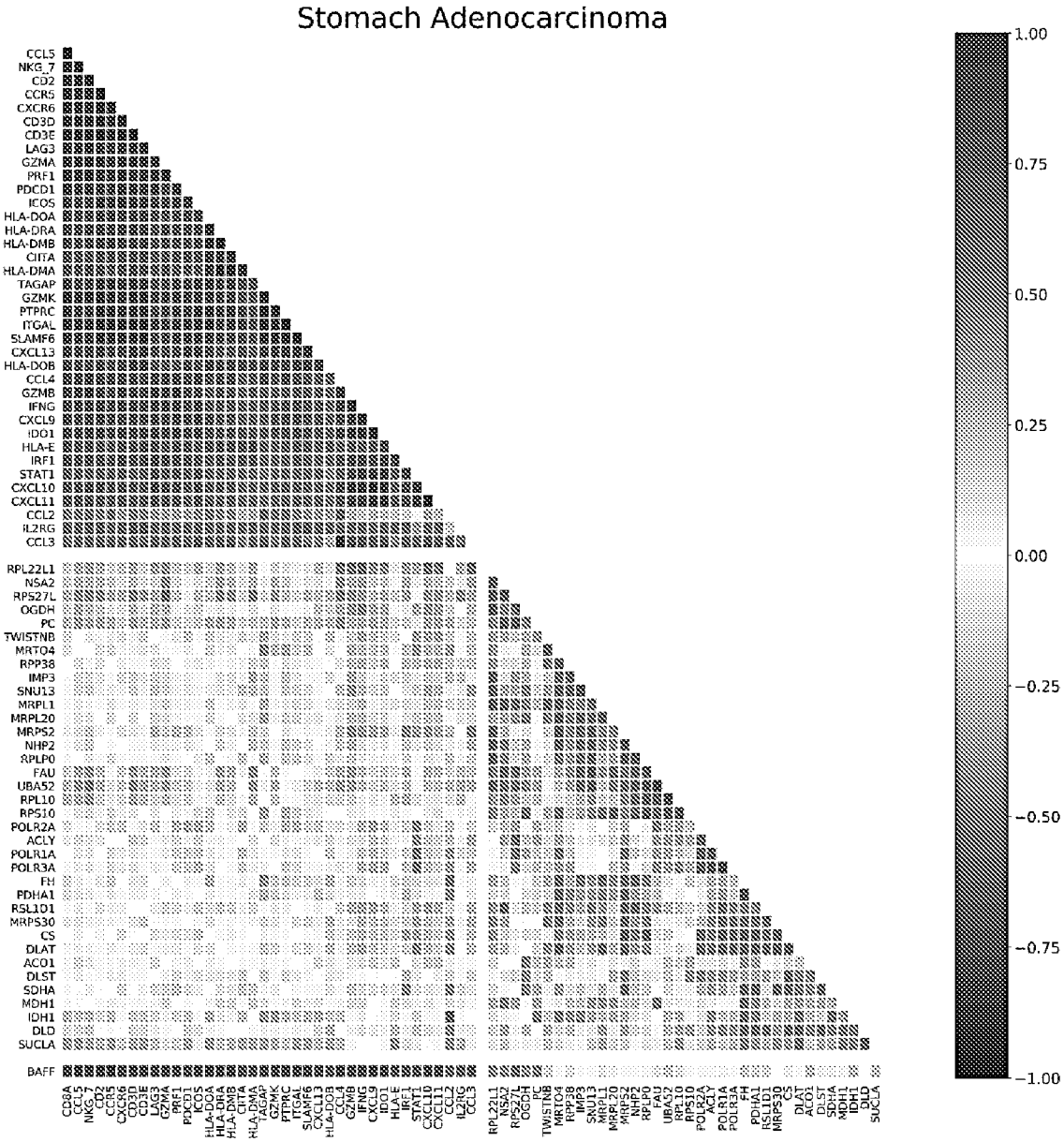

Stomach Adenocarcinoma
CCL5
NKG_7
CD2
CCR5
CXCR6
CD3D
CD3E
LAG3
GZMA
PRF1
PDCD1
ICOS
HLA-DOA
HLA-DRA
HLA-DMB
CIITA
HLA-DMA
TAGAP
GZMK
PTPRC
ITGAL
SLAMF6
CXCL13
HLA-DOB
CCL4
GZMB
IFNG
CXCL9
IDO1
HLA-E
IRF1
STAT1
CXCL10
CXCL11
CCL2
IL2RG
CCL3
RPL22L1
NSA2
RPS27L
OGDH
PC
TWISTNB
MRTO4
RPP38
IMP3
SNU13
MRPL1
MRPL20
MRPS2
NHP2
RPLP0
FAU
UBA52
RPL10
RPS10
POLR2A
ACLY
POLR1A
POLR3A
FH
PDHA1
RSL1D1
MRPS30
CS
DLAT
ACO1
DLST
SDHA
MDH1
IDH1
DLD
SUCLA
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 42

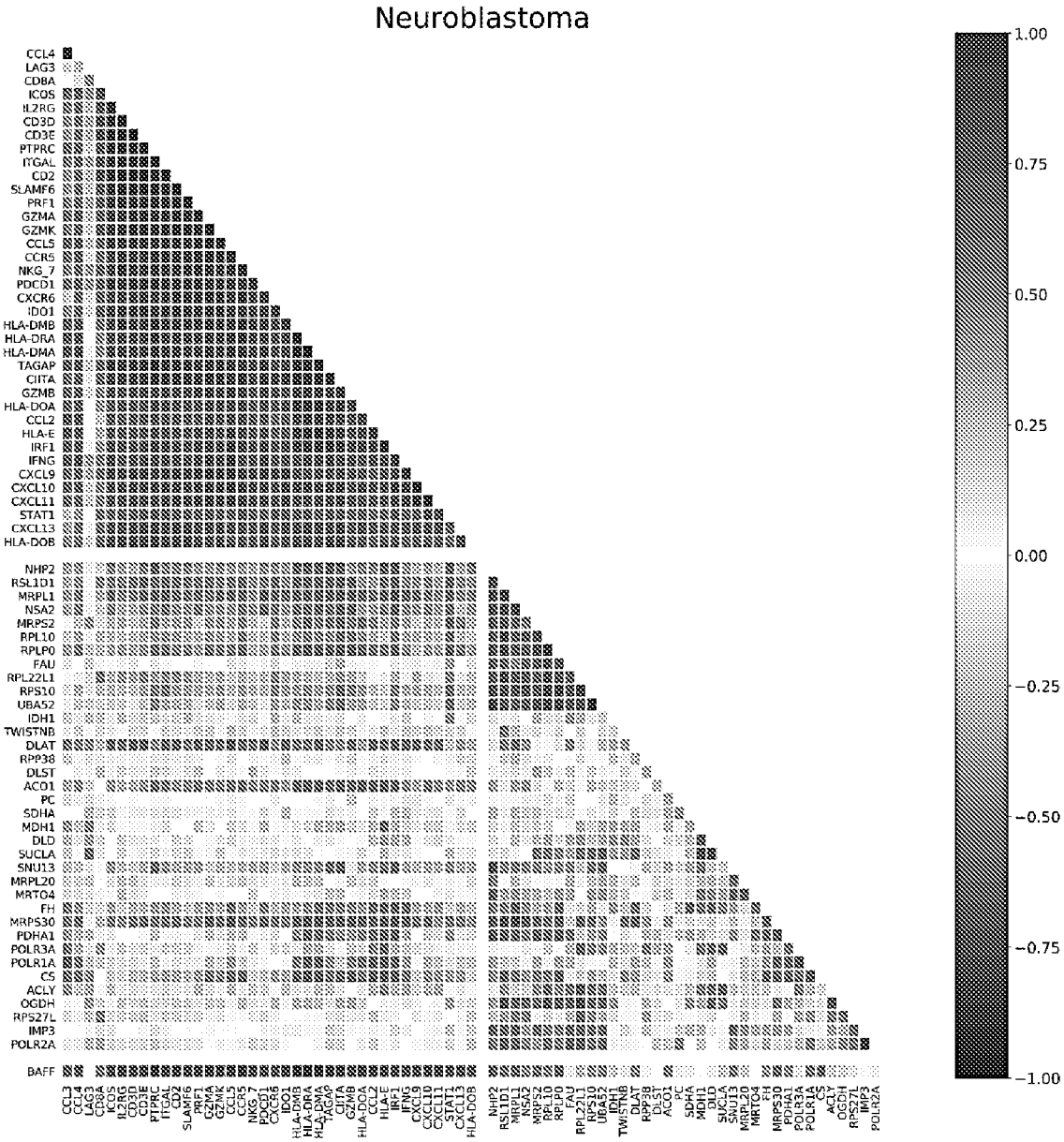


FIG. 43

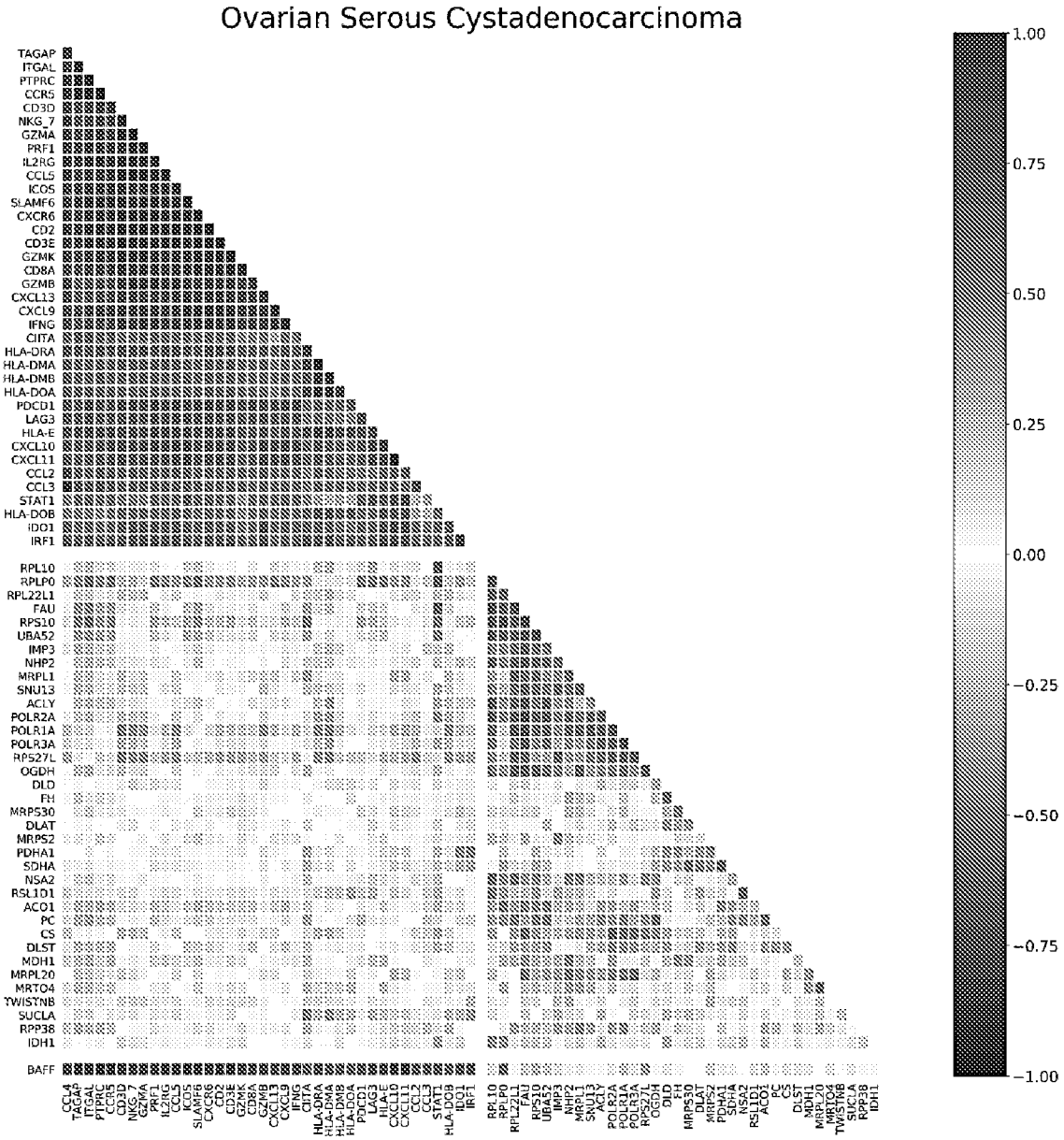

Ovarian Serous Cystadenocarcinoma
TAGAP
ITGAL
PTPRC
CCR5
CD3D
NKG7
GZMA
PRF1
IL2RG
CCL5
ICOS
SLAMF6
CXCR6
CD2
CD3E
GZMK
CD8A
GZMB
CXCL13
CXCL9
IFNG
CIITA
HLA-DRA
HLA-DMA
HLA-DMB
HLA-DOA
PDCD1
LAG3
HLA-E
CXCL10
CXCL11
CCL2
CCL3
STAT1
HLA-DOB
IDO1
IRF1
RPL10
RPLP0
RPL22L1
FAU
RPS10
UBA52
IMP3
NHP2
MRPL1
SNU13
ACLY
POLR2A
POLR1A
POLR3A
RPS27L
OGDH
DLD
FH
MRPS30
DLAT
MRPS2
PDHA1
SDHA
NSA2
RSL1D1
ACO1
PC
CS
DLST
MDH1
MRPL20
MRTO4
TWISTNB
SUCLA
RPP38
IDH1
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 44

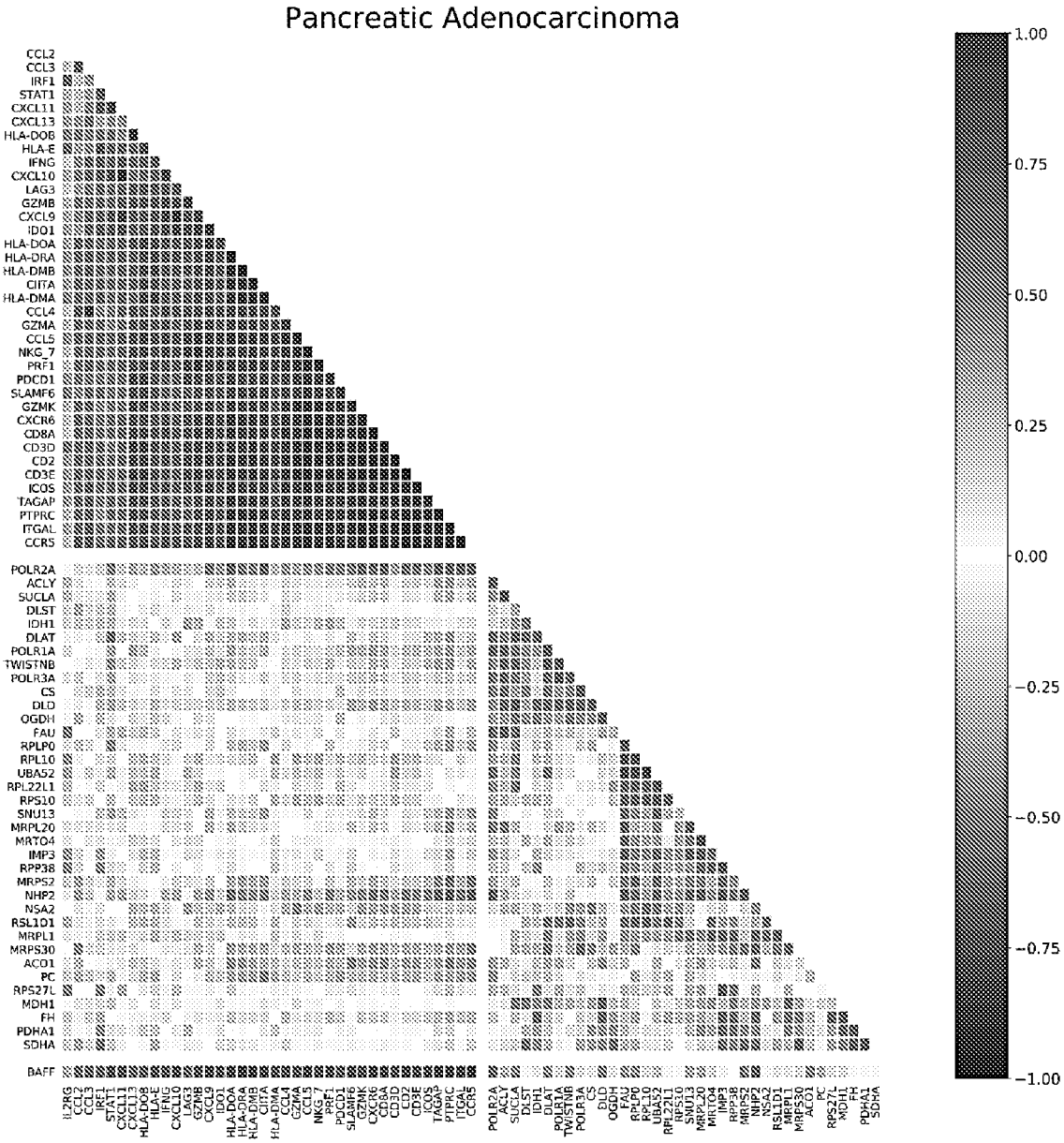

Pancreatic Adenocarcinoma
CCL2
CCL3
IRF1
STAT1
CXCL11
CXCL13
HLA-DOB
HLA-E
IFNG
CXCL10
LAG3
GZMB
CXCL9
IDO1
HLA-DOA
HLA-DRA
HLA-DMB
CIITA
HLA-DMA
CCL4
GZMA
CCL5
NKG_7
PRF1
PDCD1
SLAMF6
GZMK
CXCR6
CD8A
CD3D
CD2
CD3E
ICOS
TAGAP
PTPRC
ITGAL
CCR5
POLR2A
ACLY
SUCLA
DLST
IDH1
DLAT
POLR1A
TWISTNB
POLR3A
CS
DLD
OGDH
FAU
RPLP0
RPL10
UBA52
RPL22L1
RPS10
SNU13
MRPL20
MRTO4
IMP3
RPP38
MRPS2
NHP2
NSA2
RSL1D1
MRPL1
MRPS30
ACO1
PC
RPS27L
MDH1
FH
PDHA1
SDHA
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 45

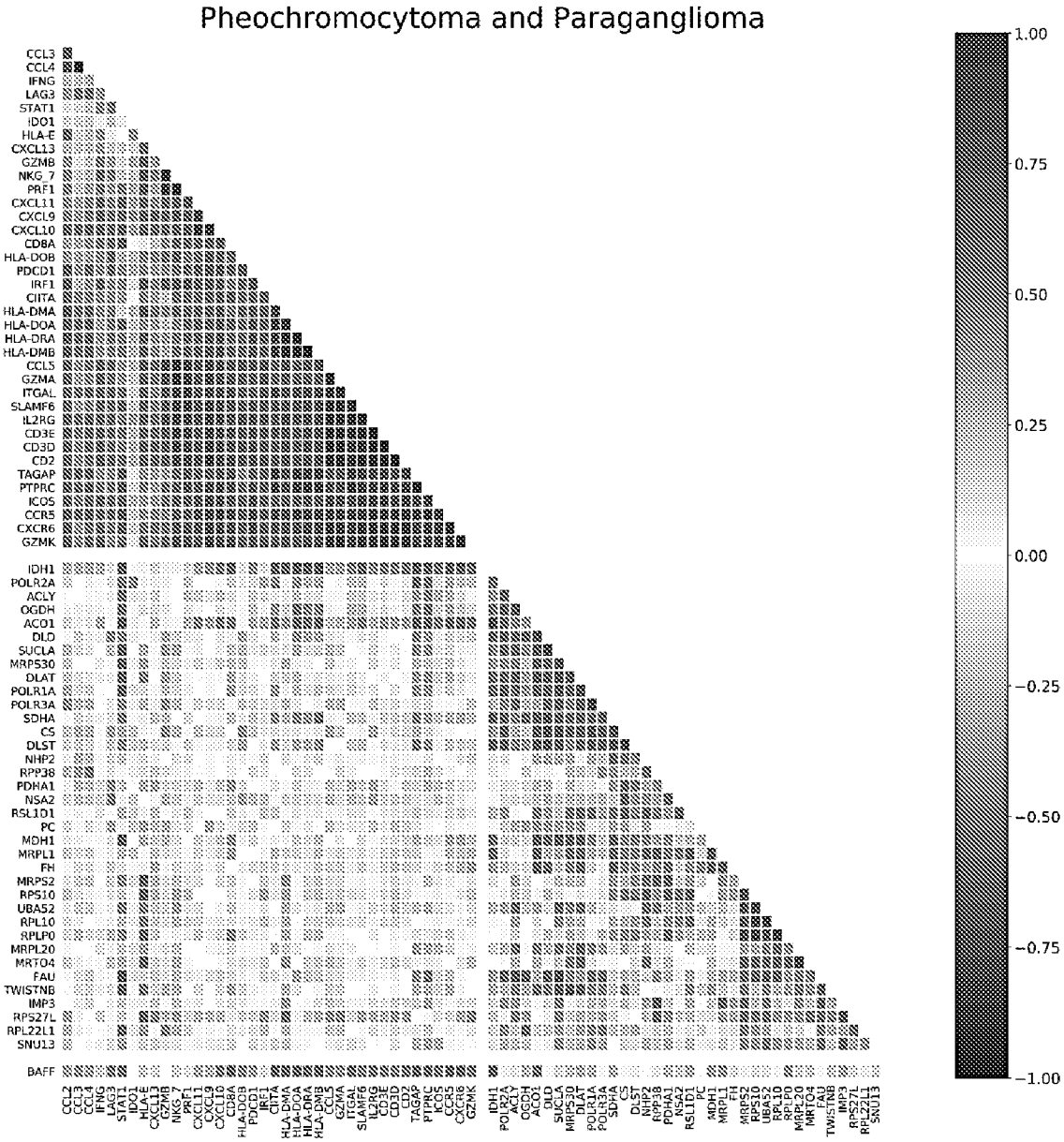

Pheochromocytoma and Paraganglioma
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 46

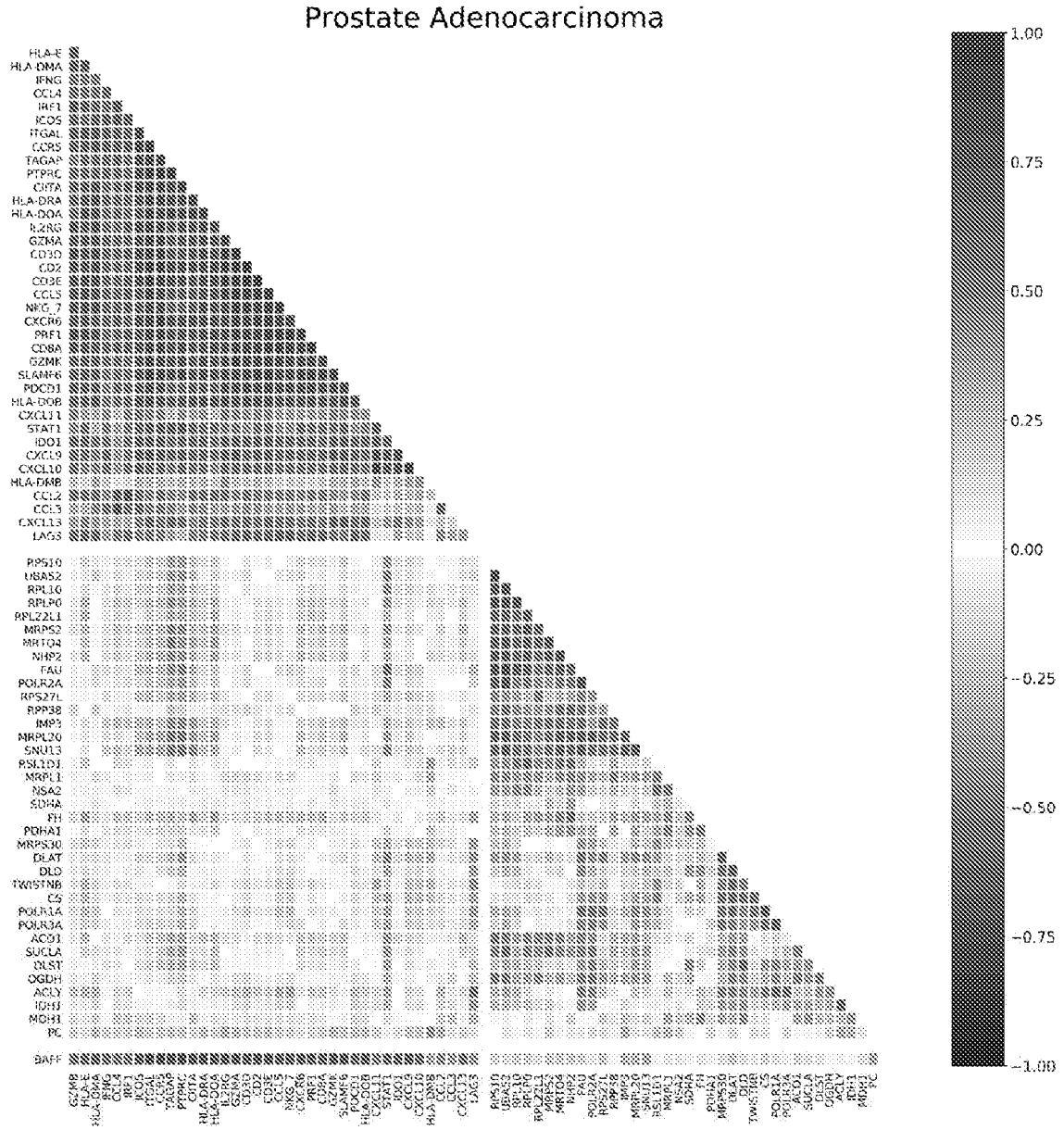

Prostate Adenocarcinoma
HLA-E
HLA-DMA
IFNG
CCL4
IRF1
ICOS
ITGAL
CCR5
TAGAP
PTPRC
CIITA
HLA-DRA
HLA-DOA
IL2RG
GZMA
CD3D
CD2
CD3E
CCL5
NKG7
CXCR6
PRF1
CD8A
GZMK
SLAMF6
PDCD1
HLA-DOB
CXCL11
STAT1
IDO1
CXCL9
CXCL10
HLA-DMB
CCL2
CCL3
CXCL13
LAG3
RPS10
UBA52
RPL10
RPLP0
RPL22L1
MRPS2
MRTO4
NHP2
FAU
POLR2A
RPS27L
RPP38
IMP3
MRPL20
SNU13
RSL1D1
MRPL1
NSA2
SDHA
FH
PDHA1
MRPS30
DLAT
DLD
TWISTNB
CS
POLR1A
POLR3A
ACO1
SUCLA
DLST
OGDH
ACLY
IDH3
MDH1
PC
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 47

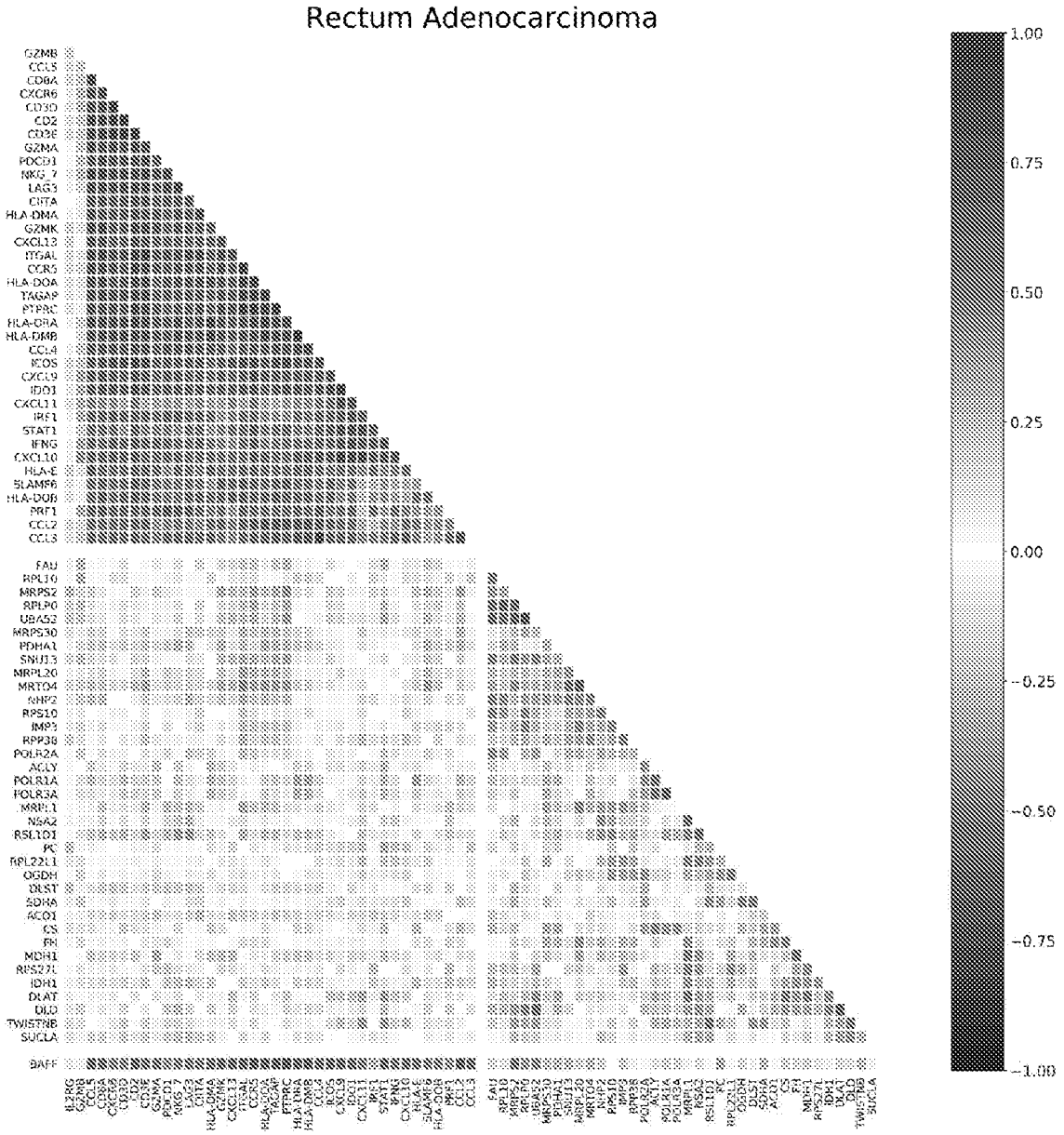


FIG. 48

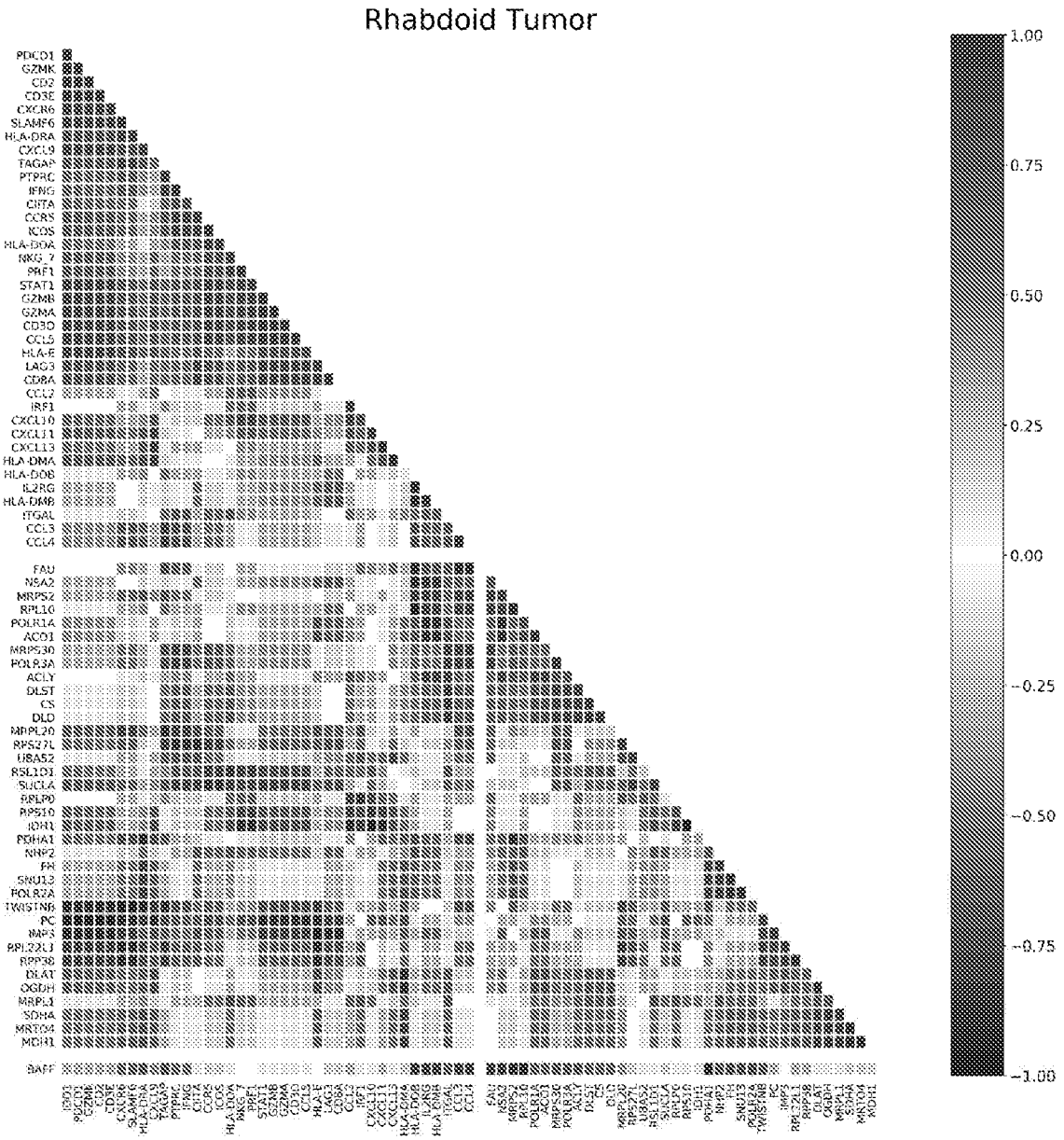


FIG. 49

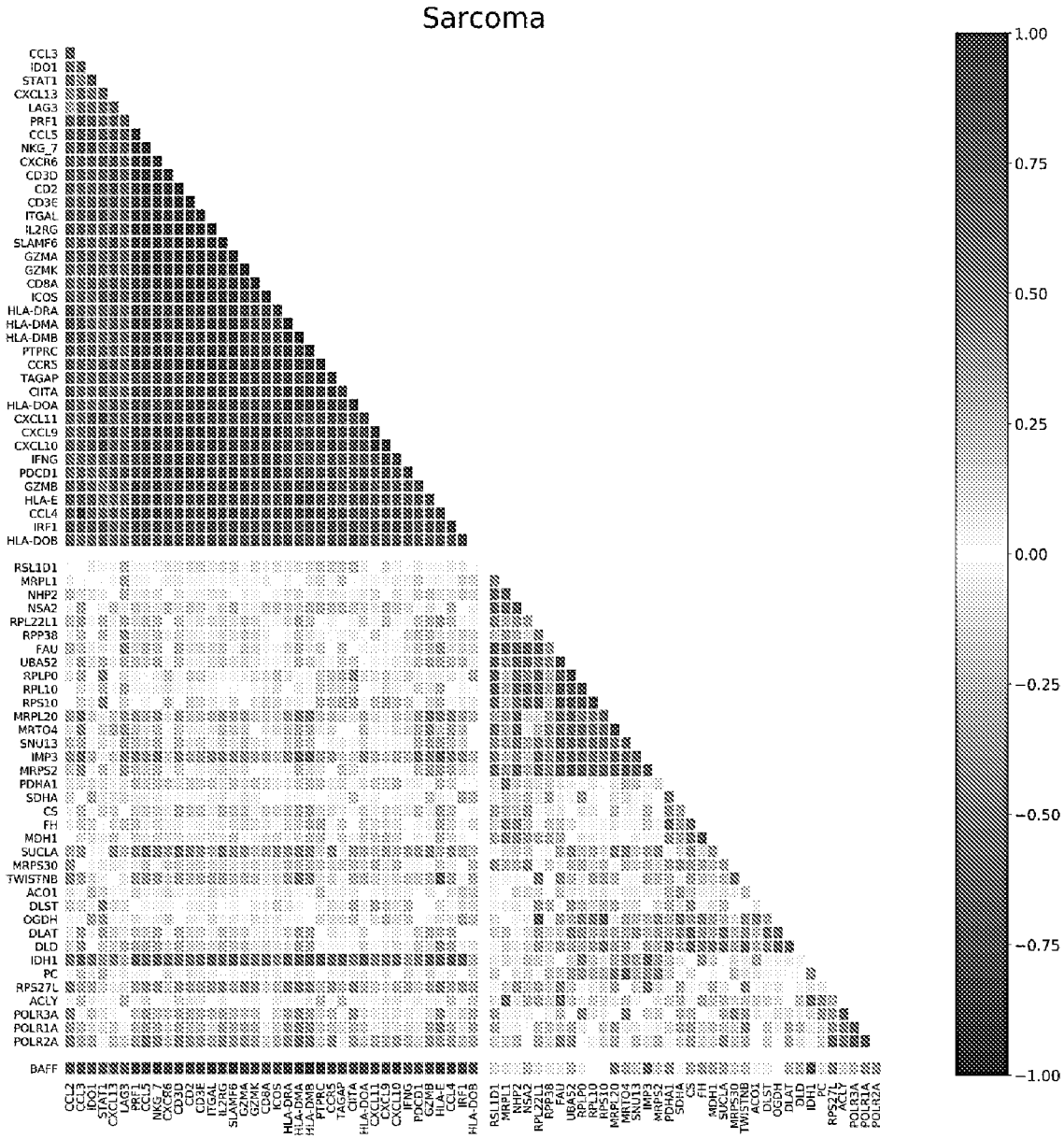

Sarcoma
CCL3
IDO1
STAT1
CXCL13
LAG3
PRF1
CCL5
NKG7
CXCR6
CD3D
CD2
CD3E
ITGAL
IL2RG
SLAMF6
GZMA
GZMK
CD8A
ICOS
HLA-DRA
HLA-DMA
HLA-DMB
PTPRC
CCR5
TAGAP
CIITA
HLA-DOA
CXCL11
CXCL9
CXCL10
IFNG
PDCD1
GZMB
HLA-E
CCL4
IRF1
HLA-DOB
RSL1D1
MRPL1
NHP2
NSA2
RPL22L1
RPP38
FAU
UBA52
RPLP0
RPL10
RPS10
MRPL20
MRTO4
SNU13
IMP3
MRPS2
PDHA1
SDHA
CS
FH
MDH1
SUCLA
MRPS30
TWISTNB
ACO1
DLST
OGDH
DLAT
DLD
IDH1
PC
RPS27L
ACLY
POLR3A
POLR1A
POLR2A
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 50

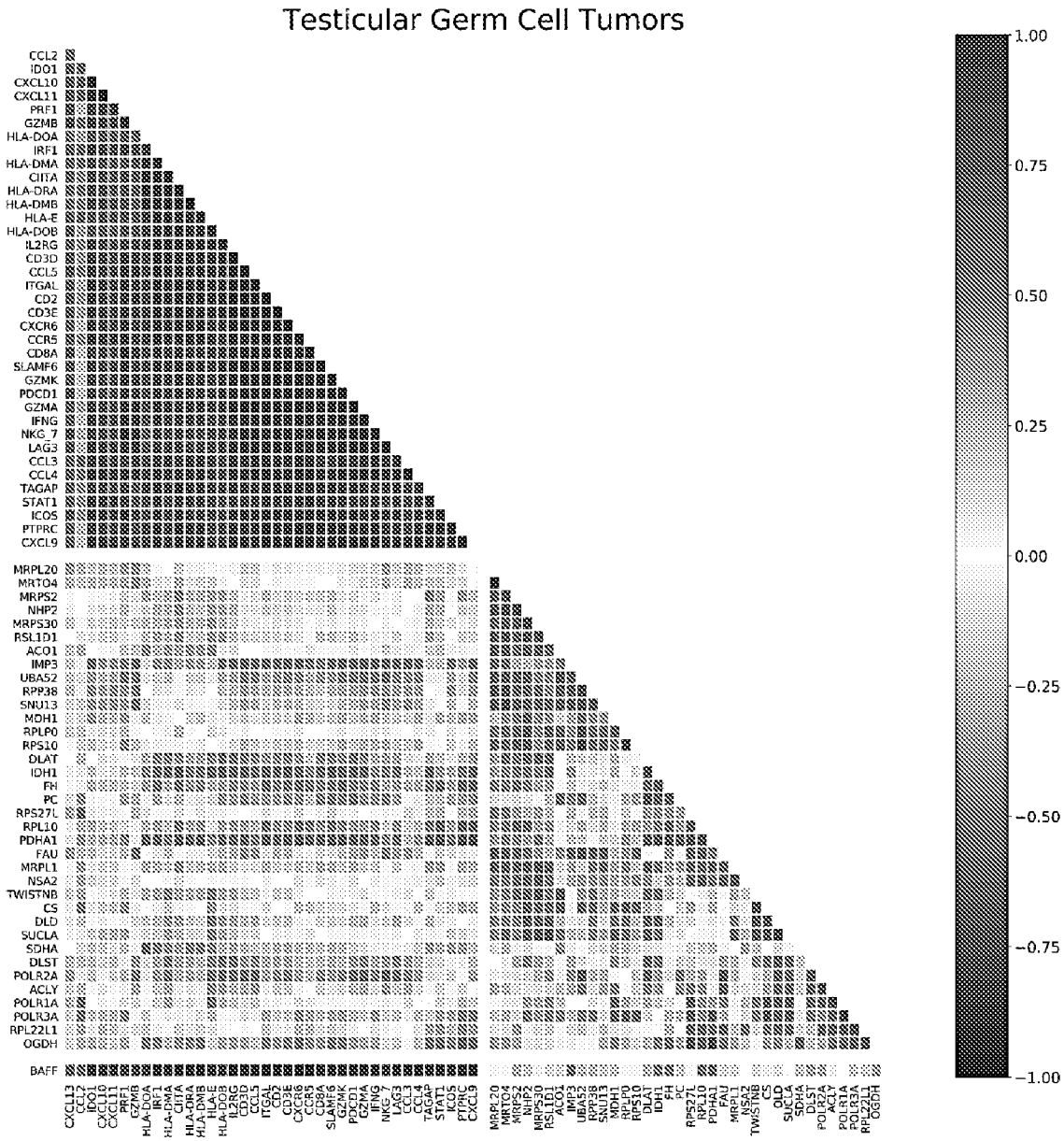

Testicular Germ Cell Tumors
CCL2
IDO1
CXCL10
CXCL11
PRF1
GZMB
HLA-DOA
IRF1
HLA-DMA
CIITA
HLA-DRA
HLA-DMB
HLA-E
HLA-DOB
IL2RG
CD3D
CCL5
ITGAL
CD2
CD3E
CXCR6
CCR5
CD8A
SLAMF6
GZMK
PDCD1
GZMA
IFNG
NKG7
LAG3
CCL3
CCL4
TAGAP
STAT1
ICOS
PTPRC
CXCL9
MRPL20
MRTO4
MRPS2
NHP2
MRPS30
RSL1D1
ACO1
IMP3
UBA52
RPP38
SNU13
MDH1
RPLP0
RPS10
DLAT
IDH1
FH
PC
RPS27L
RPL10
PDHA1
FAU
MRPL1
NSA2
TWISTNB
CS
DLD
SUCLA
SDHA
DLST
POLR2A
ACLY
POLR1A
POLR3A
RPL22L1
OGDH
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 51

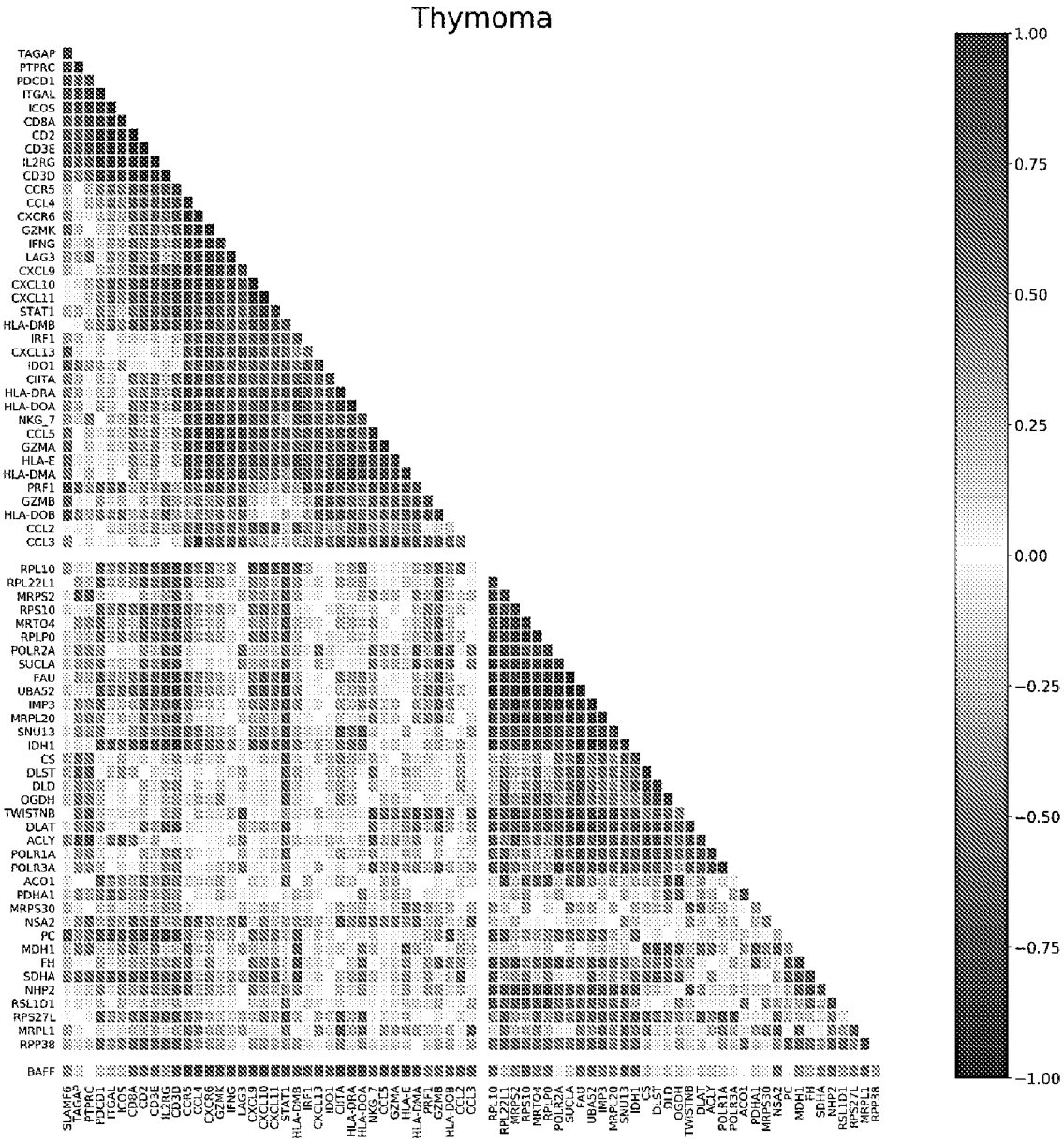

Thymoma
TAGAP
PTPRC
PDCD1
ITGAL
ICOS
CD8A
CD2
CD3E
IL2RG
CD3D
CCR5
CCL4
CXCR6
GZMK
IFNG
LAG3
CXCL9
CXCL10
CXCL11
STAT1
HLA-DMB
IRF1
CXCL13
IDO1
CIITA
HLA-DRA
HLA-DOA
NKG7
CCL5
GZMA
HLA-E
HLA-DMA
PRF1
GZMB
HLA-DOB
CCL2
CCL3
RPL10
RPL22L1
MRPS2
RPS10
MRTO4
RPLP0
POLR2A
SUCLA
FAU
UBA52
IMP3
MRPL20
SNU13
IDH1
CS
DLST
DLD
OGDH
TWISTNB
DLAT
ACLY
POLR1A
POLR3A
ACO1
PDHA1
MRPS30
NSA2
PC
MDH1
FH
SDHA
NHP2
RSL1D1
RPS27L
MRPL1
RPP38
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 52

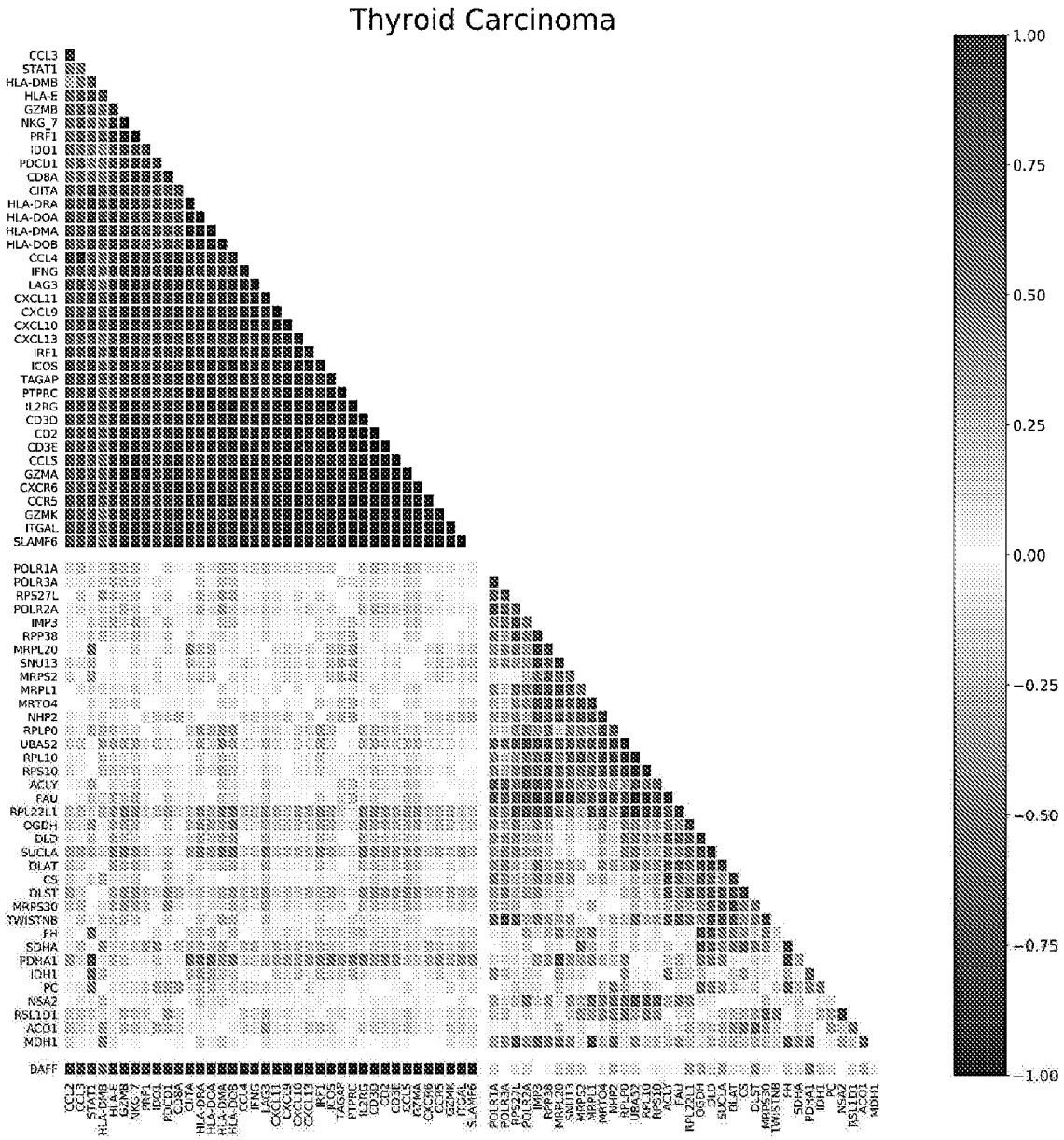

Thyroid Carcinoma
CCL3
STAT1
HLA-DMB
HLA-E
GZMB
NKG_7
PRF1
IDO1
PDCD1
CD8A
CIITA
HLA-DRA
HLA-DOA
HLA-DMA
HLA-DOB
CCL4
IFNG
LAG3
CXCL11
CXCL9
CXCL10
CXCL13
IRF1
ICOS
TAGAP
PTPRC
IL2RG
CD3D
CD2
CD3E
CCL5
GZMA
CXCR6
CCR5
GZMK
ITGAL
SLAMF6
POLR1A
POLR3A
RPS27L
POLR2A
IMP3
RPP38
MRPL20
SNU13
MRPS2
MRPL1
MRTO4
NHP2
RPLP0
UBA52
RPL10
RPS10
ACLY
FAU
RPL22L1
OGDH
DLD
SUCLA
DLAT
CS
DLST
MRPS30
TWISTNB
FH
SDHA
PDHA1
IDH1
PC
NSA2
RSL1D1
ACO1
MDH1
DAPI
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 53

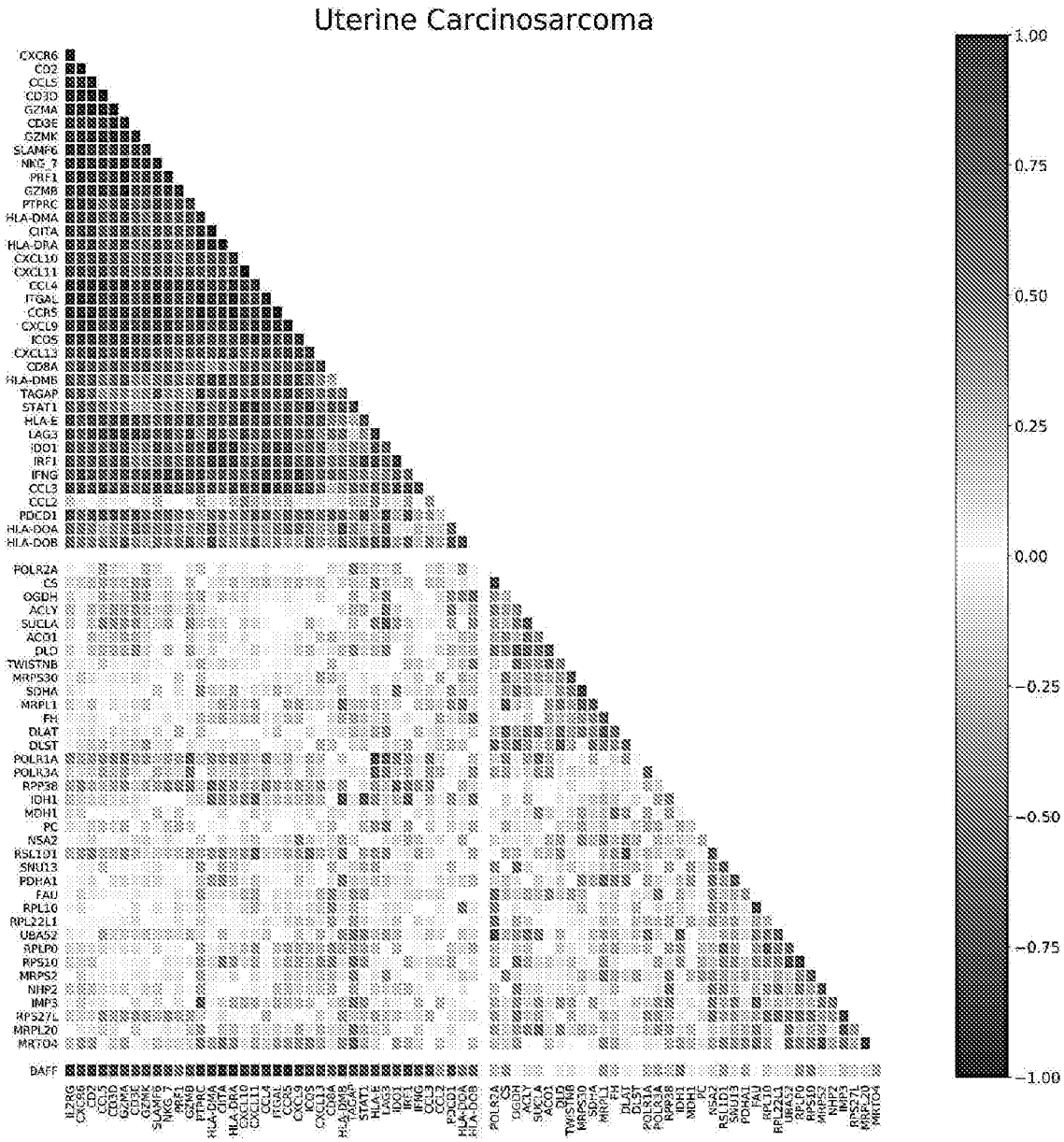


FIG. 54

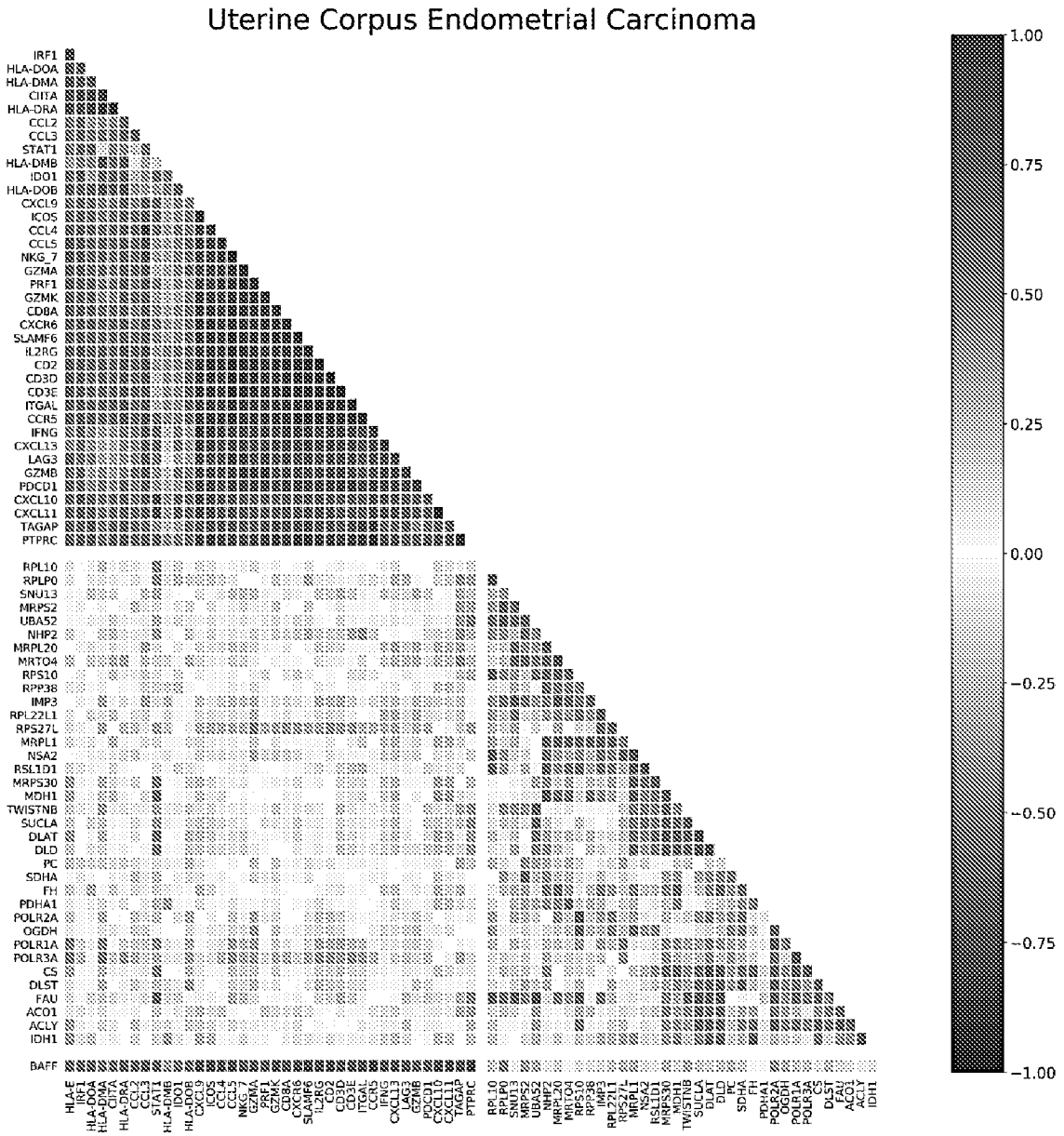

Uterine Corpus Endometrial Carcinoma
IRF1
HLA-DOA
HLA-DMA
CIITA
HLA-DRA
CCL2
CCL3
STAT1
HLA-DMB
IDO1
HLA-DOB
CXCL9
ICOS
CCL4
CCL5
NKG7
GZMA
PRF1
GZMK
CD8A
CXCR6
SLAMF6
IL2RG
CD2
CD3D
CD3E
ITGAL
CCR5
IFNG
CXCL13
LAG3
GZMB
PDCD1
CXCL10
CXCL11
TAGAP
PTPRC
RPL10
RPLP0
SNU13
MRPS2
UBA52
NHP2
MRPL20
MRTO4
RPS10
RPP38
IMP3
RPL22L1
RPS27L
MRPL1
NSA2
RSL1D1
MRPS30
MDH1
TWISTNB
SUCLA
DLAT
DLD
PC
SDHA
FH
PDHA1
POLR2A
OGDH
POLR1A
POLR3A
CS
DLST
FAU
ACO1
ACLY
IDH1
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 55

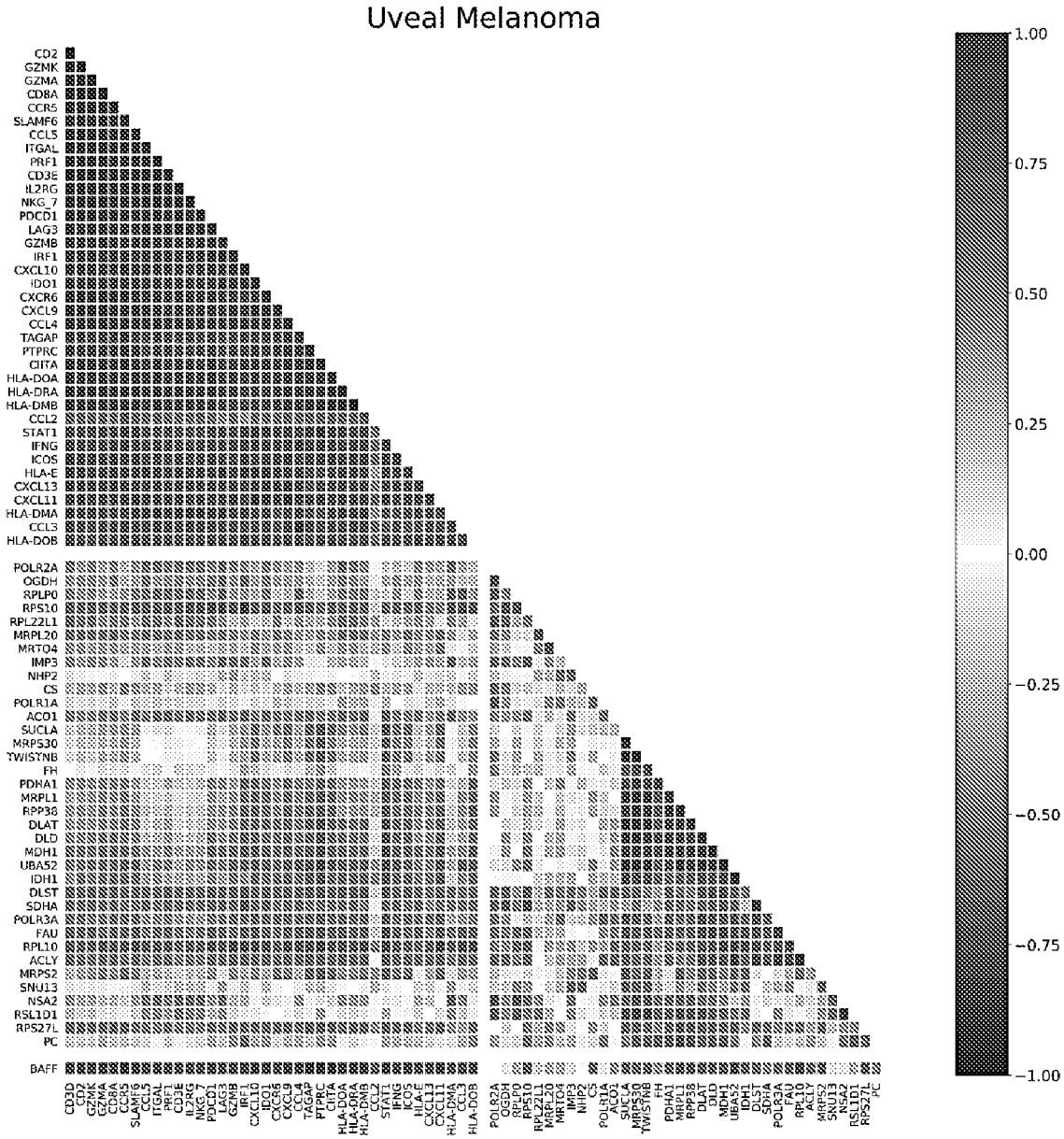

Uveal Melanoma
CD2
GZMK
GZMA
CD8A
CCR5
SLAMF6
CCL5
ITGAL
PRF1
CD3E
IL2RG
NKG7
PDCD1
LAG3
GZMB
IRF1
CXCL10
IDO1
CXCR6
CXCL9
CCL4
TAGAP
PTPRC
CIITA
HLA-DOA
HLA-DRA
HLA-DMB
CCL2
STAT1
IFNG
ICOS
HLA-E
CXCL13
CXCL11
HLA-DMA
CCL3
HLA-DOB
POLR2A
OGDH
RPLP0
RPS10
RPL22L1
MRPL20
MRTO4
IMP3
NHP2
CS
POLR1A
ACO1
SUCLA
MRPS30
TWISTNB
FH
PDHA1
MRPL1
RPP38
DLAT
DLD
MDH1
UBA52
IDH1
DLST
SDHA
POLR3A
FAU
RPL10
ACLY
MRPS2
SNU13
NSA2
RSL1D1
RPS27L
PC
BAFF
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00

FIG. 56

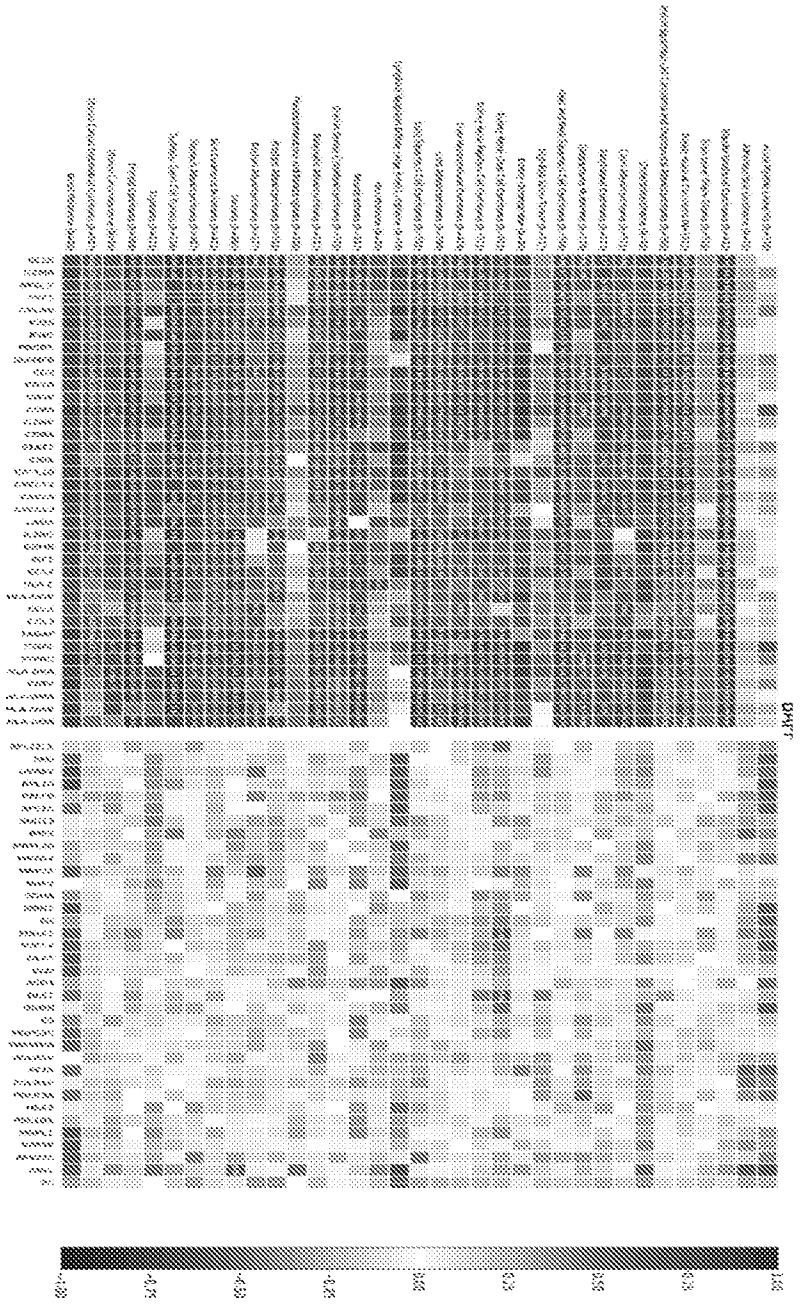


FIG. 57

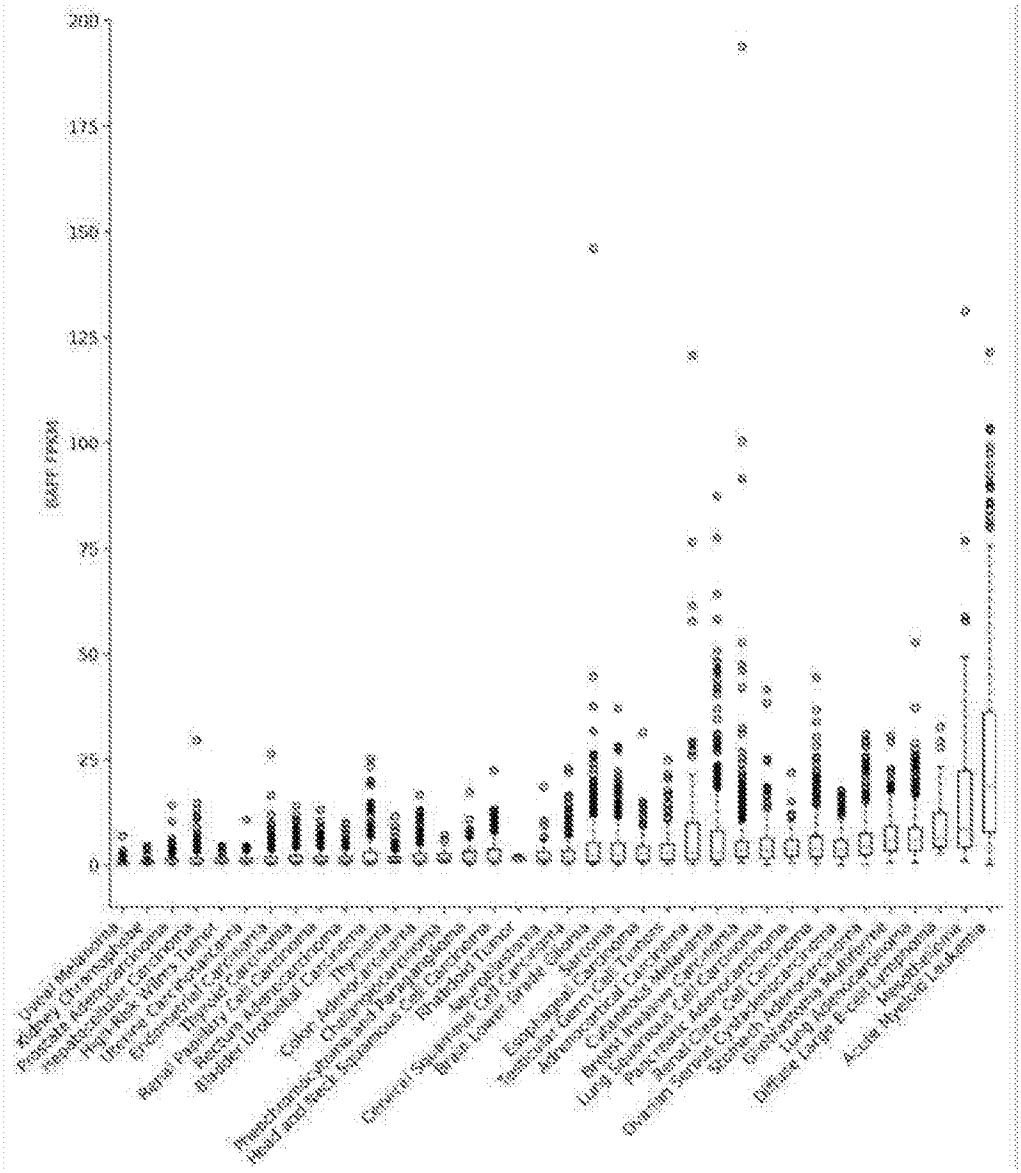

200
175
150
125
100
75
50
25
0
Uveal Melanoma
Kidney Chromophobe
Prostate Adenocarcinoma
Hepatocellular Carcinoma
High Risk Wilms Tumor
Uterine Carcinosarcoma
Endometrial Carcinoma
Adrenocortical Carcinoma
Renal Papillary Cell Carcinoma
Rectum Adenocarcinoma
Bladder Urothelial Carcinoma
Thymoma
Colon Adenocarcinoma
Cholangiocarcinoma
Pheochromocytoma Paraganglioma
Head and Neck Squamous Cell Carcinoma
Glioblastoma
Rhabdoid Tumor
Neuroblastoma
Cervical Squamous Cell Carcinoma
Brain Lower Grade Glioma
Sarcoma
Esophageal Carcinoma
Testicular Germ Cell Tumors
Adrenocortical Carcinoma
Cutaneous Melanoma
Breast Invasive Carcinoma
Lung Squamous Cell Carcinoma
Pancreatic Adenocarcinoma
Renal Clear Cell Carcinoma
Ovarian Serous Cystadenocarcinoma
Stomach Adenocarcinoma
Glioblastoma multiforme
Lung Adenocarcinoma
Diffuse Large B-cell Lymphoma
Mesothelioma
Acute Myeloid Leukemia

FIG. 58