

IMMUNOREPERTOIRE NORMALITY ASSESSMENT METHOD AND ITS USE**CROSS REFERENCE TO RELATED APPLICATION**

[0001] This application claims priority to U.S. Provisional Patent Application No. 62/234,424, entitled "Immunorepertoire Normality Assessment Method and Its Use" and filed on September 29, 2015, which is incorporated herein by reference.

FIELD OF INVENTION

[0002] The present disclosure relates to methods for performing diagnostic tests. More specifically, the present disclosure relates to diagnostic tests for the assessment of immunorepertoire diversity relative to a standard index.

BACKGROUND OF INVENTION

[0003] Diagnostic tests may be used to detect the presence or absence of the normal state in a patient, and the results of these tests may be used to screen patients and collectively aid in diagnosis. For example, a normal white blood cell count is between 4,500 and 10,000 cells per microliter. An elevated white blood cell count is not determinative for a specific disease, but it may indicate an underlying problem that requires medical evaluation. Normal ranges of red blood cell counts for women and men are generally different, with a count of 5 to 6 million per microliter being normal for males and 3.6 to 5.6 million being normal for females. Platelet counts are normal if they are within the range of 150,000 to 400,000. In the presence of inflammation, for example, red cell count may go down, white cell count may go up, and platelet count may also be elevated.

[0004] Similarly, heart disease, the tendency to have heart disease, signs of certain cancers, and a variety of genetic diseases may have as their early signs one or more abnormal results for a variety of diagnostic tests. Such diagnostic tests include, for example, measures of albumin, alkaline phosphatase, alanine transaminase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN), serum calcium, serum chloride, carbon dioxide, creatinine, direct bilirubin, gamma-glutamyl-transpeptidase (gamma-GT), glucose, lactate dehydrogenase (LDH), serum phosphorus, potassium, serum sodium, total bilirubin, total cholesterol, total protein, and uric acid.

[0005] In addition, blood glucose levels may also be used as early indicators associated with diseases as varied as Cushing syndrome, hyperthyroidism, pancreatic cancer, pancreatitis, pre-diabetes, and diabetes.

[0006] As described above, diagnostic tests are currently available and performed on a regular basis to detect the presence or absence of a normal state in an individual. These tests, however, do not address the diversity of the immunorepertoire in a patient. The ability to detect the presence or absence of a diverse immunorepertoire, relative to a standard, in an individual may assist with an assessment of the health of such individual.

SUMMARY OF INVENTION

[0007] The present disclosure relates to a method for A method for determining the immunorepertoire diversity in a patient. The method comprises: quantifying the expression of third complementarity-determining region ("CDR3") in a population or sub-population of immune system cells in a patient sample; and identifying the percentage of pCDR3 represented by such CDR3s within that population or sub-population, wherein normal immunorepertoire diversity is characterized by the presence of a minimum percentage of pCDR3 and an abnormal immunorepertoire diversity status is characterized by the absence of a minimum percentage of pCDR3.

[0008] In certain embodiments, the minimum percentage of pCDR3 in such method is a percentage number selected from about 25 percent to about 75 percent. In other embodiments, the minimum percentage of pCDR3 is about 25 percent. In other embodiments, the pCDR3 is composed of about the 1000 most-frequently-shared CDR3. In other embodiments, the pCDR3 is composed of more than 1000 of the most-frequently-shared CDR3. In yet other embodiments, the pCDR3 is composed of fewer than 1000 of the most-frequently-shared CDR3. In other embodiments, the pCDR3 is composed of CDR3 shared by at least 25 percent of a pool of individuals.

[0009] In certain embodiments, the pCDR3 is composed of CDR3 shared by at least 50 percent of a pool of individuals. In certain embodiments, such pool contains at least 100 individuals. In other embodiments, such pool contains about 1000 individuals.

[0010] The present disclosure also relates to a method for determining the immunorepertoire diversity in a patient. The method comprises: amplifying polynucleotides from a population of white blood cells from a human or animal subject in a reaction mix comprising target-specific nested primers to produce a set of first

amplicons, at least a portion of the target-specific nested primers comprising additional nucleotides which, during amplification, serve as a template for incorporating into the first amplicons a binding site for at least one common primer; transferring a portion of the first reaction mix containing the first amplicons to a second reaction mix comprising at least one common primer; amplifying, using the at least one common primer, the first amplicons to produce a set of second amplicons; sequencing the second amplicons to identify CDR3 sequences in the subpopulation of white blood cells; using the identified CDR3 sequences to quantify the percentage of pCDR3 represented by the sample to provide a normality index; and identifying whether the normality index is normal or abnormal, wherein a normal state is characterized by the presence of a minimum percentage of pCDR3 and an abnormal state is characterized by the absence of a minimum percentage of pCDR3.

[0011] In certain embodiments, such second method measures a population of white blood cells, wherein the population includes about 100,000 randomly-selected cells. In certain embodiments, the method is repeated about 10 to 100 times, each time with a random selection of cells, to determine the average percentage of pCDR3 expressed by the patient. In certain embodiments, the minimum percentage of pCDR3 is a percentage number from about 25 to about 75. In certain embodiments, the pCDR3 is composed of at least the 1000 most-frequently-shared CDR3. In certain embodiments, the pCDR3 includes SEQ ID NO:1 through SEQ ID NO: 4014 as described herein. For example, the normality index of a patient may be determined based on the percentage of pCDR3 sequences, represented by SEQ ID NO: 1 through SEQ ID NO: 4014, present in a predetermined number of reads of a patient sample. In certain embodiments, the pCDR3 is composed of CDR3 shared by at least 50 percent of a pool of individuals.

[0012] The reference pool of individuals may be different sizes. In certain embodiments, the reference pool includes at least 100 individuals. In certain embodiments, the pool contains about 1000 individuals. In certain embodiments, the pool is composed of healthy control individuals, whereas in other embodiments, the pool is composed of individuals with one or more specific disease states. The reference pool may further be controlled to account for certain variables of a given patient. In certain embodiments, the pool of individuals is approximately age-matched to the patient. In other embodiments, the pool of individuals is gender-matched to the patient.

[0013] In various aspects of the present disclosure, the immune system cells that are analyzed, under any method described herein, may include, for example, all T cells

[panT], functional subsets of T cells such as CD8+ T cells [cytotoxic T (Ta)], CD4+ T cells and their subsets [TH1, TH2, TH17, regulatory T (reg) and follicular T (TFH)], or developmental subsets of T cells such as naive T (Tn), activated T (Ta), memory T (Tm), all B cells (panB) and their subsets such as naive B (Br), activated B (Ba), memory B (Bm), plasma and plasmablast B cells. Such cells may be obtained from peripheral blood or other sources known in the art.

[0014] It will be apparent to those skilled in the art that only the preferred embodiments have been described by way of exemplification and that there are various modifications which fall within the scope of the present disclosure. These and other aspects of the present disclosure will be discussed in greater detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Fig. 1 shows four plots overlaid into a single graph, representing (from top to bottom) the number of total reads, the number of unique CDR3s, the number of pCDR3s, and the normality index.

DETAILED DESCRIPTION

[0016] The inventor has developed a method for determining the diversity of a patient's immunorepertoire by comparing the CDR3 sequences in a patient sample to the most commonly-shared CDR3 sequences (i.e., the pCDR3) of an index group of individuals. This percentage of pCDR3 in a patient's sample is referred to as the "normality index" and may serve as a diagnostic indicator of the immunorepertoire diversity in such patient. The present disclosure further includes a method for determining such subset of highly-shared pCDR3. In one aspect of the present disclosure, the immunorepertoire of a patient is considered normal if the patient's normality index meets or exceeds a minimum percentage, whereas the immunorepertoire of the patient is considered abnormal if the patient's normality index is below such minimum percentage. As used herein, "patient" may refer to either a human or an animal.

[0017] The CDR3 expressed by individuals exhibits tremendous diversity, with up to 10^{15} unique CDR3 possible. As such, the present disclosure uses CDR3 as a basis for immune system diversity. The inventor has determined, based on a sampling of 75 million CDR3, that approximately 81% of randomly-selected CDR3 are unique to a given individual and are not shared among multiple individuals. The present disclosure, however, provides

a method for determining a pool of highly-shared CDR3, thereby enabling a standard index of shared CDR3 by which the diversity of an individual's immunorepertoire may be compared.

[0018] As used herein, "abnormal" means the absence of a minimum percentage of pCDR3 sequences measured in a patient. As such, abnormal indicates a difference from the reference group of individuals used to generate the pCDR3. An abnormal immunorepertoire may, but does not necessarily, indicate the presence or absence of disease in the patient.

[0019] As used herein, "immunorepertoire" means the set of distinct CDR3 sequences detected in the lymphocytes of an individual or individuals, as applicable.

[0020] The method of the present disclosure may be performed using the following steps to identify a normal immune status or an abnormal immune status in a patient, the method comprising the steps of: (a) amplifying polynucleotides from a population of white blood cells from a patient in a reaction mix comprising target-specific nested primers to produce a set of first amplicons, at least a portion of the target-specific nested primers comprising additional nucleotides which, during amplification, serve as a template for incorporating into the first amplicons a binding site for at least one common primer; (b) transferring a portion of the first reaction mix containing the first amplicons to a second reaction mix comprising at least one common primer; (c) amplifying, using the at least one common primer, the first amplicons to produce a set of second amplicons; (d) sequencing the second amplicons to identify CDR3 sequences in the subpopulation of white blood cells, and (e) using the identified CDR3 sequences to quantify the percentage of pCDR3 represented by the sample to provide a normality index; and (f) identifying whether the normality index is normal or abnormal, wherein a normal state is characterized by the presence of a minimum percentage of pCDR3 and an abnormal state is characterized by the absence of a minimum percentage of pCDR3. As shown in FIG. 1, a patient's normality index, pCDR3s and unique CDR3s are correlated.

[0021] In certain embodiments, the sequencing includes about 100,000 reads taken per sample. In certain embodiments, the reads are performed multiple times, for example about 10 to 100 times, using random selection, to obtain an average percentage of pCDR3 sequences present in the sample. The resulting number is divided by the number of pCDR3 in the reference pool to obtain a percentage, referred to as the "normality index," which is a number between 0% and 100%. For example, if a patient sample contains 400 of 1000 pCDR3 sequences, then the patient's normality index is 0.40 or 40%. In other

embodiments at least 10,000 reads are taken. In other embodiments, more than 100,000 reads are taken. In other embodiments, the reads are performed less than 10 times. In other embodiments, the reads are performed more than 100 times.

[0022] In certain embodiments, the index pool is composed of about 1000 individuals. In other embodiments, the index pool contains between 100 and 1000 individuals. In other embodiments, the index pool contains fewer than 100 individuals. In other embodiments, the index pool contains more than 1000 individuals. Relative to the patient, the individuals may be age-matched, gender-matched, healthy, disease-matched, and/or other criteria commonly known in the art when controlling for variables. In certain embodiments, the index pool is composed of healthy controls. In other embodiments, the index pool is composed of a mix of healthy controls and individuals with one or more disease states. In other embodiments, the index pool is composed of individuals with one or more particular disease states.

[0023] In certain embodiments, the CDR3 sequences shared by the index pool (i.e., the pCDR3) are determined by comparing each sample from the index pool and identifying those CDR3s that are shared by at least 50% of the individuals tested in such reference pool. In certain embodiments, the pCDR3 includes about the top 1000 shared CDR3 sequences. In other embodiments, the pCDR3 include at least 100 CDR3 sequences. In other embodiments, the pCDR3 includes more than 1000 CDR3 sequences.

[0024] In certain embodiments, the minimum percentage of pCDR3, used to determine the normal or abnormal state of the immunorepertoire, is about 25%. In other embodiments, the minimum percentage of pCDR3 is between 25% and 75%.

[0025] It has previously been difficult to assess the immune system in a broad manner, because the number and variety of cells in a human or animal immune system is so large that sequencing of more than a small subset of cells has been almost impossible. The inventor developed a semi-quantitative PCR method (arm-PCR, described in more detail in U.S. Patent Application Publication Number 20090253183), which provides increased sensitivity and specificity over previously-available methods, while producing semi-quantitative results. It is this ability to increase specificity and sensitivity, and thereby increase the number of targets detectable within a single sample that makes the method ideal for detecting relative numbers of clonotypes of the immunorepertoire. The inventor has more recently discovered that using this sequencing method allows comparison of a patient's CDR3 sequences to those commonly shared by an index group, which has led to the development of the present method. The method may be used to evaluate the diversity

of the immunorepertoire of subjects relative to an index pool of individuals. For example, the inventor has demonstrated that the presence of disease correlates with decreased immunorepertoire diversity, for example a decrease in the diversity of CDR3 sequences, which can be readily detected using the method of the present disclosure. This method may therefore be useful as an initial diagnostic indicator, much as cell counts and biochemical tests are currently used in clinical practice, of normal versus abnormal immunorepertoire diversity.

[0026] Clonotypes (i.e., clonal types) of an immunorepertoire are determined by the rearrangement of Variable(V), Diverse(D) and Joining(J) gene segments through somatic recombination in the early stages of immunoglobulin (Ig) and T cell receptor (TCR) production of the immune system. The V(D)J rearrangement can be amplified and detected from T cell receptor alpha, beta, gamma, and delta chains, as well as from immunoglobulin heavy chain (IgH) and light chains (IgK, IgL). Cells may be obtained from a patient by obtaining peripheral blood, lymphoid tissue, cancer tissue, or tissue or fluids from other organs and/or organ systems, for example. Techniques for obtaining these samples, such as blood samples, are known to those of skill in the art. Cell counts may be extrapolated from the number of sequences detected by PCR amplification and sequencing.

[0027] The CDR3 region, comprising about 30-90 nucleotides, encompasses the junction of the recombined variable (V), diversity (D) and joining (J) segments of the gene. It encodes the binding specificity of the receptor and is useful as a sequence tag to identify unique V(D)J rearrangements.

[0028] Wang et al. disclosed that PCR may be used to obtain quantitative or semi-quantitative assessments of the numbers of target molecules in a specimen (Wang, M. et al, "Quantitation of mRNA by the polymerase chain reaction," (1989) Proc. Nat'l. Acad. Sci. 86: 9717-9721). Particularly effective methods for achieving quantitative amplification have been described previously by the inventor. One such method is known as arm-PCR, which is described in United States Patent Application Publication Number 20090253183A1.

[0029] Aspects of the present disclosure include arm-PCR amplification of CDR3 from T cells, B cells, and/or subsets of T or B cells. Such cell types may be sorted and isolated using techniques known in the art including, but not limited to, FACS sorting and magnetic bead sorting. The term "population" of cells, as used herein, therefore encompasses what are generally referred to as either "populations" or "sub-populations" of cells. Large numbers of amplified products may then be efficiently sequenced using next-generation sequencing using platforms such as 454 or Illumina, for example.

[0030] The arm-PCR method provides highly sensitive, semi-quantitative amplification of multiple polynucleotides in one reaction. The arm-PCR method may also be performed by automated methods in a closed cassette system (iCubate®, Huntsville, Alabama), which is beneficial in the present method because the repertoires of various T and B cells, for example, are so large. In the arm-PCR method, target numbers are increased in a reaction driven by DNA polymerase, which is the result of target-specific primers being introduced into the reaction. An additional result of this amplification reaction is the introduction of binding sites for common primers which will be used in a subsequent amplification by transferring a portion of the first reaction mix containing the first set of amplicons to a second reaction mix comprising common primers. "At least one common primer," as used herein, refers to at least one primer that will bind to such a binding site, and includes pairs of primers, such as forward and reverse primers. This transfer may be performed either by recovering a portion of the reaction mix from the first amplification reaction and introducing that sample into a second reaction tube or chamber, or by removing a portion of the liquid from the completed first amplification, leaving behind a portion, and adding fresh reagents into the tube in which the first amplification was performed. In either case, additional buffers, polymerase, etc., may then be added in conjunction with the common primers to produce amplified products for detection. The amplification of target molecules using common primers gives a semi-quantitative result wherein the quantitative numbers of targets amplified in the first amplification are amplified using common, rather than target-specific primers – making it possible to produce significantly higher numbers of targets for detection and to determine the relative amounts of the cells comprising various rearrangements within a patient blood sample. Also, combining the second reaction mix with a portion of the first reaction mix allows for higher concentrations of target-specific primers to be added to the first reaction mix, resulting in greater sensitivity in the first amplification reaction. It is the combination of specificity and sensitivity, along with the ability to achieve quantitative results by use of a method such as the arm-PCR method, which allows a sufficiently sensitive and quantitative assessment of the CDR3 expressed in a population of cells to produce a normality index that is of diagnostic use.

[0031] Clonal expansion due to recognition of antigen results in a larger population of cells that recognize that antigen, potentially including antibody-producing B cells or receptor-bearing T cells. This may cause the reads taken pursuant to the method disclosed herein to be biased in favor of the antigen-specific expansion, thereby reducing the percentage of pCDR3 sequences detected. Therefore, a relatively low normality index, for example one

below the minimum percentage, may be indicative of the expansion of a particular population of cells that is prevalent in individuals who have been diagnosed with a particular disease or in individuals recently-vaccinated against a particular antigen.

[0032] Primers for amplifying and sequencing variable regions of immune system cells are available commercially, and have been described in publication such as the inventor's published patent applications W02009137255 and US201000021896A1.

[0033] There are several commercially available high-throughput sequencing technologies, such as Hoffman-LaRoche, Inc.'s 454® sequencing system. In the 454® sequencing method, for example, the A and B adaptor are linked onto PCR products either during PCR or ligated on after the PCR reaction. The adaptors are used for amplification and sequencing steps. When done in conjunction with the arm-PCR technique, A and B adaptors may be used as common primers (which are sometimes referred to as "communal primers" or "superprimers") in the amplification reactions. After A and B adaptors have been physically attached to a sample library (such as PCR amplicons), a single-stranded DNA library is prepared using techniques known to those of skill in the art. The single-stranded DNA library is immobilized onto specifically-designed DNA capture beads. Each bead carries a unique singled-stranded DNA library fragment. The bead-bound library is emulsified with amplification reagents in a water-in-oil mixture, producing microreactors, each containing just one bead with one unique sample-library fragment. Each unique sample library fragment is amplified within its own microreactor, excluding competing or contaminating sequences. Amplification of the entire fragment collection is done in parallel. For each fragment, this results in copy numbers of several million per bead. Subsequently, the emulsion PCR is broken while the amplified fragments remain bound to their specific beads. The clonally amplified fragments are enriched and loaded onto a PicoTiterPlate® device for sequencing. The diameter of the PicoTiterPlate® wells allows for only one bead per well. After addition of sequencing enzymes, the fluidics subsystem of the sequencing instrument flows individual nucleotides in a fixed order across the hundreds of thousands of wells each containing a single bead. Addition of one (or more) nucleotide(s) complementary to the template strand results in a chemilluminescent signal recorded by a CCD camera within the instrument. The combination of signal intensity and positional information generated across the PicoTiterPlate® device allows the software to determine the sequence of more than 1,000,000 individual reads, each is up to about 450 base pairs, with the GS FLX system.

[0034] Having obtained the sequences using a quantitative and/or semi-quantitative method, it is then possible to calculate the normality index, for example, by determining the percentage of pCDR3 represented by a predetermined number of reads of a patient sample. Each patient's normality index may be compared to a predetermined threshold to determine whether the patient's normality index falls within the normal range, and therefore is normal, or below the threshold, and thereby is abnormal.

[0035] The method of the present disclosure provides a physician with an additional clinical test for diagnostic purposes to determine whether a patient's immunorepertoire is abnormal. Further, the method of the present disclosure, particularly if used in an automated system such as that described by the inventor in U.S. Patent Application Publication Number 201000291668A1, may be used to analyze samples from multiple patients, with detection of the amplified targets sequences being accomplished by the use of one or more microarrays.

Examples

Patient Samples

[0036] Whole blood samples (40 ml) collected in sodium heparin or peripheral blood mononuclear cells (PBMCs) were obtained from 1100 individuals, representing a mixed population of both healthy individuals and those with disease. The 1100 individuals were placed randomly into 11 different groups with 100 samples per group.

RNA extraction and repertoire amplification

[0037] RNA extraction was performed using the RNeasy Mini Kit (Qiagen) according to the manufacturer's protocol. For each target, a set of nested sequence-specific primers (Forward-out, Fo; Forward-in, Fi; Reverse-out, Ro; and Reverse-in, Ri) was designed using primer software available at www.irepertoire.com. A pair of common sequence tags was linked to all internal primers (Fi and Ri). Once these tag sequences were incorporated into the PCR products in the first few amplification cycles, the exponential phase of the amplification was carried out with a pair of communal primers. In the first round of amplification, only sequence-specific nested primers were used. The nested primers were then removed by exonuclease digestion and the first-round PCR products were used as templates for a second round of amplification by adding communal primers and a mixture of fresh enzyme and dNTP. Each distinct barcode tag was introduced into amplicon from the same sample through PCR primer.

Sequencing

[0038] Barcode tagged amplicon products from different samples were pooled together and loaded into a 2% agarose gel. Following electrophoresis, DNA fragments were purified from DNA band corresponding to 250-500bp fragments extracted from agarose gel. DNA was sequenced using the 454 GS FLX system with titanium kits (SeqWright, Inc.).

Sequencing data analysis

[0039] Sequences for each sample were sorted out according to barcode tag. Following sequence separation, sequence analysis was performed in a manner similar to the approach reported by Wang et al. (Wang C, et al. High throughput sequencing reveals a complex pattern of dynamic interrelationships among human T cell subsets. Proc Natl Acad Sci USA 107(4): 1518-1523). Briefly, germline V and J reference sequences, which were downloaded from the IMGT server (<http://www.imgt.org>), were mapped onto sequence reads using the program IRmap. The boundaries defining CDR3 region in reference sequences were mirrored onto sequencing reads through mapping information. The enclosed CDR3 regions in sequencing reads were extracted and translated into amino acid sequence.

Determination of pCDR3

[0040] Sequences obtained from each of the 11 groups were compared to determine which CDR3 sequences were detected in at least 50% of the samples in each group. The resulting CDR3 sequences were sorted such that the top 4014 most commonly shared CDR3 sequences were selected as the pCDR3 for purposes of calculating a normality index for patient samples. The CDR3 sequences selected for inclusion in the pCDR3 – SEQ ID NO:1 through SEQ ID NO: 4014 – are shown in Table I.

TABLE I

Sequence	Sequence ID No	Sequence	Sequence ID No
ASSLGETQY	SEQ ID NO: 1	ASSLGYEQY	SEQ ID NO: 7
ASSLSTDTQY	SEQ ID NO: 2	ASSLGDTQY	SEQ ID NO: 8
ASSLGTDQY	SEQ ID NO: 3	ASSLGGNTEAF	SEQ ID NO: 9
ASSPSTDTQY	SEQ ID NO: 4	ASSLGGNQPH	SEQ ID NO: 10
ASSLQETQY	SEQ ID NO: 5	ASSLEETQY	SEQ ID NO: 11
ASSLTDQY	SEQ ID NO: 6	ASSLDSNQPH	SEQ ID NO: 12
ASSLGQNTAF	SEQ ID NO: 13	ASSLSDQY	SEQ ID NO: 54
ASSLRETQY	SEQ ID NO: 14	ASSLTVNTEAF	SEQ ID NO: 55
ASSLADTQY	SEQ ID NO: 15	ASSPPSTDTQY	SEQ ID NO: 56
ASSLSYEQY	SEQ ID NO: 16	ASSLAGNTEAF	SEQ ID NO: 57
ASSLGSNQPH	SEQ ID NO: 17	ASSLGSYEQY	SEQ ID NO: 58
ASSSSYEQY	SEQ ID NO: 18	ASSPGQGYEQY	SEQ ID NO: 59

ASSSQETQY	SEQ ID NO: 19	ASSLGQGNTAF	SEQ ID NO: 60
ASSPQETQY	SEQ ID NO: 20	ASSLGGSNQPQH	SEQ ID NO: 61
ASSLGGTEAF	SEQ ID NO: 21	ASSFQETQY	SEQ ID NO: 62
ASSSTDQY	SEQ ID NO: 22	ASSLQGYEQY	SEQ ID NO: 63
ASSLGGTDTQY	SEQ ID NO: 23	ASSLGADTQY	SEQ ID NO: 64
ASSLQGNTAF	SEQ ID NO: 24	ASSLTGGTEAF	SEQ ID NO: 65
ASSLAGGDTQY	SEQ ID NO: 25	ASSLGQGNQPQH	SEQ ID NO: 66
ASSLGNTEAF	SEQ ID NO: 26	ASSLGSSYEYQY	SEQ ID NO: 67
ASSFGETQY	SEQ ID NO: 27	ASSLGSYNEQF	SEQ ID NO: 68
ASSLGGYEYQY	SEQ ID NO: 28	ASSLGGSSYEYQY	SEQ ID NO: 69
ASSLGLNTEAF	SEQ ID NO: 29	ASSLAGYEYQY	SEQ ID NO: 70
ASSLGSTDQY	SEQ ID NO: 30	ASSLAGSTDQY	SEQ ID NO: 71
ASSLTGNTEAF	SEQ ID NO: 31	ASSLKETQY	SEQ ID NO: 72
ASSLGRNTEAF	SEQ ID NO: 32	ASSLGGGTEAF	SEQ ID NO: 73
ASSPSYEYQY	SEQ ID NO: 33	ASSRDSNQPQH	SEQ ID NO: 74
ASSPSSYEYQY	SEQ ID NO: 34	ASSLGPNTAF	SEQ ID NO: 75
ASSLYNEQF	SEQ ID NO: 35	ASSLGGDTQY	SEQ ID NO: 76
ASSLGVNTEAF	SEQ ID NO: 36	ASSSSSYEQY	SEQ ID NO: 77
ASSSSTDQY	SEQ ID NO: 37	ASSLGNQPQH	SEQ ID NO: 78
ASSLAGTDTQY	SEQ ID NO: 38	ASSSTYEYQY	SEQ ID NO: 79
ASSFTDTQY	SEQ ID NO: 39	ASSLGGGDTQY	SEQ ID NO: 80
ASSLQGGYEYQY	SEQ ID NO: 40	ASSLSSYNEQF	SEQ ID NO: 81
ASSLGNEQF	SEQ ID NO: 41	ASSFSTDQY	SEQ ID NO: 82
ASSLGTEAF	SEQ ID NO: 42	ASSLGMNTEAF	SEQ ID NO: 83
ASSPGTDTQY	SEQ ID NO: 43	ASSPDSYEYQY	SEQ ID NO: 84
ASSLSSYEYQY	SEQ ID NO: 44	ASSPGYEYQY	SEQ ID NO: 85
ASSLDSYEYQY	SEQ ID NO: 45	ASSPRTDTQY	SEQ ID NO: 86
ASSLGSYEYQY	SEQ ID NO: 46	ASSLDTDTQY	SEQ ID NO: 87
ASSLDRNTEAF	SEQ ID NO: 47	ASSLGRGETQY	SEQ ID NO: 88
ASSLNTEAF	SEQ ID NO: 48	ASSRQETQY	SEQ ID NO: 89
ASSSYNEQF	SEQ ID NO: 49	ASSLAETQY	SEQ ID NO: 90
ASSPGETQY	SEQ ID NO: 50	ASSLGQGAYEQY	SEQ ID NO: 91
ASSLGGSTDQY	SEQ ID NO: 51	ASSLNSNQPQH	SEQ ID NO: 92
ASSLGGNEQF	SEQ ID NO: 52	ASSLQGNQPQH	SEQ ID NO: 93
ASSQGYEQY	SEQ ID NO: 53	ASSRTDTQY	SEQ ID NO: 94
ASSLNTGELF	SEQ ID NO: 95	ASSSQGYEQY	SEQ ID NO: 136
ASSLQGGTDTQY	SEQ ID NO: 96	ASSLVETQY	SEQ ID NO: 137
ASSLGQNYGYT	SEQ ID NO: 97	ASSLGENTEAF	SEQ ID NO: 138
ASSLSGNTEAF	SEQ ID NO: 98	ASSPGGYEQY	SEQ ID NO: 139
ASSLSSNQPQH	SEQ ID NO: 99	ASSLAGSYEQY	SEQ ID NO: 140
ASSLTGNQPQH	SEQ ID NO: 100	ASSLSGANVLT	SEQ ID NO: 141

ASSPQGYEQY	SEQ ID NO: 101	ASSPQGNTEAF	SEQ ID NO: 142
ASSLSETQY	SEQ ID NO: 102	ASSLLETQY	SEQ ID NO: 143
ASSLGGEQY	SEQ ID NO: 103	ASSRGEQY	SEQ ID NO: 144
ASSLGYNEQF	SEQ ID NO: 104	ASSLLNTEAF	SEQ ID NO: 145
ASSLRDTQY	SEQ ID NO: 105	ASSLGPYEQY	SEQ ID NO: 146
ASSFSYEQY	SEQ ID NO: 106	ASSYQETQY	SEQ ID NO: 147
ASSLRGNTEAF	SEQ ID NO: 107	ASSYSYEQY	SEQ ID NO: 148
ASSLGGSYNEQF	SEQ ID NO: 108	ASSLAGGTEAF	SEQ ID NO: 149
ASSPQGNTEAF	SEQ ID NO: 109	ASSLQGTDTQY	SEQ ID NO: 150
ASSLAGGYNEQF	SEQ ID NO: 110	ASSLRGDTQY	SEQ ID NO: 151
ASSSGYEQY	SEQ ID NO: 111	ASSLNTDTQY	SEQ ID NO: 152
ASSPTGNTEAF	SEQ ID NO: 112	ASSLGANTEAF	SEQ ID NO: 153
ASSLGQETQY	SEQ ID NO: 113	ASSPGLNTEAF	SEQ ID NO: 154
ASSLAYEQY	SEQ ID NO: 114	ASSLGQGSYEQY	SEQ ID NO: 155
ASSLSGYEQY	SEQ ID NO: 115	ASSFRETQY	SEQ ID NO: 156
ASSLTYEQY	SEQ ID NO: 116	ASSLTANTEAF	SEQ ID NO: 157
ASSLDSYNEQF	SEQ ID NO: 117	ASSLNNEQF	SEQ ID NO: 158
ASSLEGNQPQH	SEQ ID NO: 118	ASSFGDTQY	SEQ ID NO: 159
ASSLGQQETQY	SEQ ID NO: 119	ASSRQGNTEAF	SEQ ID NO: 160
ASSYTDQY	SEQ ID NO: 120	ASSLTENTEAF	SEQ ID NO: 161
ASSFGGNTEAF	SEQ ID NO: 121	ASSLTTDTQY	SEQ ID NO: 162
ASSLVGYEQY	SEQ ID NO: 122	ASSRTGNTEAF	SEQ ID NO: 163
ASSPYNEQF	SEQ ID NO: 123	ASSLGGQPQH	SEQ ID NO: 164
ASSLEGNTEAF	SEQ ID NO: 124	ASSLTGYEQY	SEQ ID NO: 165
ASSLGGYNEQF	SEQ ID NO: 125	ASSQQETQY	SEQ ID NO: 166
ASSLVGNTEAF	SEQ ID NO: 126	ASSSAYEQY	SEQ ID NO: 167
ASSLEGYEQY	SEQ ID NO: 127	ASSLDGNTEAF	SEQ ID NO: 168
ASSLGQLNTEAF	SEQ ID NO: 128	ASSLGQSYEQY	SEQ ID NO: 169
ASSPGDTQY	SEQ ID NO: 129	ASSLAGGYEQY	SEQ ID NO: 170
ASSLAGNQPQH	SEQ ID NO: 130	ASSPTTDTQY	SEQ ID NO: 171
ASSSGETQY	SEQ ID NO: 131	ASSPDRNTEAF	SEQ ID NO: 172
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ASSPGGTEAF	SEQ ID NO: 134	ASSFGTDTQY	SEQ ID NO: 175
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ASSLGQSTDTQY	SEQ ID NO: 177	ASSPGTGSYEQY	SEQ ID NO: 218
ASSRSTDTQY	SEQ ID NO: 178	ASSLSGNQPQH	SEQ ID NO: 219
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ASSPRGETQY	SEQ ID NO: 756	ASSSSDTQY	SEQ ID NO: 797

ASSLVSDTQY	SEQ ID NO: 757	ASSLTSNQPQH	SEQ ID NO: 798
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ASSRTGGTEAF	SEQ ID NO: 760	ASSLTGNEQF	SEQ ID NO: 801
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ASSLAGGPYNEQF	SEQ ID NO: 763	ASSLGQGGQPQH	SEQ ID NO: 804
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ASSRTANTEAF	SEQ ID NO: 766	ASSLRLNTEAF	SEQ ID NO: 807
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ASSLRGLNTEAF	SEQ ID NO: 838	ASSQDRGYEQY	SEQ ID NO: 879

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ASSQGGTDTQY	SEQ ID NO: 922	ASSLGAEAF	SEQ ID NO: 963
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ASSLAGELF	SEQ ID NO: 1273	ASSRGQQETQY	SEQ ID NO: 1314
ASSRTGSNQPQH	SEQ ID NO: 1274	ASSSGTVNTEAF	SEQ ID NO: 1315
ASSLQGADTQY	SEQ ID NO: 1275	ASSLEGSTDQY	SEQ ID NO: 1316
ASSLVDEQF	SEQ ID NO: 1276	ASSLQGAYEQY	SEQ ID NO: 1317
ASSSRGNTEAF	SEQ ID NO: 1277	ASSRDYEQY	SEQ ID NO: 1318
ASSFGGNEQF	SEQ ID NO: 1278	ASRLAGGTDQY	SEQ ID NO: 1319
ASSPRADTQY	SEQ ID NO: 1279	ASSLGTGQETQY	SEQ ID NO: 1320
ASSISTDTQY	SEQ ID NO: 1280	ASSLVMNTEAF	SEQ ID NO: 1321
ASSLVQNTEAF	SEQ ID NO: 1281	ASSLGLADTQY	SEQ ID NO: 1322
ASSQGNTEAF	SEQ ID NO: 1282	ASSPLAGGYNEQF	SEQ ID NO: 1323
ASSPGGYGYT	SEQ ID NO: 1283	ASSLRGYGYT	SEQ ID NO: 1324
ASSLGVYNEQF	SEQ ID NO: 1325	ASSLRDSNQPQH	SEQ ID NO: 1366
ASSWGNTEAF	SEQ ID NO: 1326	ASSFGGGTDQY	SEQ ID NO: 1367
ASSRDSYGYT	SEQ ID NO: 1327	ASSYLETQY	SEQ ID NO: 1368
ASSLPNTEAF	SEQ ID NO: 1328	ASSSGTSTDQY	SEQ ID NO: 1369
ASSSGQLNTEAF	SEQ ID NO: 1329	ASSRTSGSTDQY	SEQ ID NO: 1370
ASSRGMNTEAF	SEQ ID NO: 1330	ASSPGQSNQPQH	SEQ ID NO: 1371

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ASSFRDQY	SEQ ID NO: 1333	ASSDSTDQY	SEQ ID NO: 1374
ASSPLGDTQY	SEQ ID NO: 1334	ASSPDYNEQF	SEQ ID NO: 1375
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ASSRTVQETQY	SEQ ID NO: 1344	ASSFSYNEQF	SEQ ID NO: 1385
ASSLDRGSYNEQF	SEQ ID NO: 1345	ASSLLVNTEAF	SEQ ID NO: 1386
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ASSSGGETQY	SEQ ID NO: 1603	ASSPRTGSYEQY	SEQ ID NO: 1644
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ASSLEYNEQF	SEQ ID NO: 1740	ASSLVPNTEAF	SEQ ID NO: 1781

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ASSTGLNTEAF	SEQ ID NO: 1826	ASSPRNEQF	SEQ ID NO: 1867
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ASSLNEKLF	SEQ ID NO: 1833	ASSPGGSSYEQY	SEQ ID NO: 1874
ASSSGLSTDTQY	SEQ ID NO: 1834	ASSLAGGYGYT	SEQ ID NO: 1875
ASSLPYNEQF	SEQ ID NO: 1835	ASSLSRNQPQH	SEQ ID NO: 1876
ASSPQMNTAF	SEQ ID NO: 1836	SARGGNTEAF	SEQ ID NO: 1877
ASSPGRMNTAF	SEQ ID NO: 1837	ASSFTENTAF	SEQ ID NO: 1878
ASSRDRNYGYT	SEQ ID NO: 1838	ASSFGANTEAF	SEQ ID NO: 1879
ASSFRVNTAF	SEQ ID NO: 1839	ASSYGTEAF	SEQ ID NO: 1880
ASSLGRNNEQF	SEQ ID NO: 1840	ASSSGTGNTAF	SEQ ID NO: 1881
ASSLQGSSYEQY	SEQ ID NO: 1841	ASSLGATNEKLF	SEQ ID NO: 1882
ASSSMNTAF	SEQ ID NO: 1842	ASSLTGRTEAF	SEQ ID NO: 1883
ASSSSSTDTQY	SEQ ID NO: 1843	ASSLNMNTAF	SEQ ID NO: 1884
ASSRQGDTEAF	SEQ ID NO: 1844	ASSDSSYEQY	SEQ ID NO: 1885
ASSLASGTDQY	SEQ ID NO: 1845	ASSRQGLNTEAF	SEQ ID NO: 1886
ASSLQGDYGYT	SEQ ID NO: 1846	ASSFMNTAF	SEQ ID NO: 1887
ASSPTGQETQY	SEQ ID NO: 1847	ASSQGGYGYT	SEQ ID NO: 1888
ASSLQGDTQY	SEQ ID NO: 1848	ASSLTGGSYNEQF	SEQ ID NO: 1889
ASSPGANTEAF	SEQ ID NO: 1849	ASSLGGTYNEQF	SEQ ID NO: 1890
ASSLQGGGGYT	SEQ ID NO: 1850	ASSSLAGGYNEQF	SEQ ID NO: 1891
ASSLRGSSYEQY	SEQ ID NO: 1851	ASSLQGSYEQY	SEQ ID NO: 1892
ASSFGQPQH	SEQ ID NO: 1852	ASSLVSYNEQF	SEQ ID NO: 1893
ASSQDGYEQY	SEQ ID NO: 1853	ASSYSGEQY	SEQ ID NO: 1894
ASSAQGNTEAF	SEQ ID NO: 1854	ASSLLLNTAF	SEQ ID NO: 1895
ASSLVGTGELF	SEQ ID NO: 1855	ASSLGGATDTQY	SEQ ID NO: 1896
ASSLNNQPQH	SEQ ID NO: 1856	ASSLLAGSYNEQF	SEQ ID NO: 1897
ASSSVYEQY	SEQ ID NO: 1857	ASSQGANTEAF	SEQ ID NO: 1898
ASSVGLNTEAF	SEQ ID NO: 1899	ASSRDRSTDTQY	SEQ ID NO: 1940
ASSYLYEQY	SEQ ID NO: 1900	ASSPQGDTEAF	SEQ ID NO: 1941
ASSLGVSNQPQH	SEQ ID NO: 1901	ASSTNTEAF	SEQ ID NO: 1942
ASSWGQNTAF	SEQ ID NO: 1902	ASSPGQNQPQH	SEQ ID NO: 1943
ASRTGGTDQY	SEQ ID NO: 1903	ASSQVGNTAF	SEQ ID NO: 1944
ASSVADTQY	SEQ ID NO: 1904	ASSPLETQY	SEQ ID NO: 1945

ASSLDRGNEQF	SEQ ID NO: 1905	ASSDRDTGELF	SEQ ID NO: 1946
ASSRGTGELF	SEQ ID NO: 1906	ASSPTGGYEYQ	SEQ ID NO: 1947
ASRDSSYEYQ	SEQ ID NO: 1907	ASSPTGYGYT	SEQ ID NO: 1948
ASSVTGNTEAF	SEQ ID NO: 1908	ASSVGGGTEAF	SEQ ID NO: 1949
ASSSTANTEAF	SEQ ID NO: 1909	ASSFRGETQY	SEQ ID NO: 1950
ASSSLAGGTDQY	SEQ ID NO: 1910	ASSLGLAAYNEQF	SEQ ID NO: 1951
ASSRGLQETQY	SEQ ID NO: 1911	ASSLDGETQY	SEQ ID NO: 1952
ASSLLGSTDTQY	SEQ ID NO: 1912	ASSDGYEQY	SEQ ID NO: 1953
ASSPDGYEQY	SEQ ID NO: 1913	ASSPGLAYNEQF	SEQ ID NO: 1954
ASSLARDTQY	SEQ ID NO: 1914	ASSLIGETQY	SEQ ID NO: 1955
ASSLGGGADTQY	SEQ ID NO: 1915	ASSRGDTEAF	SEQ ID NO: 1956
ASSQGSYNEQF	SEQ ID NO: 1916	ASSSQMNTEAF	SEQ ID NO: 1957
ASSLTGGETQY	SEQ ID NO: 1917	ASSQDRGTDQY	SEQ ID NO: 1958
ASSPGTTYEQY	SEQ ID NO: 1918	ASSLTSGGTDQY	SEQ ID NO: 1959
ASSPGTANYGYT	SEQ ID NO: 1919	ASSFGGSYNEQF	SEQ ID NO: 1960
ASSFSSGNTIY	SEQ ID NO: 1920	ASSLPGGELF	SEQ ID NO: 1961
ASSDRGNTEAF	SEQ ID NO: 1921	ASSQDGETQY	SEQ ID NO: 1962
ASSLAGGEQY	SEQ ID NO: 1922	ASSLEGGQPQH	SEQ ID NO: 1963
ASSPDRDTEAF	SEQ ID NO: 1923	ASSPVNTEAF	SEQ ID NO: 1964
ASSPLNQPH	SEQ ID NO: 1924	ASSFGGQPQH	SEQ ID NO: 1965
ASSESSYEYQ	SEQ ID NO: 1925	ASSYGLNTEAF	SEQ ID NO: 1966
ASSPGGGYEYQ	SEQ ID NO: 1926	ASSPGTASYEQY	SEQ ID NO: 1967
ASRGQLNTEAF	SEQ ID NO: 1927	ASSLGRGNEQF	SEQ ID NO: 1968
ASSRTGNYGYT	SEQ ID NO: 1928	ASSLVGYGYT	SEQ ID NO: 1969
ASSSNSYEYQ	SEQ ID NO: 1929	ASSPTYEQY	SEQ ID NO: 1970
ASSLGTEETQY	SEQ ID NO: 1930	ASSFRGYEQY	SEQ ID NO: 1971
ASSLVDTEAF	SEQ ID NO: 1931	ASSLDGNTIY	SEQ ID NO: 1972
SARDSYEYQ	SEQ ID NO: 1932	ASSTGNQPQH	SEQ ID NO: 1973
ASSYSGTEAF	SEQ ID NO: 1933	ASSAGETQY	SEQ ID NO: 1974
ASSLGTENTTEAF	SEQ ID NO: 1934	ASSQGSSYEYQ	SEQ ID NO: 1975
ASSYSSYNEQF	SEQ ID NO: 1935	ASSLRDSSYEYQ	SEQ ID NO: 1976
ASSWTENTTEAF	SEQ ID NO: 1936	ASSLRQGTDTQY	SEQ ID NO: 1977
ASSLGAGTDQY	SEQ ID NO: 1937	ASSPGSGNTIY	SEQ ID NO: 1978
ASSPTSGSTDTQY	SEQ ID NO: 1938	ASSLQGGTDQY	SEQ ID NO: 1979
ASSPNYGYT	SEQ ID NO: 1939	ASSLTGGQPQH	SEQ ID NO: 1980
ASSLGVGTEAF	SEQ ID NO: 1981	ASSPGTAYNEQF	SEQ ID NO: 2022
ASSPGTSGSYEQY	SEQ ID NO: 1982	ASSDSSTDTQY	SEQ ID NO: 2023
ASSRGYNEQF	SEQ ID NO: 1983	ASSQVNEQF	SEQ ID NO: 2024
ASSPPNTEAF	SEQ ID NO: 1984	ASSLAGGAYEQY	SEQ ID NO: 2025
ASSLLAGAYNEQF	SEQ ID NO: 1985	ASSLGRDYEYQ	SEQ ID NO: 2026
ASSPDRLNTEAF	SEQ ID NO: 1986	ASSLGFTDTQY	SEQ ID NO: 2027

ASSRAYEQY	SEQ ID NO: 1987	ASSLGWNTEAF	SEQ ID NO: 2028
ASSGGSNQPH	SEQ ID NO: 1988	ASSLGLNTGELF	SEQ ID NO: 2029
ASSPGTGNQY	SEQ ID NO: 1989	ASSFRYEQY	SEQ ID NO: 2030
ASSQDRGNQPH	SEQ ID NO: 1990	ASSPGQANTEAF	SEQ ID NO: 2031
ASSRTSGSYNEQF	SEQ ID NO: 1991	ASSGGNTEAF	SEQ ID NO: 2032
ASSPGLAGGDTQY	SEQ ID NO: 1992	ASSLAGRETQY	SEQ ID NO: 2033
ASSLVTEAF	SEQ ID NO: 1993	ASSFGQETQY	SEQ ID NO: 2034
ASSLLENTEAF	SEQ ID NO: 1994	ASSLAGGPTDTQY	SEQ ID NO: 2035
ASSLTGGQETQY	SEQ ID NO: 1995	ASSYTGELF	SEQ ID NO: 2036
ASSGYEQY	SEQ ID NO: 1996	SARQGNQPH	SEQ ID NO: 2037
ASSLGQGSTEAF	SEQ ID NO: 1997	ASSFSGNEQF	SEQ ID NO: 2038
ASSLAPYEQY	SEQ ID NO: 1998	ASSLEGYNEQF	SEQ ID NO: 2039
ASSFRGSYEQY	SEQ ID NO: 1999	ASSPGDYGTY	SEQ ID NO: 2040
ASSLIYEQY	SEQ ID NO: 2000	SARTGNQPH	SEQ ID NO: 2041
ASSFRGNEQF	SEQ ID NO: 2001	ASSRDRDTEAF	SEQ ID NO: 2042
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ASSSGLAGGDTQY	SEQ ID NO: 2003	ASSGGGDTQY	SEQ ID NO: 2044
ASSFPGTDTQY	SEQ ID NO: 2004	ASSLEGDQPH	SEQ ID NO: 2045
ASSFRGGTEAF	SEQ ID NO: 2005	SARLAGGQETQY	SEQ ID NO: 2046
ASSLGQGDTEAF	SEQ ID NO: 2006	ASSGGSSYNEQF	SEQ ID NO: 2047
ASSLLYNEQF	SEQ ID NO: 2007	ASSSSGDTQY	SEQ ID NO: 2048
ASSEAYEQY	SEQ ID NO: 2008	ASSQTVNTEAF	SEQ ID NO: 2049
ASSLRGEQF	SEQ ID NO: 2009	ASSEGNTEAF	SEQ ID NO: 2050
ASSFTVNTEAF	SEQ ID NO: 2010	ASSSLDTQY	SEQ ID NO: 2051
ASSLTGADTQY	SEQ ID NO: 2011	ASSQGGAYEQY	SEQ ID NO: 2052
ASSLVGSYNEQF	SEQ ID NO: 2012	ASSLGQRNTEAF	SEQ ID NO: 2053
ASSPLSTDYQY	SEQ ID NO: 2013	ASSFSENTEAF	SEQ ID NO: 2054
ASSGTYEQY	SEQ ID NO: 2014	ASSSGGDTQY	SEQ ID NO: 2055
ASSSGGSTDTQY	SEQ ID NO: 2015	ASSLDSMNTEAF	SEQ ID NO: 2056
ASSLSGMNTEAF	SEQ ID NO: 2016	SARQGNTEAF	SEQ ID NO: 2057
ASSPGTGYNEQF	SEQ ID NO: 2017	ASSLGLAQETQY	SEQ ID NO: 2058
ASSSGGEQY	SEQ ID NO: 2018	ASSQNNEQF	SEQ ID NO: 2059
ASSQGAYEQY	SEQ ID NO: 2019	ASSLGRSNQPH	SEQ ID NO: 2060
ASSLVGGYEQY	SEQ ID NO: 2020	ASSLGPNEQF	SEQ ID NO: 2061
ASSGQGYGYT	SEQ ID NO: 2021	ASSSPGDTQY	SEQ ID NO: 2062
ASSFSRNTEAF	SEQ ID NO: 2063	ASSSSGYEQY	SEQ ID NO: 2104
ASSPGGQPH	SEQ ID NO: 2064	ASSPPGADTQY	SEQ ID NO: 2105
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ASSPLGYEQY	SEQ ID NO: 2066	ASSLENQPH	SEQ ID NO: 2107
ASSLDYGYT	SEQ ID NO: 2067	ASSLRNTGELF	SEQ ID NO: 2108
ASSLSGTYEQY	SEQ ID NO: 2068	ASSPGQGTEAF	SEQ ID NO: 2109

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ASSRQVNTEAF	SEQ ID NO: 2070	ASSQGSNTIY	SEQ ID NO: 2111
ASSLDRGPYEQY	SEQ ID NO: 2071	ASSPQGYGYT	SEQ ID NO: 2112
ASSLQGQPQH	SEQ ID NO: 2072	ASSLGNNEQF	SEQ ID NO: 2113
ASSLSGGETQY	SEQ ID NO: 2073	ASSSQENTEAF	SEQ ID NO: 2114
ASSRGGQETQY	SEQ ID NO: 2074	ASSYSSTDTQY	SEQ ID NO: 2115
ASSRDRGSYEQY	SEQ ID NO: 2075	ASSLQGETQY	SEQ ID NO: 2116
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ASSLEGYTEAF	SEQ ID NO: 2079	ASRGSSYNEQF	SEQ ID NO: 2120
ASSPGLAGNEQF	SEQ ID NO: 2080	ASSPGSDTQY	SEQ ID NO: 2121
ASSLQGNTEAF	SEQ ID NO: 2081	ASGQETQY	SEQ ID NO: 2122
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ASSFGQNYGYT	SEQ ID NO: 2084	ASSLGGGDTQY	SEQ ID NO: 2125
ASSGTSGYNEQF	SEQ ID NO: 2085	ASRRGNTEAF	SEQ ID NO: 2126
ASSATGNTEAF	SEQ ID NO: 2086	ASSPDSSNQPQH	SEQ ID NO: 2127
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ASSFGYNEQF	SEQ ID NO: 2094	ASSPGGTQY	SEQ ID NO: 2135
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ASSLKNTEAF	SEQ ID NO: 2098	ASSRDRTYEQY	SEQ ID NO: 2139
ASSRRETQY	SEQ ID NO: 2099	ASSPQGANTEAF	SEQ ID NO: 2140
ASSLEPNTEAF	SEQ ID NO: 2100	ASRDSYEQY	SEQ ID NO: 2141
ASSFDNEQF	SEQ ID NO: 2101	ASSLGTGNYGYT	SEQ ID NO: 2142
ASSFLNEQF	SEQ ID NO: 2102	ASSPRGPDQY	SEQ ID NO: 2143
ASSRDSNTEAF	SEQ ID NO: 2103	ASSDTEYEQY	SEQ ID NO: 2144
ASSYGNEQF	SEQ ID NO: 2145	ASSLGGNEQY	SEQ ID NO: 2186
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ASSQTGGTEAF	SEQ ID NO: 2148	ASSPPGQGYEQY	SEQ ID NO: 2189
ASSPGLAGGNEQF	SEQ ID NO: 2149	ASSYSENTEAF	SEQ ID NO: 2190
ASSQGGEQF	SEQ ID NO: 2150	SARGGYEQY	SEQ ID NO: 2191

ASSLSGLNTEAF	SEQ ID NO: 2151	ASSLRDEQY	SEQ ID NO: 2192
ASSRGGYEQY	SEQ ID NO: 2152	ASSPGQVNTEAF	SEQ ID NO: 2193
ASSPRTSTDTQY	SEQ ID NO: 2153	ASSLTGEETQY	SEQ ID NO: 2194
ASSVGNTEAF	SEQ ID NO: 2154	ASSSRNTEAF	SEQ ID NO: 2195
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ASSLGGGSTDTQY	SEQ ID NO: 2156	ASSFTGELF	SEQ ID NO: 2197
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ASSLGPNTGELF	SEQ ID NO: 2159	ASSRQGNYGTY	SEQ ID NO: 2200
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ASSPDRAYEQY	SEQ ID NO: 2161	ASSLQGNTGELF	SEQ ID NO: 2202
ASSQVADTQY	SEQ ID NO: 2162	ASSPRTANTEAF	SEQ ID NO: 2203
ASRGETQY	SEQ ID NO: 2163	ASSPGTTDTQY	SEQ ID NO: 2204
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ASSIGGTEAF	SEQ ID NO: 2168	ASSTGTDQY	SEQ ID NO: 2209
ASSPGLAEETQY	SEQ ID NO: 2169	ASSQEGYEQY	SEQ ID NO: 2210
ASSAAYEQY	SEQ ID NO: 2170	ASSLGVDQY	SEQ ID NO: 2211
ASSFSGELF	SEQ ID NO: 2171	ASSPTSGGYNEQF	SEQ ID NO: 2212
ASSLSPSYEQY	SEQ ID NO: 2172	ASSLDGDTQY	SEQ ID NO: 2213
ASSLGQGNEKLF	SEQ ID NO: 2173	ASSATYEQY	SEQ ID NO: 2214
ASSLGGASTDTQY	SEQ ID NO: 2174	ASSPPYNEQF	SEQ ID NO: 2215
ASSSTGSYEQY	SEQ ID NO: 2175	ASSLTNQPQH	SEQ ID NO: 2216
ASSPLDTQY	SEQ ID NO: 2176	ASSLTAYEQY	SEQ ID NO: 2217
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ASSPPGNEQF	SEQ ID NO: 2178	ASSLVGGETQY	SEQ ID NO: 2219
ASSQGPDTQY	SEQ ID NO: 2179	ASSRQGQETQY	SEQ ID NO: 2220
ASSGGSYEQY	SEQ ID NO: 2180	ASSLSGAYEQY	SEQ ID NO: 2221
ASSLGLAYNEQF	SEQ ID NO: 2181	ASSSGLYNEQF	SEQ ID NO: 2222
ASSNSNQPQH	SEQ ID NO: 2182	ASSLMGNTEAF	SEQ ID NO: 2223
ASRNTGELF	SEQ ID NO: 2183	ASRNTDTQY	SEQ ID NO: 2224
ASSRSYNEQF	SEQ ID NO: 2184	ASSLGGSDTQY	SEQ ID NO: 2225
ASSQVTDQY	SEQ ID NO: 2185	ASSPPQETQY	SEQ ID NO: 2226
ASSLTGTNTEAF	SEQ ID NO: 2227	ASSRDYNEQF	SEQ ID NO: 2268
ASSLAGSYEQY	SEQ ID NO: 2228	ASSLDQNTEAF	SEQ ID NO: 2269
ASSLEGDTAF	SEQ ID NO: 2229	ASSPPGYEQY	SEQ ID NO: 2270
ASSQDRGYGYT	SEQ ID NO: 2230	ASSRTGDQPQH	SEQ ID NO: 2271
ASSLASGNTIY	SEQ ID NO: 2231	ASSLLRNTEAF	SEQ ID NO: 2272
ASSPGGMNTEAF	SEQ ID NO: 2232	ASSYGGYEQY	SEQ ID NO: 2273

ASSTTGNTAF	SEQ ID NO: 2233	ASSEGYGYT	SEQ ID NO: 2274
ASSFRNQPH	SEQ ID NO: 2234	ASSQGDYGYT	SEQ ID NO: 2275
ASSPGSSGNTIY	SEQ ID NO: 2235	ASSPTGSGNTIY	SEQ ID NO: 2276
ASSLSGGYNEQF	SEQ ID NO: 2236	ASSRDQETQY	SEQ ID NO: 2277
ASSLRQGYEQY	SEQ ID NO: 2237	ASSLGGPTDTQY	SEQ ID NO: 2278
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ASSRTTDTQY	SEQ ID NO: 2239	ASSLGGVTEAF	SEQ ID NO: 2280
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ASSGSYNEQF	SEQ ID NO: 2241	ASSLEGGNTEAF	SEQ ID NO: 2282
ASSQGQNYGYT	SEQ ID NO: 2242	ASSPGTDYEQY	SEQ ID NO: 2283
ASSLLGGTDTQY	SEQ ID NO: 2243	ASSLGRNTGELF	SEQ ID NO: 2284
ASSLVTGELF	SEQ ID NO: 2244	ASSYGGSYEQY	SEQ ID NO: 2285
ASSLQGQGYGYT	SEQ ID NO: 2245	ASSLGNYEQY	SEQ ID NO: 2286
ASSPGTSSYEQY	SEQ ID NO: 2246	ASSLTGANVLT	SEQ ID NO: 2287
ASSTNTGELF	SEQ ID NO: 2247	ASSSTGYGYT	SEQ ID NO: 2288
ASSSRGTEAF	SEQ ID NO: 2248	ASSPGTGSYNEQF	SEQ ID NO: 2289
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ASSQGQGNTEAF	SEQ ID NO: 2251	ASSFGQQTQY	SEQ ID NO: 2292
ASSLRPNTEAF	SEQ ID NO: 2252	ASSLAGSQETQY	SEQ ID NO: 2293
ASSLDRNEQF	SEQ ID NO: 2253	ASSPTGGNTEAF	SEQ ID NO: 2294
ASSPDRYEQY	SEQ ID NO: 2254	ASSLVGLNTEAF	SEQ ID NO: 2295
ASSSQVNTEAF	SEQ ID NO: 2255	ASRGQETQY	SEQ ID NO: 2296
ASSLMETQY	SEQ ID NO: 2256	ASSFPSTDQY	SEQ ID NO: 2297
ASSSGNYGYT	SEQ ID NO: 2257	ASSSDRGYEQY	SEQ ID NO: 2298
ASSSDSTDQY	SEQ ID NO: 2258	ASSPTGTYEYQY	SEQ ID NO: 2299
ASSSQGDTEAF	SEQ ID NO: 2259	ASSAGNTEAF	SEQ ID NO: 2300
ASSLDRSSYNEQF	SEQ ID NO: 2260	ASSRDGYEQY	SEQ ID NO: 2301
ASSFAETQY	SEQ ID NO: 2261	ASSLGRADTQY	SEQ ID NO: 2302
ASSSGGSNQPQH	SEQ ID NO: 2262	ASSLEGADTQY	SEQ ID NO: 2303
ASSLAVQETQY	SEQ ID NO: 2263	ASSPTSGTDTQY	SEQ ID NO: 2304
ASSRTGGNTEAF	SEQ ID NO: 2264	ASSFGTANTEAF	SEQ ID NO: 2305
ASSLQGTGELF	SEQ ID NO: 2265	ASSLKGYEQY	SEQ ID NO: 2306
ASSSTGSNQPQH	SEQ ID NO: 2266	ASSLYRNTEAF	SEQ ID NO: 2307
ASSYSGGYEQY	SEQ ID NO: 2267	ASSLAGPDTQY	SEQ ID NO: 2308
ASSPRRNTEAF	SEQ ID NO: 2309	ASSDRGTDQY	SEQ ID NO: 2350
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ASRKNTAF	SEQ ID NO: 2311	ASSLSYGYT	SEQ ID NO: 2352
ASSQDSTDQY	SEQ ID NO: 2312	ASSLEGNTIY	SEQ ID NO: 2353
ASSLVGNTIY	SEQ ID NO: 2313	ASSLAGGTGELF	SEQ ID NO: 2354
ASSPGLNQPH	SEQ ID NO: 2314	ASSPGQGGNQPH	SEQ ID NO: 2355

ASSSGTSYEQY	SEQ ID NO: 2315	ASSLGLAGVNEQF	SEQ ID NO: 2356
ASSLQGRTEAF	SEQ ID NO: 2316	ASSLLGSYEQY	SEQ ID NO: 2357
ASSLDRADTQY	SEQ ID NO: 2317	ASSSGGNEQF	SEQ ID NO: 2358
ASSPQGSYEQY	SEQ ID NO: 2318	ASSPSSNQ PQH	SEQ ID NO: 2359
ASSPTGSSYNEQF	SEQ ID NO: 2319	ASSGTSGTDTQY	SEQ ID NO: 2360
ASRDYNEQF	SEQ ID NO: 2320	ASRSSTDYQY	SEQ ID NO: 2361
ASSSGPYNEQF	SEQ ID NO: 2321	ASSPGRNQ PQH	SEQ ID NO: 2362
ASSIQGNTEAF	SEQ ID NO: 2322	ASSYSGSYEQY	SEQ ID NO: 2363
ASSRGGSYNEQF	SEQ ID NO: 2323	ASSFNYEQY	SEQ ID NO: 2364
ASSYSGGNTEAF	SEQ ID NO: 2324	ASSVGSNQ PQH	SEQ ID NO: 2365
ASSRNYEQY	SEQ ID NO: 2325	ASSTDRNTEAF	SEQ ID NO: 2366
ASSVDRNTEAF	SEQ ID NO: 2326	SARGSNQ PQH	SEQ ID NO: 2367
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ASSLGGAGNTIY	SEQ ID NO: 2331	ASSRYSNQ PQH	SEQ ID NO: 2372
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ASSLEGYSNQ PQH	SEQ ID NO: 2333	ASSYSVNTEAF	SEQ ID NO: 2374
ASSSLNEQF	SEQ ID NO: 2334	ASRGQMNTAF	SEQ ID NO: 2375
ASSFPDTQY	SEQ ID NO: 2335	ASSYRGTDYQY	SEQ ID NO: 2376
ASSQGENTEAF	SEQ ID NO: 2336	ASSLGGGSNQ PQH	SEQ ID NO: 2377
ASSPQSGGNTIY	SEQ ID NO: 2337	ASSPRSYEQY	SEQ ID NO: 2378
ASSPGDTEAF	SEQ ID NO: 2338	ASSLGTASYEQY	SEQ ID NO: 2379
ASSQDRGNEQF	SEQ ID NO: 2339	ASSPRQGNQ PQH	SEQ ID NO: 2380
ASSPTGDQ PQH	SEQ ID NO: 2340	ASSSQGYGYT	SEQ ID NO: 2381
ASSYSRGYEQY	SEQ ID NO: 2341	ASSLDLTDYQY	SEQ ID NO: 2382
ASSLLGDTEAF	SEQ ID NO: 2342	ASSLDRGEQY	SEQ ID NO: 2383
ASRRTGNTAF	SEQ ID NO: 2343	ASSYSNTEAF	SEQ ID NO: 2384
ASSLLAGYNEQF	SEQ ID NO: 2344	ASSPRGGNQ PQH	SEQ ID NO: 2385
ASSLAGASTDYQY	SEQ ID NO: 2345	ASSLVSGGNTIY	SEQ ID NO: 2386
ASSLTGPNTEAF	SEQ ID NO: 2346	ASSSGQAYEQY	SEQ ID NO: 2387
ASSFSGTEAF	SEQ ID NO: 2347	ASSYGGTDYQY	SEQ ID NO: 2388
ASSLQGAGNTIY	SEQ ID NO: 2348	ASSPTGGSYEQY	SEQ ID NO: 2389
ASSLGGSQ PQH	SEQ ID NO: 2349	ASSLVAGGTDYQY	SEQ ID NO: 2390
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ASSRDRVNTEAF	SEQ ID NO: 2392	ASSPRSSYEQY	SEQ ID NO: 2433
ASSYSGSSYNEQF	SEQ ID NO: 2393	ASSRGSGNTIY	SEQ ID NO: 2434
ASRGSYEQY	SEQ ID NO: 2394	ASSSDSYGYT	SEQ ID NO: 2435
ASSQTGEYEQY	SEQ ID NO: 2395	ASSLAGGRETQY	SEQ ID NO: 2436
ASSYGSYEQY	SEQ ID NO: 2396	ASSQVGNEQF	SEQ ID NO: 2437

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ASSQDSSYEYQY	SEQ ID NO: 2401	ASSLLAGGPDQTQY	SEQ ID NO: 2442
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ASSQSSYNEQF	SEQ ID NO: 2411	ASSEETQY	SEQ ID NO: 2452
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ASSEGGQPQH	SEQ ID NO: 2923	ASSSGDQPQH	SEQ ID NO: 2964
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ASSQDYNEQF	SEQ ID NO: 3476	ASSLGLEQY	SEQ ID NO: 3517
ASSQRDTQY	SEQ ID NO: 3477	ASSVGRNTEAF	SEQ ID NO: 3518
ASSQDRGDTQY	SEQ ID NO: 3478	ASSPGRNYGYT	SEQ ID NO: 3519
ASSVGTEAF	SEQ ID NO: 3479	ASSRGPYEYQY	SEQ ID NO: 3520
ASSLRPYEYQY	SEQ ID NO: 3480	ASSWTGGNQPQH	SEQ ID NO: 3521
ASSGNYGYT	SEQ ID NO: 3481	ASSLGRDNEQF	SEQ ID NO: 3522
ASSQGLAGYNEQF	SEQ ID NO: 3482	ASSLLGEQF	SEQ ID NO: 3523
ASSETVNTEAF	SEQ ID NO: 3483	ASSPGQPNTTEAF	SEQ ID NO: 3524
ASSAGGTDQY	SEQ ID NO: 3484	ASSPTGYTEAF	SEQ ID NO: 3525
ASSLAGLTDQY	SEQ ID NO: 3485	ASSPAGYEYQY	SEQ ID NO: 3526
ASSLRENQPQH	SEQ ID NO: 3486	ASSLIGNEQF	SEQ ID NO: 3527
ASSLGHTDTQY	SEQ ID NO: 3487	ASSQDRGSYNEQF	SEQ ID NO: 3528
ASSQGLYNEQF	SEQ ID NO: 3488	ASSLAANYGYT	SEQ ID NO: 3529
ASSLLAGQETQY	SEQ ID NO: 3489	ASSLVLETQY	SEQ ID NO: 3530
ASSLGFYEYQY	SEQ ID NO: 3490	ASSIGLNTEAF	SEQ ID NO: 3531
ASSLGVGQPQH	SEQ ID NO: 3491	ASSLGEGTEAF	SEQ ID NO: 3532
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ASSSHTDTQY	SEQ ID NO: 3493	ASSPDRVYGYT	SEQ ID NO: 3534
ASSLSRQETQY	SEQ ID NO: 3494	SARDGNQPQH	SEQ ID NO: 3535
ASSRQGSSYEYQY	SEQ ID NO: 3495	ASSLRSYNEQF	SEQ ID NO: 3536
ASSLGTGGYNEQF	SEQ ID NO: 3496	ASSFGGTYEYQY	SEQ ID NO: 3537
ASSSGQGADTQY	SEQ ID NO: 3497	ASSQTGGNQPQH	SEQ ID NO: 3538
ASSLRGAYEYQY	SEQ ID NO: 3539	ASSFTGYEYQY	SEQ ID NO: 3580
ASSQVGGNTEAF	SEQ ID NO: 3540	ASSLGQGPYNEQF	SEQ ID NO: 3581
ASSLDRGNYGYT	SEQ ID NO: 3541	ASSLARSYEYQY	SEQ ID NO: 3582
ASSAQGYEYQY	SEQ ID NO: 3542	ASSLGQIYEYQY	SEQ ID NO: 3583
ASSSSSGANVLT	SEQ ID NO: 3543	ASSLGLAVYNEQF	SEQ ID NO: 3584
ASSFGGADTQY	SEQ ID NO: 3544	ASSFRDTEAF	SEQ ID NO: 3585

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ASSRGTYEQY	SEQ ID NO: 3547	ASSLGSLNTEAF	SEQ ID NO: 3588
ASSTGQNTEAF	SEQ ID NO: 3548	ASSLTPYEQY	SEQ ID NO: 3589
ASSIGNTEAF	SEQ ID NO: 3549	ASSPRSYNEQF	SEQ ID NO: 3590
ASSLVGVNTEAF	SEQ ID NO: 3550	ASSLGGYEQF	SEQ ID NO: 3591
ASSPAGGTDQY	SEQ ID NO: 3551	ASSPGRTEAF	SEQ ID NO: 3592
ASSQRTDQY	SEQ ID NO: 3552	ASSLGTSSYEQY	SEQ ID NO: 3593
ASSLVRNEQF	SEQ ID NO: 3553	ASSLAGGNTIY	SEQ ID NO: 3594
ASSFGGEQF	SEQ ID NO: 3554	ASSLASEQY	SEQ ID NO: 3595
ASSFQGSNQPQH	SEQ ID NO: 3555	ASSLRVTDQY	SEQ ID NO: 3596
ASSLGTGGNEQF	SEQ ID NO: 3556	ASSLDPDQY	SEQ ID NO: 3597
ASSYEETQY	SEQ ID NO: 3557	ASSLGQSYNEQF	SEQ ID NO: 3598
ASSAEETQY	SEQ ID NO: 3558	ASSLQNQPQH	SEQ ID NO: 3599
SARQGGTEAF	SEQ ID NO: 3559	ASSSRSSYEQY	SEQ ID NO: 3600
ASSQVGTEAF	SEQ ID NO: 3560	ASSLISYEQY	SEQ ID NO: 3601
SAREGNQPQH	SEQ ID NO: 3561	ASSLQGRETQY	SEQ ID NO: 3602
ASSLDGGNQPQH	SEQ ID NO: 3562	ASSLAPSYEQY	SEQ ID NO: 3603
ASSPSGGNQPQH	SEQ ID NO: 3563	ASSYGGETQY	SEQ ID NO: 3604
ASSFLAGGTDQY	SEQ ID NO: 3564	ASSSLGETQY	SEQ ID NO: 3605
ASSGQNTEAF	SEQ ID NO: 3565	ASSQDLGYEQY	SEQ ID NO: 3606
ASSLNRGYEQY	SEQ ID NO: 3566	ASSPDRGQPQH	SEQ ID NO: 3607
ASSSRLNTEAF	SEQ ID NO: 3567	ASSLNGYEQY	SEQ ID NO: 3608
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ASSLGSETQY	SEQ ID NO: 3569	ASSLRGGYGYT	SEQ ID NO: 3610
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ASSLGQGNEQY	SEQ ID NO: 3573	ASSSYNSPLH	SEQ ID NO: 3614
ASSWNTEAF	SEQ ID NO: 3574	ASGNTEAF	SEQ ID NO: 3615
ASSQGGSGNTIY	SEQ ID NO: 3575	ASSLSGGSTDQY	SEQ ID NO: 3616
ASSPRTEAF	SEQ ID NO: 3576	ASSFSSSYEQY	SEQ ID NO: 3617
ASSQGRDQPQH	SEQ ID NO: 3577	ASSLGLQETQY	SEQ ID NO: 3618
ASSLAGGNNEQF	SEQ ID NO: 3578	ASSLESSYEQY	SEQ ID NO: 3619
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ASSSTGDTQY	SEQ ID NO: 3622	ASSLGSGNQPQH	SEQ ID NO: 3663
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ASSPGGAYEQY	SEQ ID NO: 3625	ASSLPGNEQF	SEQ ID NO: 3666
ASSVGGNQPQH	SEQ ID NO: 3626	ASSSRMNTEAF	SEQ ID NO: 3667

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ASSTRETQY	SEQ ID NO: 3628	ASSPTANYGYT	SEQ ID NO: 3669
ASSSRENTAF	SEQ ID NO: 3629	ASSSRDRGYEQY	SEQ ID NO: 3670
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ASSPAGDTQY	SEQ ID NO: 3632	ASSSQLNTEAF	SEQ ID NO: 3673
ASSSGPQETQY	SEQ ID NO: 3633	ASSPSPYEQY	SEQ ID NO: 3674
ASSYPNQPH	SEQ ID NO: 3634	ASSLGHEQF	SEQ ID NO: 3675
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ASSQDRGSYEQY	SEQ ID NO: 3636	ASSSGGGNQPH	SEQ ID NO: 3677
ASSQDPNQPH	SEQ ID NO: 3637	ASSSTGGYEQY	SEQ ID NO: 3678
ASSPRTGAYEQY	SEQ ID NO: 3638	ASSFGQLNTEAF	SEQ ID NO: 3679
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ASSSGLAYEQY	SEQ ID NO: 3640	ASSFQGDTEAF	SEQ ID NO: 3681
ASSSGAYNEQF	SEQ ID NO: 3641	ASSLVDEQY	SEQ ID NO: 3682
ASSKQETQY	SEQ ID NO: 3642	ASSLGVMNTEAF	SEQ ID NO: 3683
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ASSSTSGSYNEQF	SEQ ID NO: 3645	ASSPGTSGTYEQY	SEQ ID NO: 3686
ASSLTSGTYEQY	SEQ ID NO: 3646	ASSLRTANTEAF	SEQ ID NO: 3687
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ASSRPNTEAF	SEQ ID NO: 3712	ASSQGSNTEAF	SEQ ID NO: 3753
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ASSPGTGGYNEQF	SEQ ID NO: 3715	ASSLDSNEQF	SEQ ID NO: 3756
ASSPTGDEQY	SEQ ID NO: 3716	ASSFSADTQY	SEQ ID NO: 3757
ASSQGGTDTQY	SEQ ID NO: 3717	ASSLVTNTEAF	SEQ ID NO: 3758
ASSQGRTDTQY	SEQ ID NO: 3718	ASSFAGELF	SEQ ID NO: 3759
ASSPGQGRETQY	SEQ ID NO: 3719	ASSLDSSSYNEQF	SEQ ID NO: 3760
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ASSQDSGN TIY	SEQ ID NO: 3721	ASSLSLNQPQH	SEQ ID NO: 3762
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ASSLGT SNEQF	SEQ ID NO: 3723	ASSLGQGDYGYT	SEQ ID NO: 3764
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ASSLKVNTEAF	SEQ ID NO: 3725	ASSTGTGSYEYQY	SEQ ID NO: 3766
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ASSLIGDTQY	SEQ ID NO: 3727	ASSLGTGN TIY	SEQ ID NO: 3768
ASSESGYEQY	SEQ ID NO: 3728	ASSLLGADTQY	SEQ ID NO: 3769
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ASSSDYNEQF	SEQ ID NO: 3731	ASSPRQGQETQY	SEQ ID NO: 3772
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ASSLVRGTEAF	SEQ ID NO: 3796	ASSPRGYGYT	SEQ ID NO: 3837
ASSLASGYEQY	SEQ ID NO: 3797	ASSYGPNTAEF	SEQ ID NO: 3838
ASSIGNTEAF	SEQ ID NO: 3798	ASSPDRSYEQY	SEQ ID NO: 3839
ASSGQGAYEQY	SEQ ID NO: 3799	ASSRGQGTDTQY	SEQ ID NO: 3840
ASSSASTDTQY	SEQ ID NO: 3800	ASRYSNQPQH	SEQ ID NO: 3841
ASSFGPYEQY	SEQ ID NO: 3801	ASSSQYEQY	SEQ ID NO: 3842
ASSLGSSSYNEQF	SEQ ID NO: 3802	ASSLRSDTQY	SEQ ID NO: 3843
ASSRGQGAYEQY	SEQ ID NO: 3803	ASRRSTDYQY	SEQ ID NO: 3844
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ASSEQGGTEAF	SEQ ID NO: 3805	ASSSLGDTDTQY	SEQ ID NO: 3846
ASSQGTGSYEQY	SEQ ID NO: 3806	ASSPPGNQPQH	SEQ ID NO: 3847
ASSLGGRDTQY	SEQ ID NO: 3807	ASSLAGVQETQY	SEQ ID NO: 3848
ASSYKETQY	SEQ ID NO: 3808	ASSLNRETQY	SEQ ID NO: 3849
ASSTGNYGYT	SEQ ID NO: 3809	ASSPPMNTEAF	SEQ ID NO: 3850
ASSLFQETQY	SEQ ID NO: 3810	ASSLGQLNQPQH	SEQ ID NO: 3851
ASSSGQGDPQH	SEQ ID NO: 3811	ASSLRGRETQY	SEQ ID NO: 3852
ASSLYGNQPQH	SEQ ID NO: 3812	ASSPQRNTEAF	SEQ ID NO: 3853
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ASSDPYEQY	SEQ ID NO: 3815	ASSPGLAGVNEQF	SEQ ID NO: 3856
SASQETQY	SEQ ID NO: 3816	ASSRQGGTQY	SEQ ID NO: 3857
ASSLQGSNTEAF	SEQ ID NO: 3817	ASRGQGGTEAF	SEQ ID NO: 3858
ASSLQGNNTY	SEQ ID NO: 3818	ASSYDSYNEQF	SEQ ID NO: 3859
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ASSDGSTDTQY	SEQ ID NO: 3822	ASSLVGRNTEAF	SEQ ID NO: 3863
ASSLRTVNTEAF	SEQ ID NO: 3823	ASSLGLSSYEQY	SEQ ID NO: 3864
ASSRDYDTDTQY	SEQ ID NO: 3824	ASSLGFNQPQH	SEQ ID NO: 3865
ASSRQGPYEQY	SEQ ID NO: 3825	ASSPQGAYEQY	SEQ ID NO: 3866
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ASSPTPNTEAF	SEQ ID NO: 3868	ASSLWETQY	SEQ ID NO: 3909
ASSLPGELF	SEQ ID NO: 3869	ASSPGSGANVLT	SEQ ID NO: 3910
ASSFPGNNTY	SEQ ID NO: 3870	SARENTEAF	SEQ ID NO: 3911
ASSLRDSTDTQY	SEQ ID NO: 3871	ASSLGGAETQY	SEQ ID NO: 3912
ASSFYTEAF	SEQ ID NO: 3872	ASSLKGTDTQY	SEQ ID NO: 3913

ATSDSNQPQH	SEQ ID NO: 3873	ASSLSGGAYEQY	SEQ ID NO: 3914
ASSLEQETQY	SEQ ID NO: 3874	ASSLRGGQETQY	SEQ ID NO: 3915
ASSFPGELF	SEQ ID NO: 3875	ASSLRGVNTEAF	SEQ ID NO: 3916
ASSLVSTEAF	SEQ ID NO: 3876	ASSQGRTEAF	SEQ ID NO: 3917
ASSSTGMNTEAF	SEQ ID NO: 3877	ASSPTGANTEAF	SEQ ID NO: 3918
ASSLAPSTDQY	SEQ ID NO: 3878	ASSSGDYGTY	SEQ ID NO: 3919
ASSLAGLQETQY	SEQ ID NO: 3879	ASSPGGDYGTY	SEQ ID NO: 3920
ASSLSSSGNTIY	SEQ ID NO: 3880	ASSLGTSGNEQF	SEQ ID NO: 3921
ASSQELNTEAF	SEQ ID NO: 3881	ASSSQGDQPQH	SEQ ID NO: 3922
ASSLLAGGQETQY	SEQ ID NO: 3882	ASSPRTGNQPQH	SEQ ID NO: 3923
ASSPGLASYEQY	SEQ ID NO: 3883	ASSLGVEQF	SEQ ID NO: 3924
ASSPGTGGSYEQY	SEQ ID NO: 3884	ASSLGTGDQPQH	SEQ ID NO: 3925
ASSLTGTGNTIY	SEQ ID NO: 3885	ASSFQGTEAF	SEQ ID NO: 3926
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ASSPGTGGYGYT	SEQ ID NO: 3887	ASSLRGEETQY	SEQ ID NO: 3928
ASSLDRGSNQPQH	SEQ ID NO: 3888	ASSLGQKNTEAF	SEQ ID NO: 3929
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ASSLGQPNQPQH	SEQ ID NO: 3890	ASSYSNTGELF	SEQ ID NO: 3931
ASSRGQGSYEQY	SEQ ID NO: 3891	ASSLSDTEAF	SEQ ID NO: 3932
ASSFEGNQPQH	SEQ ID NO: 3892	ASSASGSTDTQY	SEQ ID NO: 3933
ASSQNSNQPQH	SEQ ID NO: 3893	ASSFNYGYT	SEQ ID NO: 3934
ASSLQGGGTEAF	SEQ ID NO: 3894	ASSPTGPYEQY	SEQ ID NO: 3935
ASSPSGGYEQY	SEQ ID NO: 3895	ASRTGTDQY	SEQ ID NO: 3936
ASSLTSGNTIY	SEQ ID NO: 3896	ASSGQNYGYT	SEQ ID NO: 3937
ASSPRGPYEQY	SEQ ID NO: 3897	ASSSPGYEQY	SEQ ID NO: 3938
ASSLGDYNEQF	SEQ ID NO: 3898	ASRTYNEQF	SEQ ID NO: 3939
ASSSRDSYEQY	SEQ ID NO: 3899	ASSYGDTEAF	SEQ ID NO: 3940
ASSGQGSYEQY	SEQ ID NO: 3900	ASSLQGTGNTIY	SEQ ID NO: 3941
ASSQATDTQY	SEQ ID NO: 3901	ASSSQGLNTEAF	SEQ ID NO: 3942
ASSLNRGETQY	SEQ ID NO: 3902	ASSERGNTEAF	SEQ ID NO: 3943
ASSPREETQY	SEQ ID NO: 3903	ASSPDRSNQPQH	SEQ ID NO: 3944
ASSPAGETQY	SEQ ID NO: 3904	SARLAGGTDQY	SEQ ID NO: 3945
ASSYSGNTIY	SEQ ID NO: 3905	ASSLSGSTTEAF	SEQ ID NO: 3946
ASGRNTEAF	SEQ ID NO: 3906	ASSLGSTGELF	SEQ ID NO: 3947
ASSSTGNEQF	SEQ ID NO: 3907	ASSPRDSYNEQF	SEQ ID NO: 3948
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ASSQGNEQY	SEQ ID NO: 3950	ATSRDRGYEQY	SEQ ID NO: 3983
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ASSLTGENTEAF	SEQ ID NO: 3952	ASSDSSYNEQF	SEQ ID NO: 3985
ASSLERETQY	SEQ ID NO: 3953	ASSLTENQPQH	SEQ ID NO: 3986
ASSLGGVTDQY	SEQ ID NO: 3954	ASSLGQTDQY	SEQ ID NO: 3987

ASSLASGSYNEQF	SEQ ID NO: 3955	ASSYSRGNTEAF	SEQ ID NO: 3988
ASSSGTGNYGYT	SEQ ID NO: 3956	ASSLGLLNTEAF	SEQ ID NO: 3989
ASSFENTEAF	SEQ ID NO: 3957	ASSLGHNEQF	SEQ ID NO: 3990
ASSPRQGYEQY	SEQ ID NO: 3958	ASSVSDTQY	SEQ ID NO: 3991
ASSSGLYEQY	SEQ ID NO: 3959	ASSFLSTDQY	SEQ ID NO: 3992
ASSLSGAYNEQF	SEQ ID NO: 3960	ASRLTDQY	SEQ ID NO: 3993
ASSPGAYNEQF	SEQ ID NO: 3961	ASSYTGGTEAF	SEQ ID NO: 3994
ASSLGGVQETQY	SEQ ID NO: 3962	ASSLGGNTDTQY	SEQ ID NO: 3995
ASSLTDYEQY	SEQ ID NO: 3963	ASSPGTSGQETQY	SEQ ID NO: 3996
ASSLGEDTQY	SEQ ID NO: 3964	ASSLDFTDTQY	SEQ ID NO: 3997
ASSPPGSSYNEQF	SEQ ID NO: 3965	ASSLDSQPQH	SEQ ID NO: 3998
ASSFRGSYNEQF	SEQ ID NO: 3966	ASSQDGNTEAF	SEQ ID NO: 3999
ASSGTLNTEAF	SEQ ID NO: 3967	ASSYSTSTDQY	SEQ ID NO: 4000
ASSFDTDTQY	SEQ ID NO: 3968	ASSLRNSPLH	SEQ ID NO: 4001
ASSIGYEQY	SEQ ID NO: 3969	ASSAGGNTEAF	SEQ ID NO: 4002
ASSLAGDGYT	SEQ ID NO: 3970	ASSLTGRETQY	SEQ ID NO: 4003
ASRGQPNTEAF	SEQ ID NO: 3971	ASSAYTDQY	SEQ ID NO: 4004
ASRDRAEQY	SEQ ID NO: 3972	ASSLGQNTDTQY	SEQ ID NO: 4005
ASSLARNQPQH	SEQ ID NO: 3973	ASSLGAGSYEQY	SEQ ID NO: 4006
ASSSDGYEQY	SEQ ID NO: 3974	ASSQGGGYEQY	SEQ ID NO: 4007
ASSTGQGNTEAF	SEQ ID NO: 3975	ASSLRTNTEAF	SEQ ID NO: 4008
AISESYEQY	SEQ ID NO: 3976	ASSLARSTDQY	SEQ ID NO: 4009
ASSLAPYNEQF	SEQ ID NO: 3977	ASSSRDSSYEQY	SEQ ID NO: 4010
ASSLSGGADTQY	SEQ ID NO: 3978	ASSSGTGGNQPQH	SEQ ID NO: 4011
ASSWGLNTEAF	SEQ ID NO: 3979	ASSLWGQETQY	SEQ ID NO: 4012
ASSRTAQETQY	SEQ ID NO: 3980	ASSRQGSNTIY	SEQ ID NO: 4013
ASSTSNQPQH	SEQ ID NO: 3981	ASSPYTEAF	SEQ ID NO: 4014

[0041] This application references various publications. The disclosures of these publications, in their entireties, are hereby incorporated by reference into this application to describe more fully the state of the art to which this application pertains. The references disclosed are also individually and specifically incorporated herein by reference for material contained within them that is discussed in the sentence in which the reference is relied on.

[0042] The methodologies and the various embodiments thereof described herein are exemplary. Various other embodiments of the methodologies described herein are possible.