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(54) Title: COMPOSITIONS AND METHODS OF REPLICATION DEFICIENT ADENOVIRAL VECTORS FOR VACCINE APPLICATIONS

(57) Abstract: The invention includes compositions and methods of generating a chimpanzee-derived adenovirus AdC6 or AdC7 vector vaccine comprising a deletion of E1, a deletion of E3 ORF3, ORF4, ORF5, ORF6, and ORF7 and a sequence encoding HIV protein gp140, gp160 or Gag, methods of treating and/or preventing or immunizing against HIV and methods of inducing an effector T cell, memory T cell and B cell immune response in a mammal administered the composition produced thereby. Furthermore, the invention encompasses a pharmaceutical composition for vaccinating a mammal as well as a protein expression system.

TITLE OF THE INVENTION

Compositions and Methods of Replication Deficient Adenoviral Vectors For Vaccine Applications

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CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to U.S. Provisional Application Serial No. 62/369,288, filed August 1, 2016, the contents of which are incorporated by reference herein in their entirety.

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STATEMENT REGARDING FEDERALLY SPONSORED
RESEARCH OR DEVELOPMENT

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BACKGROUND OF THE INVENTION

Vaccination is widely recognized as the most effective method of preventing or ameliorating morbidity from infectious diseases. However, traditional methods of vaccine development using inactivation or attenuation of viruses have failed for some of the most deadly human pathogens, necessitating new approaches. Progresses in research have enabled the genetic manipulation of viruses allowing their attenuation as well as incorporation of other foreign sequences. Viral vectors have been studied as potential tools to deliver vaccines as they present advantages over traditional vaccines in that they stimulate a broad range of immune responses including antibody (B cell), T helper cell- (CD4⁺ T cell), and cytotoxic T lymphocyte- (CTL, CD8⁺ T cell) mediated immunity. These viral vector vaccines could be used against various infectious and malignant diseases (Small and Hildegund, Curr Opin Virol. 2011, October 1; 1(4): 241–245).

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Adenoviruses (Ad) vectors are commonly used as vaccine carriers because of their ability to induce insert-specific CD8⁺ T cell responses, they have broad tropism, high transduction efficiency and relatively pose no to low risks. However, vaccination is less effective in the presence of neutralizing antibodies (nAb) and pre-existing Ad-specific immunity represents a major obstacle for Ad-based vaccines as it decreases gene transfer

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efficacy and increases vector-mediated toxicity. Until now, most Ad vectors are based on human serotype 5 (AdHu5). This virus is endemic in most human populations, and neutralizing antibodies specific to AdHu5 can be detected in up to 40–90% of humans.

Seroprevalence of other known human Ads also fluctuate globally with the occurrence of natural infection.

To avoid the potential limitations imposed by preexisting immunity, vectors based on rare human Ad serotypes and Ad from other species are being explored. For instance, vectors based on alternative Ad serotypes are in development, including AdHu26, 35, 48, and the chimpanzee-derived AdC6, C7, and C68. Neutralizing titers to these various rare Ad serotypes are typically low in humans, with seroprevalence to AdC6 and AdC7 less than 5% of adults in the United States and less than 10% seropositive in equatorial Africa, the natural habitat for chimpanzees. However clinical proof of safety, tolerability and immunogenicity of these alternates Ad vectors remain lacking. Certain Adenovirus vectors are disclosed in U.S. Application No. 14/190,787.

Clearly, there is a need in the art for methods of producing more efficient adenovirus vector vaccine systems that circumvent the host's pre-existing immunity, support gene expression of large foreign inserts, while inducing a potent immune response and being stable and safe for the host. The present invention fulfills this need.

SUMMARY OF THE INVENTION

The invention provides a composition comprising a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, wherein the early gene E1 is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted, and wherein the nucleic acid sequence further comprises a promoter sequence linked to a sequence encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag.

In one embodiment, the promoter is a constitutive promoter. In another embodiment, the promoter is a cytomegalovirus immediate early promoter (CMV). In yet another embodiment, the nucleic acid sequence is selected from the group consisting of SEQ ID NOs: 1-8.

In another aspect, the invention provides a protein expression system comprising the composition listed above herein which comprises a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, wherein the early gene E1

is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted, wherein the nucleic acid sequence further comprises a promoter sequence linked to a sequence encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag, and further
5 wherein the nucleic acid sequence is selected from the group consisting of SEQ ID NOs: 1-8.

The invention also provides a protein expression system comprising the composition listed above herein which comprises a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, wherein the early gene E1 is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted, wherein the
10 nucleic acid sequence further comprises a promoter sequence linked to a sequence encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag, and further wherein the nucleic acid sequence encodes an amino acid sequence selected from the group consisting of SEQ ID NOs: 9-16.

The invention further provides a method of eliciting an immune response in a mammal against a heterologous protein. The method of the invention comprises administering to the mammal a composition comprising a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, wherein the early gene E1 is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted,
20 and wherein the nucleic acid sequence further comprises a promoter sequence linked to a sequence encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag.

In one embodiment, the nucleic acid sequence is selected from the group consisting of SEQ ID NOs: 1-8.

In another aspect, the invention provides a method of treating and/or preventing HIV in a mammal. The method of the invention comprises administering a therapeutically effective amount of a composition encoded by a nucleic acid sequence selected from the group consisting of SEQ ID NOs: 1-8.

In yet another aspect, the invention provides method of vaccinating a mammal
30 against HIV infection. The method of the invention comprises administering to the mammal a pharmaceutically acceptable amount of the composition listed above herein, which comprises a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, wherein the early gene E1 is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted, wherein the nucleic acid sequence further comprises a

promoter sequence linked to a sequence encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag, and further wherein administration of the composition elicits an immune response in the mammal.

5 In one embodiment, the composition is administered prophylactically to the mammal. In another embodiment, the composition is administered therapeutically to the mammal. In yet another embodiment, composition is administered in combination with an adjuvant.

10 In a further aspect, the invention includes a method of generating a effector and memory T cell immune response to a heterologous protein in a mammal. The method of the invention comprises the steps of: (a) administering the composition of the invention listed above herein to a mammal in an amount effective to elicit an immune response in the mammal; (b) administering a second effective amount of the chimpanzee-derived adenovirus vector of the composition of the invention listed above herein at a second, subsequent time
15 period, wherein T memory cells directed against the heterologous protein are reactivated in the mammal.

In one embodiment, the composition administered first in (a) and second in (b) comprises a same or a different HIV heterologous protein selected from the group consisting of gp140, gp160 and Gag. In another embodiment, the composition administered first in (a)
20 and in (b) has a same or a different serotype selected from the group consisting of AdC6 and AdC7.

In yet a further aspect, the invention includes a method of generating an adaptive B cell immune response to a heterologous protein in a mammal. The method of the invention comprises the steps of: (a) administering the composition of the invention listed
25 above herein to a mammal in an amount effective to elicit an immune response in the mammal; (b) administering a second effective amount of the composition of the invention listed above herein at a second, subsequent time period, wherein B memory cells directed against the heterologous protein are reactivated in the mammal.

In some embodiments, the mammal is a human.

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BRIEF DESCRIPTION OF THE DRAWINGS

For the purpose of illustrating the invention, there are depicted in the drawings certain embodiments of the invention. However, the invention is not limited to the precise arrangements and instrumentalities of the embodiments depicted in the drawings.

5 Figs. 1A-1D are series of graphs illustrating the neutralizing antibody titers to MW965 PV compared to non-specific neutralization of MuLV PV. Figs. 1A-1C (groups 1-6, upper and lower graphs): sera of mice were tested after the last immunization at a 1:40 dilution for neutralization of the indicated pseudotyped lentiviruses. Data show % neutralization of each individual samples from the 6 groups. Median and IQR are indicated
10 by lines. Differences to neutralization of the control were determined by Friedman test with Dunn correction. * indicates p-values below 0.05. Fig. 1D: titers of neutralizing antibodies against MW965 PV.

Figs. 2A-2B are series of graphs and histograms illustrating sera binding studies from study mice. Fig. 2A displays results from sera of the same mice shown in Figs.
15 1A-1D tested 4 weeks after each immunization at serial dilutions for binding to HIV-1 clade C gp140. Fig. 2A shows the results for median adsorbance $\pm$ interquartile range (IQR) for data obtained with sera from individual mice tested at a 1:2000 dilution. Background data obtained with pre-bleeds were subtracted (OD < 0.1). The bars below indicate the timing of priming (P) and boosting (B) for each group shown to the right. Fig. 2B shows samples from
20 the 1st bleeds after the last boost that were also tested for binding to a peptide expressing the sequence of the V2 loop of HIV-1 clade C. Results show adsorbance after subtraction of pre-bleed results for the 1:100 dilution of sera. Dots show results for individual mice, bars the medians and error bars the IQR.

Fig. 3 is a table depicting the characteristics of the Rhesus Macaques (RM)
25 tested in the present invention. Animals were distributed with high or low nAb responses to AdHu5 and AdHu26 equally into three groups of twelve RMs each. Each group had eight Mamu-A*01⁺ RMs and groups 1 and 3 each had one Mamu-B*17⁺ animal

Figs. 4A-4C are series of graphs illustrating virus acquisition, viral loads over time and levels of SIV genome integration. Fig. 4A shows viral titers over time in 12 control
30 animals and 12 animals each vaccinated with AdC or AdHu vectors. Mamu-A*01⁺/B*17⁺ animals are highlighted in dark grey. The bottom graph to the right shows median titers for the three groups (Controls, "Co"; AdC7/AdC6, "AdC"; AdHu26/AdHu5, "AdH"). Differences in viral loads (area under the curve) and set point viral loads were determined by Kruskal-Wallis test with Dunn correction. Fig. 4B shows as Kaplan-Meier curves infection

according to weeks after 1st challenge in Mamu-A*01⁻/B*17⁻ (left, n=3 for AdC and controls, n=4 for AdHu5) and Mamu-A*01⁺/B*17⁺ RMs (right, n=9 for AdC and controls, n=8 for AdHu). Differences were calculated by Log-rank (Mantel Cox) test. Fig. 4C shows to the left relative levels of integrated SIV genome at 2 (light grey symbol) and 12 (dark grey symbol) weeks after infection of subcohorts of the animals (n = 7 for AdC, n = 11 for AdHu5, n = 4 for controls). Each samples was tested by qPCR using 40-60 replicates. Outliers were excluded by median absolute deviation tests. Differences within one group between weeks 2 and 12 were determined by multiple t-tests. Differences between the three groups were calculated by 2-way Anova. The right graph shows number of challenges required till infection for AdC- and AdHu-vaccinated animals maintained stable levels of SIV integration (change <100, light grey symbol) or showed pronounced increases (change >100, dark grey symbol). Differences between animals of one group with high vs. low integration were calculated by multiple t-tests with Sidak-Holms correction.

Figs. 5A-5C are series of graphs depicting the titers of Env-specific Abs. Env-specific Abs of individual animals were measured by ELISA. Graphs show median Ab titers $\pm$ IQR for serial dilutions of sera from for AdC (closed squares) and AdHu (open squares) vaccinated MamuA*01⁻/B17⁻ (Fig. 5A, n = 3 for AdC- and 4 for AdHu-vaccinated animals) and Mamu-A*01⁺/B*17⁺ RMs (Fig. 5B, n = 9 for AdC and 8 for AdHu-vaccinated animals). Fig. 5C shows titers of individual animals of the 3 groups after challenges (n = 12 per group). Connecting lines indicate significant differences * $p \leq 0.05$, ** $p \leq 0.01$ by Mann-Whitney tests.

Figs. 6A-6B are series of dot plots demonstrating the role of Abs in preventing SIV acquisition. The graphs show Spearman's correlations between antibody titers at wk 32 and number of challenges need to achieve infection for AdC (Fig. 6A, n = 10) and AdHu (Fig. 6B, n = 11) vaccinated RMs. R- (correlation coefficient) and unadjusted p-values are shown within the graphs. Animals that were not infected after 10 challenges were excluded.

Figs. 7A-7L are series of graphs depicting the kinetics of Gag-specific T cell responses. The graphs show frequencies of Gag-specific total CD8⁺ (Fig. 7A, Fig. 7G) and CD4⁺ (Fig. 7D, Fig. 7J), CD8_{CM} (Fig. 7B, Fig. 7H), CD4_{CM} (Fig. 7E, Fig. 7K), CD8_{EM} (Fig. 7C, Fig. 7I) and CD4_{EM} (Fig. 7F, Fig. 7L) T cells of AdC- (Figs. 7A-7F) and AdHu- (Figs. 7G-7L) vaccinated animals (n = 12 per group) as the sum of all possible functionally distinct responses calculated from Boolean gating after subtraction of background responses. Each graph shows median responses $\pm$ IQR of Mamu-A*01⁻/B*17⁻ (closed squares, n = 3 for AdC- and n = 4 for AdHu-vaccinated animals) and Mamu-A*01⁺/B*17⁺ (open squares, n = 9 for

AdC- and $n = 8$ for AdHu-vaccinated animals) RMs. (*) indicates significant differences between the two subcohorts by Mann-Whitney tests.

Fig. 8. is a series of graphs showing the effect of CD8 depletion on serum viral loads. The graphs show relative viral loads of subcohorts of AdC (right, black squares, $n = 5$) and AdHu (left, grey circles, $n = 4$) animals that were treated 28 weeks after the last challenge with antibodies to CD8. Of note the one animal that had detectable titers before depletion also maintained titers by 65 days after antibody treatment had been initiated.

Fig. 9 is a dot plot showing the cross-reactivity of Ad binding Abs. Pre-immunization sera and sera harvested 4 weeks after the 2nd intra-tracheal administration of AdHu vectors from 16 RMs of groups 1 and 2 were tested for antibodies to the Ad vectors by ELISA on plates coated with Ad vectors expressing an irrelevant transgene. Adsorbance values of pre-bleeds were subtracted from those of immune sera before calculating titers. Graphs show titers of individual sera with lines indicating median titer $\pm$ IQR.

Figs. 10A-10D are series of graphs depicting the role of viral loads and peak viral loads in increasing Ab titers after challenge. The graphs show correlations by Spearman between Ab titers at week 62 and viral loads (Fig. 10A, Fig. 10C) or peak viral loads (Fig. 10B, Fig. 10D) for AdC- (Fig. 10A, Fig. 10B, $n = 12$) and AdHu- (Fig. 10C, Fig. 10D, $n = 12$) vaccinated RMs. R- and unadjusted p-values are shown within the graphs.

Fig. 11 is a series of graphs illustrating Gag and Env-specific T cell responses of control animals. Six of the control animals were tested the day of first challenge and shortly after challenges for frequencies of Gag and Env specific CD4⁺ (closed black squares) and CD8⁺ (open white squares) T cells. Graphs show median frequencies $\pm$ IQR of individual animals before and after challenge $\pm$ IQR.

Figs. 12A-12F are series of dot plots depicting the effect of CD8⁺ T cell subsets on viral loads and peak viral loads. The graphs show correlations by Spearman between CD8_{EM} (Fig. 12A, Fig. 12C, Fig. 12D, Fig. 12F) and CD8_{CM} (Fig. 12B, Fig. 12E) frequencies after the boost and peak viral loads (Fig. 12A, Fig. 12B, Fig. 12D, Fig. 12E) or set viral loads over time (Fig. 12C, Fig. 12F) in AdC- (Figs. 12A-12C, $n = 12$) and AdHu- (Figs. 12D-12F, $n = 12$) vaccinated RMs. R- and unadjusted p-values are shown within the graphs.

Figs. 13A-13D are series of dot plots depicting the effect of peak viral loads on CD4⁺ T cell subsets. The graphs show correlations by Spearman between total CD4⁺ T (Fig. 13A, Fig. 13C) and CD4_{EM} (Fig. 13B, Fig. 13D) frequencies after challenges and peak

viral loads for AdC- (Fig. 13A, Fig. 13B, n = 12) and AdHu- (Fig. 13C, Fig. 13D, n = 12) vaccinated RMs. R- and unadjusted p-values are shown within the graphs.

Fig. 14 is a series of graphs depicting the effect of Gag-specific CD8⁺ T cells on levels of SIV integration. The graph on the right shows frequencies of Gag-specific CD8_{EM} T cells before challenge in animals with low levels of SIV integration by 2 weeks after infection (<50,000, dark grey symbol, AdC: n = 4, AdHu: n = 5) as compared to animals with high levels of integration (>50,000, light grey symbols, AdC: n = 3, AdHu: n = 6). Differences were determined by multiple t-tests with Sidak-Holms correction. The graphs in the middle and to the right show frequencies of Gag-specific CD8_{CM} (middle) and CD8_{EM} T cells (right) before challenge in animals with low levels of SIV integration by 12 weeks after infection (<10⁶, dark grey symbol, AdC: n = 4, AdHu: n = 5) as compared to animals with high levels of integration (>10⁶, light grey symbols, AdC: n = 3, AdHu: n = 6). Differences were determined by multiple t-tests with Sidak-Holms correction. Lines with star above indicate significant differences.

Figs. 15A-15L are series of graphs illustrating Env-specific T Cell responses in vaccinated RMs. Frequencies of Env-specific total CD8⁺, CD8_{CM} and CD8_{EM}, total CD4_{CM} and CD4_{EM} T cells tested before and after challenges in 6 randomly selected control RMs are shown. Organization and symbols of the graph are identical to those of Figs. 7A-7L.

Fig. 16 is a series of histograms demonstrating the functions of Gag-specific total CD8⁺ T cells over time. The graphs show median frequencies ± IQR of Gag-specific CD8⁺ T cells from AdC- (left graphs) and AdHu- (right graphs) vaccinated Mamu-A*01⁻/B17⁻ (white bars; AdC: n = 3, AdHu: n = 4) and Mamu-A*01⁺/B17⁺ RMs (grey bars; AdC: n = 9, AdHu: n = 8) exhibiting either of the possible 15 combinations of functions. Cells were tested at different times after vaccination. (#) indicates significant differences by Wilcoxon Rank test calculated by Spice software.

Fig. 17 is a series of histograms demonstrating the functions of Gag-specific total CD4⁺ T cells over time. The graphs show frequencies of functionally distinct Gag-specific CD4⁺ T cells mirroring the design of Fig. 16. with Mamu-A*01⁻/B17⁻ (white bars AdC: n = 3, AdHu: n = 4) and Mamu-A*01⁺/B17⁺ RMs (grey bars AdC: n = 9, AdHu: n = 8). (#) indicates significant differences by Wilcoxon Rank test calculated by Spice software.

Fig. 18 is a series of histograms demonstrating the functions of CD8⁺ and CD4⁺ T cell subsets. The graphs show median frequencies ± IQR of Gag-specific CD8_{CM}, CD8_{EM}, CD4_{CM} and CD4_{EM} from AdC- (left graphs) and AdHu- (right graphs) vaccinated

Mamu-A*01⁻/B*17⁻ (white bars; AdC: n = 3, AdHu: n = 4) and Mamu-A*01⁺/B*17⁺ RMs (grey bars; AdC: n = 9, AdHu: n = 8) exhibiting either of the possible 15 combination of functions. Cells were tested 48 weeks after priming, i.e., shortly before the 1st SIV challenge. (#) indicates significant differences by Wilcoxon Rank test calculated by Spice software.

5 Figs. 19A-19D are series of images depicting various maps and sequences of AdC6 and AdC7. Figs. 19A-19B : Maps of AdC6 and AdC7 vectors expressing Env. Fig. 19C: Maps of pShuttle plasmids containing gp140 (DU172 and DU422).

Figs. 20A-20K are a list of the nucleotide (Figs. 20A-20H) and amino acid (Figs. 20I-20K) sequences of the AdC6 vector expressing gp140 (SEQ ID NOs: 1 and 9
10 respectively).

Figs. 21A-21J are a list of the nucleotide (Figs. 21A-21G) and amino acid (Figs. 21H-21J) sequences of the AdC6 vector expressing Gag (SEQ ID NOs: 2 and 10 respectively).

Figs. 22A-22K are a list of the nucleotide (Figs. 22A-22H) and amino acid (Figs. 22I-22K) sequences of the AdC7 vector expressing gp140 (SEQ ID NOs: 3 and 11
15 respectively).

Figs. 23A- 23K are a list of the nucleotide (Figs. 23A-23H) and amino acid sequences (Figs. 23I-23K) of the AdC7 vector expressing Gag (SEQ ID NOs: 4 and 12 respectively).

20 Figs. 24A-24K are a list of the nucleotide (Figs. 24A-24H) and amino acid sequences (Figs. 24I-43K) of the AdC6 vector expressing gp160, construct DU172 (SEQ ID NOs: 5 and 13 respectively).

Figs. 25A-25K are a list of the nucleotide (Figs. 25A-25H) and amino acid (Figs. 25I-25K) sequences of the AdC6 vector expressing gp160, construct DU422 (SEQ ID
25 NOs: 6 and 14 respectively).

Figs. 26A-26K are a list of the nucleotide (Figs. 26A-26H) and amino acid (Figs. 26I-26K) sequences of the AdC7 vector expressing gp160, construct DU172 (SEQ ID NOs: 7 and 15 respectively).

Figs. 27A-27K are a list of the nucleotide (Figs. 27A-27H) and amino acid (Figs. 27I-27K) sequences of the AdC7 vector expressing gp160, construct DU422 (SEQ ID
30 NOs: 8 and 16 respectively).

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to compositions and methods for generating a chimpanzee-derived adenovirus vector comprising a nucleic acid sequence comprising a deletion in some of the adenovirus early genes (i.e. deletion of E1 and a partial deletion E3) and a promoter sequence linked to a sequence encoding a heterologous protein comprising, in certain embodiments, an HIV gp140, gp160, or HIV Gag protein or other potentially toxic proteins such as the rabies virus glycoprotein. Additionally, the current invention includes compositions and methods of treating of and/or preventing or immunizing against, a specific disease or disorder, and methods of inducing an effector and memory T and B cell immune response in a mammal administered the chimpanzee-derived adenovirus vector the invention.

Definitions

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention pertains. Although any methods and materials similar or equivalent to those described herein may be used in the practice for testing of the present invention, the preferred materials and methods are described herein. In describing and claiming the present invention, the following terminology will be used.

It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting.

As used herein, the articles “a” and “an” are used to refer to one or to more than one (i.e., to at least one) of the grammatical object of the article. By way of example, “an element” means one element or more than one element.

The term “antibody” or “Ab” as used herein, refers to a protein, or polypeptide sequence derived from an immunoglobulin molecule, which specifically binds to a specific epitope on an antigen. Antibodies can be intact immunoglobulins derived from natural sources or from recombinant sources and can be immunoreactive portions of intact immunoglobulins. The antibodies useful in the present invention may exist in a variety of forms including, for example, polyclonal antibodies, monoclonal antibodies, intracellular antibodies (“intrabodies”), Fv, Fab and F(ab)₂, as well as single chain antibodies (scFv) and humanized antibodies (Harlow et al., 1998, Using Antibodies: A Laboratory Manual, Cold Spring Harbor Laboratory Press, NY; Harlow et al., 1989, Antibodies: A Laboratory Manual, Cold Spring Harbor, New York; Houston et al., 1988, Proc. Natl. Acad. Sci. USA 85:5879-5883; Bird et al., 1988, Science 242:423-426). An antibody may be derived from natural

sources or from recombinant sources. Antibodies are typically tetramers of immunoglobulin molecules.

The term “ameliorating” or “treating” means that the clinical signs and/or the symptoms associated with a disease are lessened as a result of the actions performed. The signs or symptoms to be monitored will be well known to the skilled clinician.

As used herein when referring to a measurable value such as an amount, a temporal duration, and the like, the term “about” is meant to encompass variations of $\pm 20\%$ or $\pm 10\%$, more preferably $\pm 5\%$, even more preferably $\pm 1\%$, and still more preferably $\pm 0.1\%$ from the specified value, as such variations are appropriate to perform the disclosed methods.

The term “biological” or “biological sample” refers to a sample obtained from an organism or from components (e.g., cells) of an organism. The sample may be of any biological tissue or fluid. Frequently the sample will be a “clinical sample” which is a sample derived from a patient. Such samples include, but are not limited to, bone marrow, cardiac tissue, sputum, blood, lymphatic fluid, blood cells (e.g., white cells), tissue or fine needle biopsy samples, urine, peritoneal fluid, and pleural fluid, or cells therefrom. Biological samples may also include sections of tissues such as frozen sections taken for histological purposes.

As used herein, “greater” refers to expression levels which are at least 10% or more, for example, 20%, 30%, 40%, or 50%, 60%, 70%, 80%, 90% higher or more, and/or 1.1 fold, 1.2 fold, 1.4 fold, 1.6 fold, 1.8 fold, 2.0 fold higher or more, and any and all whole or partial increments therebetween, than a control.

As used herein, the terms “control,” or “reference” are used interchangeably and refer to a value that is used as a standard of comparison.

The term “immunogenicity” as used herein, refers to the innate ability of an antigen or organism to elicit an immune response in an animal when the antigen or organism is administered to the animal. Thus, “enhancing the immunogenicity” refers to increasing the ability of an antigen or organism to elicit an immune response in an animal when the antigen or organism is administered to an animal. The increased ability of an antigen or organism to elicit an immune response can be measured by, among other things, a greater number of antibodies that bind to an antigen or organism, a greater diversity of antibodies to an antigen or organism, a greater number of T-cells specific for an antigen or organism, a greater cytotoxic or helper T-cell response to an antigen or organism, a greater expression of cytokines in response to an antigen, and the like.

As used herein, the terms “eliciting an immune response” or “immunizing” refer to the process of generating a B cell and/or a T cell response against a heterologous protein.

The term “activation”, as used herein, refers to the state of a cell following sufficient cell surface moiety ligation to induce a noticeable biochemical or morphological change. Within the context of T cells, such activation refers to the state of a T cell that has been sufficiently stimulated to induce cellular proliferation. Activation of a T cell may also induce cytokine production and performance of regulatory or cytolytic effector functions. Within the context of other cells, this term infers either up or down regulation of a particular physico-chemical process.

The term “activated T cell” means a T cell that is currently undergoing cell division, cytokine production, performance of regulatory or cytolytic effector functions, and/or has recently undergone the process of “activation.”

The term “antigen” or “Ag” as used herein is defined as a molecule that provokes an immune response. This immune response may involve either antibody production, or the activation of specific immunologically-competent cells, or both. The skilled artisan will understand that any macromolecule, including virtually all proteins or peptides, can serve as an antigen. Furthermore, antigens can be derived from recombinant or genomic DNA. A skilled artisan will understand that any DNA, which comprises a nucleotide sequences or a partial nucleotide sequence encoding a protein that elicits an immune response therefore encodes an “antigen” as that term is used herein. Furthermore, one skilled in the art will understand that an antigen need not be encoded solely by a full-length nucleotide sequence of a gene. It is readily apparent that the present invention includes, but is not limited to, the use of partial nucleotide sequences of more than one gene and that these nucleotide sequences are arranged in various combinations to elicit the desired immune response. Moreover, a skilled artisan will understand that an antigen need not be encoded by a “gene” at all. It is readily apparent that an antigen can be generated synthesized or can be derived from a biological sample. Such a biological sample can include, but is not limited to a tissue sample, a tumor sample, a cell or a biological fluid.

“Heterologous antigens” used herein to refer to an antigen that is not endogenous to the organism comprising or expressing an antigen. As an example, a virus vaccine vector comprising or expressing a viral or tumor antigen comprises a heterologous antigen. The term “Heterologous protein” as used herein refers to a protein that elicits a beneficial immune response in a subject (i.e. mammal), irrespective of its source.

By the terms "Human Immunodeficiency Virus" or HIV" as used herein is meant any HIV strain or variant that is known in the art or that is heretofore unknown, including without limitation, HIV-1 and HIV-2. HIV-1 is exemplified in certain embodiments disclosed herein.

5 The term "specifically binds", "selectively binds" or "binding specificity" refers to the ability of the humanized antibodies or binding compounds of the invention to bind to a target epitope with a greater affinity than that which results when bound to a non-target epitope. In certain embodiments, specific binding refers to binding to a target with an affinity that is at least 10, 50, 100, 250, 500, or 1000 times greater than the affinity for a non-
10 target epitope.

As used herein, by "combination therapy" is meant that a first agent is administered in conjunction with another agent. "In combination with" or "In conjunction with" refers to administration of one treatment modality in addition to another treatment modality. As such, "in combination with" refers to administration of one treatment modality
15 before, during, or after delivery of the other treatment modality to the individual. Such combinations are considered to be part of a single treatment regimen or regime.

"Humoral immunity" or "humoral immune response" both refer to B-cell mediated immunity and are mediated by highly specific antibodies, produced and secreted by B-lymphocytes (B-cells).

20 "Prevention" refers to the use of a pharmaceutical compositions for the vaccination against a disorder.

"Adjuvant" refers to a substance that is capable of potentiating the immunogenicity of an antigen. Adjuvants can be one substance or a mixture of substances and function by acting directly on the immune system or by providing a slow release of an
25 antigen. Examples of adjuvants are aluminium salts, polyanions, bacterial glycopeptides and slow release agents as Freund's incomplete.

"Delivery vehicle" refers to a composition that helps to target the antigen to specific cells and to facilitate the effective recognition of an antigen by the immune system. The best-known delivery vehicles are liposomes, virosomes, microparticles including
30 microspheres and nanospheres, polymeres, bacterial ghosts, bacterial polysaccharides, attenuated bacteria, virus like particles, attenuated viruses and ISCOMS.

"Incorporated into" or "encapsulated in" refers to an antigenic peptide that is within a delivery vehicle, such as microparticles, bacterial ghosts, attenuated bacteria, virus like particles, attenuated viruses, ISCOMs, liposomes and preferably virosomes.

As used herein, the terms “peptide,” “polypeptide,” and “protein” are used interchangeably, and refer to a compound comprised of amino acid residues covalently linked by peptide bonds. A protein or peptide must contain at least two amino acids, and no limitation is placed on the maximum number of amino acids that may comprise a protein or peptide’s sequence. Polypeptides include any peptide or protein comprising two or more amino acids joined to each other by peptide bonds. As used herein, the term refers to both short chains, which also commonly are referred to in the art as peptides, oligopeptides and oligomers, for example, and to longer chains, which generally are referred to in the art as proteins, of which there are many types. “Polypeptides” include, for example, biologically active fragments, substantially homologous polypeptides, oligopeptides, homodimers, heterodimers, variants of polypeptides, modified polypeptides, derivatives, analogs, fusion proteins, among others. The polypeptides include natural peptides, recombinant peptides, synthetic peptides, or a combination thereof.

A “fusion protein” as used herein refers to a protein wherein the protein comprises two or more proteins linked together by peptide bonds or other chemical bonds. The proteins can be linked together directly by a peptide or other chemical bond, or with one or more amino acids between the two or more proteins, referred to herein as a spacer.

In the context of the present invention, the following abbreviations for the commonly occurring nucleic acid bases are used. “A” refers to adenosine, “C” refers to cytosine, “G” refers to guanosine, “T” refers to thymidine, and “U” refers to uridine.

The term “RNA” as used herein is defined as ribonucleic acid.

“Transform”, “transforming”, and “transformation” is used herein to refer to a process of introducing an isolated nucleic acid into the interior of an organism.

The term “treatment” as used within the context of the present invention is meant to include therapeutic treatment as well as prophylactic, or suppressive measures for the disease or disorder. As used herein, the term “treatment” and associated terms such as “treat” and “treating” means the reduction of the progression, severity and/or duration of a disease condition or at least one symptom thereof. The term ‘treatment’ therefore refers to any regimen that can benefit a subject. The treatment may be in respect of an existing condition or may be prophylactic (preventative treatment). Treatment may include curative, alleviative or prophylactic effects. References herein to “therapeutic” and “prophylactic” treatments are to be considered in their broadest context. The term “therapeutic” does not necessarily imply that a subject is treated until total recovery. Similarly, “prophylactic” does not necessarily mean that the subject will not eventually contract a disease condition. Thus,

for example, the term treatment includes the administration of an agent prior to or following the onset of a disease or disorder thereby preventing or removing all signs of the disease or disorder. As another example, administration of the agent after clinical manifestation of the disease to combat the symptoms of the disease comprises “treatment” of the disease.

5 The term “equivalent,” when used in reference to nucleotide sequences, is understood to refer to nucleotide sequences encoding functionally equivalent polypeptides. Equivalent nucleotide sequences will include sequences that differ by one or more nucleotide substitutions, additions- or deletions, such as allelic variants; and will, therefore, include sequences that differ from the nucleotide sequence of the nucleic acids described herein due
10 to the degeneracy of the genetic code.

 The term “isolated” as used herein with respect to nucleic acids, such as DNA or RNA, refers to molecules separated from other DNAs or RNAs, respectively that are present in the natural source of the macromolecule. The term isolated as used herein also refers to a nucleic acid or peptide that is substantially free of cellular material, viral material,
15 or culture medium when produced by recombinant DNA techniques, or chemical precursors or other chemicals when chemically synthesized. Moreover, an “isolated nucleic acid” is meant to include nucleic acid fragments, which are not naturally occurring as fragments and would not be found in the natural state. The term “isolated” is also used herein to refer to polypeptides, which are isolated from other cellular proteins and is meant to encompass both
20 purified and recombinant polypeptides. An “isolated cell” or “isolated population of cells” is a cell or population of cells that is not present in its natural environment.

 A “mutation” as used therein is a change in a DNA sequence resulting in an alteration from its natural state. The mutation can comprise a deletion and/or insertion and/or duplication and/or substitution of at least one desoxyribonucleic acid base such as a purine
25 (adenine and/or thymine) and/or a pyrimidine (guanine and/or cytosine). Mutations may or may not produce discernible changes in the observable characteristics (phenotype) of an organism.

 As used herein, the term “nucleic acid” refers to polynucleotides such as deoxyribonucleic acid (DNA), and, where appropriate, ribonucleic acid (RNA). The term
30 should also be understood to include, as equivalents, analogs of either RNA or DNA made from nucleotide analogs, and, as applicable to the embodiment being described, single (sense or antisense) and double-stranded polynucleotides. ESTs, chromosomes, cDNAs, mRNAs, and rRNAs are representative examples of molecules that may be referred to as nucleic acids.

As used herein, "operably linked" sequences include both expression control sequences that are contiguous with the gene of interest and expression control sequences that act in trans or at a distance to control the gene of interest. Expression control sequences include appropriate transcription initiation, termination, promoter and enhancer sequences; efficient RNA processing signals such as splicing and polyadenylation (polyA) signals; sequences that stabilize cytoplasmic mRNA; sequences that enhance translation efficiency (i.e., Kozak consensus sequence); sequences that enhance protein stability; and when desired, sequences that enhance secretion of the encoded product. There are numerous expression control sequences, including promoters which are native, constitutive, inducible and/or tissue-specific, are known in the art that may be used in the compositions of the invention. "Operably linked" should be construed to include RNA expression and control sequences in addition to DNA expression and control sequences.

The term "promoter" as used herein is defined as a DNA sequence recognized by the synthetic machinery of the cell, or introduced synthetic machinery, required to initiate the specific transcription of a polynucleotide sequence.

As used herein, the term "promoter/regulatory sequence" means a nucleic acid sequence, which is required for expression of a gene product operably linked to the promoter/regulatory sequence. In some instances, this sequence may be the core promoter sequence and in other instances, this sequence may also include an enhancer sequence and other regulatory elements, which are required for expression of the gene product. The promoter/regulatory sequence may, for example, be one which expresses the gene product in a tissue specific manner.

A "constitutive" promoter is a nucleotide sequence which, when operably linked with a polynucleotide which encodes or specifies a gene product, causes the gene product to be produced in a cell under most or all physiological conditions of the cell.

An "inducible" promoter is a nucleotide sequence which, when operably linked with a polynucleotide which encodes or specifies a gene product, causes the gene product to be produced in a cell substantially only when an inducer which corresponds to the promoter is present in the cell.

As used herein, the term "pharmaceutical composition" refers to a mixture of at least one compound useful within the invention with other chemical components, such as carriers, stabilizers, diluents, adjuvants, dispersing agents, suspending agents, thickening agents, and/or excipients. The pharmaceutical composition facilitates administration of the compound to an organism. Multiple techniques of administering a compound exist in the art

including, but not limited to: intravenous, oral, aerosol, parenteral, ophthalmic, pulmonary and topical administration.

The language “pharmaceutically acceptable carrier” includes a pharmaceutically acceptable salt, pharmaceutically acceptable material, composition or carrier, such as a liquid or solid filler, diluent, excipient, solvent or encapsulating material, involved in carrying or transporting a compound(s) of the present invention within or to the subject such that it may perform its intended function. Typically, such compounds are carried or transported from one organ, or portion of the body, to another organ, or portion of the body. Each salt or carrier must be “acceptable” in the sense of being compatible with the other ingredients of the formulation, and not injurious to the subject. Some examples of materials that may serve as pharmaceutically acceptable carriers include: sugars, such as lactose, glucose and sucrose; starches, such as corn starch and potato starch; cellulose, and its derivatives, such as sodium carboxymethyl cellulose, ethyl cellulose and cellulose acetate; powdered tragacanth; malt; gelatin; talc; excipients, such as cocoa butter and suppository waxes; oils, such as peanut oil, cottonseed oil, safflower oil, sesame oil, olive oil, corn oil and soybean oil; glycols, such as propylene glycol; polyols, such as glycerin, sorbitol, mannitol and polyethylene glycol; esters, such as ethyl oleate and ethyl laurate; agar; buffering agents, such as magnesium hydroxide and aluminum hydroxide; alginic acid; pyrogen-free water; isotonic saline; Ringer’s solution; ethyl alcohol; phosphate buffer solutions; diluent; granulating agent; lubricant; binder; disintegrating agent; wetting agent; emulsifier; coloring agent; release agent; coating agent; sweetening agent; flavoring agent; perfuming agent; preservative; antioxidant; plasticizer; gelling agent; thickener; hardener; setting agent; suspending agent; surfactant; humectant; carrier; stabilizer; and other non-toxic compatible substances employed in pharmaceutical formulations, or any combination thereof. As used herein, “pharmaceutically acceptable carrier” also includes any and all coatings, antibacterial and antifungal agents, and absorption delaying agents, and the like that are compatible with the activity of the compound, and are physiologically acceptable to the subject. Supplementary active compounds may also be incorporated into the compositions.

As used herein, the term “effective amount” or “therapeutically effective amount” means the amount of the virus like particle generated from vector of the invention which is required to prevent the particular disease condition, or which reduces the severity of and/or ameliorates the disease condition or at least one symptom thereof or condition associated therewith.

A “subject” or “patient,” as used therein, may be a human or non-human mammal. Non-human mammals include, for example, livestock and pets, such as ovine, bovine, porcine, canine, feline and murine mammals. Preferably, the subject is human.

“Titers” are numerical measures of the concentration of a virus or viral vector compared to a reference sample, where the concentration is determined either by the activity of the virus, or by measuring the number of viruses in a unit volume of buffer. The titer of viral stocks are determined, e.g., by measuring the infectivity of a solution or solutions (typically serial dilutions) of the viruses, e.g., on HeLa cells using the soft agar method (see, Graham & Van Der eb (1973) Virology 52:456-467) or by monitoring resistance conferred to cells, e.g., G418 resistance encoded by the virus or vector, or by quantitating the viruses by UV spectrophotometry (see, Chardonnet & Dales (1970) Virology 40:462-477).

A “vector” is a composition of matter which comprises an isolated nucleic acid and which can be used to deliver the isolated nucleic acid to the interior of a cell. Numerous vectors are known in the art including, but not limited to, linear polynucleotides, polynucleotides associated with ionic or amphiphilic compounds, plasmids, and viruses. In the present disclosure, the term “vector” includes an autonomously replicating virus.

Ranges: throughout this disclosure, various aspects of the invention can be presented in a range format. It should be understood that the description in range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the invention. Accordingly, the description of a range should be considered to have specifically disclosed all the possible subranges as well as individual numerical values within that range. For example, description of a range such as from 1 to 6 should be considered to have specifically disclosed subranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 2.7, 3, 4, 5, 5.3, and 6. This applies regardless of the breadth of the range.

Description

The invention provides chimpanzee-derived adenoviral vectors useful in vaccine development and gene therapy. These vectors comprise a deletion of the viral early genomic region E1, and a selective deletion of some of the nine open reading frames (ORFs) of the viral early genomic region E3 while retaining others. The disclosed vectors are

particularly useful for vaccine development and therapy. Adenoviral vectors comprising such deletions are disclosed in U.S. Application No. 14/190,787.

The present invention comprises the novel improvement over U.S. Application No. 14/190,787 wherein the adenoviral vector encodes nucleic acid encoding a heterologous protein encoding HIV envelope protein gp140, wherein when the vector is introduced into a cell, the cell stably expresses gp140 protein, for over 12 serial passages of the vector within cells.

The present invention comprises the novel improvement over U.S. Application No. 14/190,787 wherein the adenoviral vector encodes nucleic acid encoding a heterologous protein encoding HIV envelope protein gp160, wherein when the vector is introduced into a cell, the cell stably expresses gp160 protein, for over many serial passages of the vector within cells.

The present invention also comprises the novel improvement over U.S. Application No. 14/190,787 wherein the adenoviral vector encodes nucleic acid encoding a heterologous protein encoding HIV Gag, wherein when the vector is introduced into a cell, the cell stably expresses gag protein, for over many serial passages of the vector within cells.

In one aspect, the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag. In another aspect, the heterologous protein is all or an antigenic portion of the HIV gp140, gp160 or HIV Gag proteins.

In one embodiment, the HIV serotype is HIV-1.

In some embodiments, the chimpanzee-derived adenovirus vector comprises a nucleic acid sequence comprising a constitutive promoter.

In some embodiments, the chimpanzee-derived adenovirus vector of this invention comprises a nucleic acid sequence consists of SEQ ID NOs: 1- 4.

In other embodiments, the present invention relates to a protein expression system comprising a chimpanzee-derived adenovirus vector comprising a nucleic acid sequence selected from the group consisting of SEQ ID NOs: 1-4. In yet other embodiments, the protein expression system of this invention comprises a chimpanzee-derived adenovirus vector, wherein the vector comprises a nucleic acid sequence encoding an amino acid sequence selected from the group consisting of SEQ ID NOs: 5-8.

In one embodiment, the invention provides a method of generating effector and memory T cell immune responses to a heterologous protein in a mammal. The method comprises first administering to the mammal the chimpanzee-derived adenovirus vector of this invention in an amount effective to elicit an immune response in the mammal; and

second, administering a second effective amount of the chimpanzee-derived adenovirus vector at a subsequent time period, wherein T memory cells directed against the heterologous protein are reactivated in the mammal.

In one embodiment, the invention provides a method of generating an adaptive
5 B cell immune response to a heterologous protein in a mammal. The method comprises first administering to the mammal the chimpanzee-derived adenovirus vector of this invention in an amount effective to elicit an immune response in the mammal; and second, administering a second effective amount of the chimpanzee-derived adenovirus vector at a subsequent time period, wherein B memory cells directed against the heterologous protein are reactivated in
10 the mammal.

In some aspects of the invention, the chimpanzee-derived adenovirus vector administered herein to a mammal, in a first and second step, comprises the same or a different: HIV heterologous protein selected from the group consisting of gp140, gp160 and Gag encoded by an adenovirus serotype selected from the group consisting of AdC6 and
15 AdC7.

Vaccine compositions comprising adenovirus particles made using the adenovirus vectors disclosed herein can be used to induce immunity in a mammal against one or more encoded heterologous proteins or antigenic portions thereof. Immunity can be induced using the disclosed vaccine compositions or dosage units. Immune responses can be
20 assessed using suitable methods known in the art, as disclosed, for example, in WO2012/02483.

In certain embodiments, the mammal is a human.

Heterologous Gene Expression

In one aspect, although the cytomegalovirus immediate early promoter is
25 exemplified herein as the promoter driving expression of the HIV protein, the invention should not be construed to be limited to this promoter sequence. Promoter sequences that are useful in the invention include any promoter that induces high levels of gene expression. Such promoters may include, but are not limited to those disclosed elsewhere herein.

In one embodiment, a suitable promoter is the immediate early
30 cytomegalovirus (CMV) promoter sequence. This promoter sequence is a strong constitutive promoter sequence capable of driving high levels of expression of any polynucleotide sequence operatively linked thereto. Another example of a suitable promoter is Elongation Growth Factor -1 α (EF-1 α). However, other constitutive promoter sequences may also be used, including, but not limited to the simian virus 40 (SV40) early promoter, mouse

mammary tumor virus (MMTV), human immunodeficiency virus (HIV) long terminal repeat (LTR) promoter, MoMuLV promoter, an avian leukemia virus promoter, an Epstein-Barr virus immediate early promoter, a Rous sarcoma virus promoter, as well as human gene promoters such as, but not limited to, the actin promoter, the myosin promoter, the

5 hemoglobin promoter, and the creatine kinase promoter. Further, the invention should not be limited to the use of constitutive promoters. Inducible promoters are also contemplated as part of the invention. The use of an inducible promoter provides a molecular switch capable of turning on expression of the polynucleotide sequence, which it is operatively linked when such expression is desired, or turning off the expression when expression is not desired.

10 Examples of inducible promoters include, but are not limited to a metallothioneine promoter, a glucocorticoid promoter, a progesterone promoter, and a tetracycline promoter.

In some embodiments, the invention further includes the use of a tissue-specific promoter that drives expression of a given heterologous gene in one or more specific types of cells (e.g., myoglobin promoter, muscle creatine kinase promoter, desmin promoter, 15 mammalian troponin 1 promoter, and skeletal alpha-action promoter). Furthermore, any artificial synthetic promoters known in the art can be used in this invention as these promoters can provide optimal efficiency and stability for the heterologous gene.

Additionally, enhancer sequences regulate expression of the gene contained within a vector. Typically, enhancers are bound with protein factors to enhance the transcription of a gene.

20 Enhancers may be located upstream or downstream of the gene it regulates. Enhancers may also be tissue-specific to enhance transcription in a specific cell or tissue type.

In order to assess the expression of the heterologous gene of interest, the expression vector to be introduced into a cell can also contain either a selectable marker gene or a reporter gene or both to facilitate identification and selection of expressing cells from the 25 population of cells sought to be infected through the hybrid-virus vectors. In other aspects, the selectable marker may be carried on a separate piece of DNA and used in a co-infection/transfection procedure. Both selectable markers and reporter genes may be flanked with appropriate regulatory sequences to enable expression in the host cells. Useful selectable markers include, for example, antibiotic-resistance genes, such as the neomycin resistant gene 30 and the like.

Reporter genes are used for identifying potentially infected cells and for evaluating the functionality of regulatory sequences. In general, a reporter gene is a gene that is not present in or expressed by the recipient organism or tissue and that encodes a polypeptide whose expression is manifested by some easily detectable property, e.g.,

enzymatic activity. Suitable reporter genes may include genes encoding luciferase, beta-galactosidase, chloramphenicol acetyl transferase, secreted alkaline phosphatase, or the green fluorescent protein gene (e.g., Ui-Tei et al., 2000 FEBS Letters 479: 79-82).

It will be apparent to one skilled in the art that the invention is not limited to the nature of the heterologous gene that is expressed by the adenovirus vector of the invention. Any suitable heterologous gene can be used where expression of the gene provides a benefit to the mammal. For example, the heterologous gene may be a viral protein whose expression in a mammal confers immunity to infection by the virus.

Similarly, the heterologous gene may be a bacterial antigen, a parasitic antigen, a fungal antigen, a cancer antigen, an antigen involved in a deleterious autoimmune reaction, or any other protein where an immune response directed thereto provides benefit.

5 Heterologous proteins

In the present invention, the adenovirus vector of the invention may encode any heterologous protein useful in the invention, and may encode more than one heterologous protein inserted in tandem in the virus vector of the invention. Typically, the heterologous protein is a peptide fragment, polypeptide, protein or fusion protein. Optionally, the
10 heterologous protein is suitable such that a cell-mediated immune response is induced against it in a mammal following administration of the vector to the mammal.

In one embodiment, the heterologous protein is derived from an HIV protein. In another embodiment, the heterologous protein is derived from HIV envelope glycoprotein. Non-limiting examples of HIV envelope glycoprotein are gp120, gp41, gp160 and gp140. In
15 yet another embodiment, the heterologous protein is derived from HIV Gag protein.

In some embodiments, the heterologous protein may be derived from a toxic protein such as, but not limited to, the rabies virus glycoprotein.

In some embodiments, the heterologous protein may be derived from a cancer. In such embodiments, heterologous protein is, or is a fragment of, a tumor specific antigen. In
20 certain embodiments the cancer may be derived from the group including Acute and Chronic Myelogenous Leukemia (AML, CML), Follicular Non-Hodgkins lymphoma, malignant melanoma, Hairy Cell leukaemia, multiple myeloma, carcinoid tumors with carcinoid syndrome and liver and lymph node metastases, AIDS related Kaposi's sarcoma, renal cell carcinoma, adenocarcinoma of the large bowel, squamous cell carcinoma of the head and
25 neck. The cancer may also be derived from organs and solid tissues, e.g., colon cancer, lung cancer, breast cancer, stomach cancer, prostate cancer, and endometrial cancer. When such

heterologous proteins are used in the compositions and methods of the present invention, the resulting immune response generated may combat cancers and thus the vectors and viruses produced by these vectors are designed to be oncolytic.

5 In other embodiments, the heterologous protein may be associated with the pathology of an autoimmune disease. Organs and tissues commonly affected by autoimmune disorders include, but are not limited to, blood vessels, connective tissues, endocrine glands such as the thyroid or pancreas, joints, muscles, red blood cells and skin. Examples of autoimmune (or autoimmune-related) disorders for which such heterologous proteins may be useful include, but are not limited to, Addison's disease, Celiac disease, Dermatomyositis, 10 Graves' disease, Hashimoto's thyroiditis, Multiple sclerosis, Myasthenia gravis, Pernicious anemia, Reactive arthritis, Rheumatoid arthritis, Sjogren syndrome, Systemic lupus erythematosus and Type I diabetes.

Methods of the Invention

The vectors of the invention are useful in a variety of applications useful for immunizing a mammal against disease, and/or treating, preventing or diminishing risk of disease in a mammal.

The invention therefore includes a method of immunizing a mammal against a heterologous protein. The method comprises administering to the mammal a composition comprising a composition comprising a chimpanzee-derived adenovirus (Ad) vector comprising a DNA sequence comprising a deletion in E1, a deletion of E3 ORF3, ORF4, ORF5, ORF6, and ORF7 and a promoter sequence linked to a sequence encoding a heterologous protein, wherein expression of the heterologous protein induces an immune response in the mammal. In one embodiment the chimpanzee-derived Ad vector is AdC6. In another embodiment the chimpanzee-derived Ad vector is AdC7.

The invention further includes a method of treating a mammal in need thereof where the method administering a therapeutically effective amount of a composition encoded by a chimpanzee-derived adenovirus vector comprising a DNA sequence consisting of SEQ ID NOs: 1-4, wherein expression of the heterogeneous gene provides benefit to the mammal. In one aspect, the invention includes a method of generating effector and memory T cell immune responses to a heterologous protein in a mammal. In another aspect, the invention includes a method of generating an adaptive B cell immune response to a heterologous protein in a mammal.

Additionally included in the invention is a method of diminishing the risk that a mammal will develop a disease. The method comprises administering to the mammal a composition comprising a composition comprising a chimpanzee-derived adenovirus vector comprising a DNA sequence comprising a deletion in E1, a deletion of E3 ORF3, ORF4, ORF5, ORF6, and ORF7 and a promoter sequence linked to a sequence encoding a heterologous protein. Expression of the heterogeneous gene (e.g. HIV gp140, gp160 or Gag protein) induces an immune response to the heterologous protein encoded thereby in the mammal, thereby diminishing the risk that the mammal will develop a disease (e.g. HIV-1) associated with the heterologous protein.

Adenovirus vector production

Methods of making the adenovirus vector of the invention are described in detail in the Experimental Examples Section herein and in U.S. Application No. 14/190,787 incorporated herein by reference. In general, production, purification and quality control procedures for Adenovirus vectors are well established in the art. Once a vector backbone is created, molecular cloning can be used to create an adenoviral plasmid comprising a coding sequence for an antigenic heterologous protein. The plasmid can be transfected into packaging cells that provide E1 of a suitable adenovirus serotype in trans. Packaging cells are well known in the art, and cells lines such as HEK293 or PERC6 can be used for this purpose. Viral particles are then harvested once plaques become visible. Fresh cells can then be infected to ensure continued replication of the adenovirus. Quality can be assessed using Southern blotting or other methods, such as restriction enzyme mapping, sequencing, and PCR, to confirm the presence of the transgene and the lack of gene rearrangements or undesired deletions.

Vaccine compositions comprising adenovirus particles made using the adenovirus vectors disclosed herein can be used to induce immunity against the encoded antigenic protein. Vaccines can be formulated using standard techniques and can comprise, in addition to a replication-incompetent adenovirus vector encoding a desired protein, a pharmaceutically acceptable vehicle, such as phosphate-buffered saline (PBS) or other buffers, as well as other components such as antibacterial and antifungal agents, isotonic and absorption delaying agents, adjuvants, and the like. In some embodiments vaccine compositions are administered in combination with one or more other vaccines. Dosage units of vaccine compositions can be provided. Such dosage units typically comprise 10^8 to 10^{11} adenoviral particles (e.g., 10^8 , 5×10^8 , 10^9 , 5×10^9 , 10^{10} , 5×10^{10} , 10^{11}). In some

embodiments, the dosage of 5×10^{10} virus particles is of choice. Particularly, this dosage (5×10^{10}) suits best humans in clinical trials.

Pharmaceutical Compositions and Formulations.

The vector of the invention may be formulated as a pharmaceutical composition.

5 Such a pharmaceutical composition may be in a form suitable for administration to a subject (i.e. mammal), or the pharmaceutical composition may further comprise one or more pharmaceutically acceptable carriers, one or more additional ingredients, or some combination of these. The various components of the pharmaceutical composition may be present in the form of a physiologically acceptable salt, such as in
10 combination with a physiologically acceptable cation or anion, as is well known in the art.

In one embodiment, the pharmaceutical compositions useful for practicing the method of the invention may be administered to deliver a dose of between 10^6 and 10^{12} PFU.

In one embodiment, the pharmaceutical compositions useful for practicing the method of the invention may comprise an adjuvant. Non-limiting examples of suitable are
15 Freund's complete adjuvant, Freund's incomplete adjuvant, Quil A, Detox, ISCOMs or squalene.

Pharmaceutical compositions that are useful in the methods of the invention may be suitably developed for inhalation, oral, rectal, vaginal, parenteral, topical, transdermal, pulmonary, intranasal, buccal, ophthalmic, intrathecal, intravenous or another
20 route of administration. Other contemplated formulations include projected nanoparticles, liposomal preparations, resealed erythrocytes containing the active ingredient, and immunologically-based formulations. The route(s) of administration is readily apparent to the skilled artisan and depends upon any number of factors including the type and severity of the disease being treated, the type and age of the veterinary or human patient being treated,
25 and the like.

Although the descriptions of pharmaceutical compositions provided herein are principally directed to pharmaceutical compositions suitable for ethical administration to humans, it is understood by the skilled artisan that such compositions are generally suitable for administration to animals of all sorts. Modification of pharmaceutical compositions
30 suitable for administration to humans in order to render the compositions suitable for administration to various animals is well understood, and the ordinarily skilled veterinary pharmacologist can design and perform such modification with merely ordinary, if any,

experimentation. Subjects to which administration of the pharmaceutical compositions of the invention is contemplated include, but are not limited to, humans and other primates, mammals including commercially relevant mammals such as cattle, pigs, horses, sheep, cats, and dogs.

5 The composition of the invention may comprise a preservative from about 0.005% to 2.0% by total weight of the composition. The preservative is used to prevent spoilage in the case of exposure to contaminants in the environment.

Administration/Dosing

10 The regimen of administration may affect what constitutes an effective amount. For example, the adenovirus vector of the invention may be administered to the subject (i.e. mammal) in a single dose, in several divided dosages, as well as staggered dosages may be administered daily or sequentially, or the dose may be continuously infused, or may be a bolus injection. Further, the dosages may be proportionally increased or
15 decreased as indicated by the exigencies of the therapeutic or prophylactic situation.

Administration of the compositions of the present invention to a subject, preferably a mammal, more preferably a human, may be carried out using known procedures, at dosages and for periods of time effective to treat the disease in the subject. An effective amount of the composition necessary to achieve the intended result will vary and will depend
20 on factors such as the disease to be treated or prevented, the age, sex, weight, condition, general health and prior medical history of the subject being treated, and like factors well-known in the medical arts. In particular embodiments, it is especially advantageous to formulate the composition in dosage unit form for ease of administration and uniformity of dosage. Dosage unit form as used herein refers to physically discrete units suited as unitary
25 dosages for the subjects to be treated; each unit containing a predetermined quantity of therapeutic compound calculated to produce the desired therapeutic effect in association with the required pharmaceutical vehicle. The dosage unit forms of the invention are dictated by and directly dependent on (a) the unique characteristics of the composition and the heterologous protein to be expressed, and the particular therapeutic effect to be achieved.

Routes of Administration

30 One skilled in the art will recognize that although more than one route can be used for administration, a particular route can provide a more immediate and more effective reaction than another route. Routes of administration of any of the compositions\ of the

invention include inhalation, oral, nasal, rectal, parenteral, sublingual, transdermal, transmucosal (e.g., sublingual, lingual, (trans)buccal, (trans)urethral, vaginal (e.g., trans- and perivaginally), (intra)nasal, and (trans)rectal), intravesical, intrapulmonary, intraduodenal, intragastrical, intrathecal, subcutaneous, intramuscular, intradermal, intra-arterial,

5 intravenous, intrabronchial, inhalation, and topical administration.

Kits

In some embodiments a kit is provided for treating, preventing, or ameliorating an a given disease, disorder or condition, or a symptom thereof, as described
10 herein wherein the kit comprises: a) a compound or compositions as described herein; and optionally b) an additional agent or therapy as described herein. The kit can further include instructions or a label for using the kit to treat, prevent, or ameliorate the disease, disorder or condition. In yet other embodiments, the invention extends to kits assays for a given disease, disorder or condition, or a symptom thereof, as described herein. Such kits may, for example,
15 contain the reagents from PCR or other nucleic acid hybridization technology (microarrays) or reagents for immunologically based detection techniques (e.g., ELISpot, ELISA).

EXAMPLES

The invention is now described with reference to the following Examples.

20 These Examples are provided for the purpose of illustration only and the invention should in no way be construed as being limited to these Examples, but rather should be construed to encompass any and all variations which become evident as a result of the teaching provided herein.

Without further description, it is believed that one of ordinary skill in the art
25 can, using the preceding description and the following illustrative examples, make and utilize the compounds of the present invention and practice the claimed methods. The following working examples therefore, specifically point out the preferred embodiments of the present invention, and are not to be construed as limiting in any way the remainder of the disclosure.

The results of the experiments are now described in the following examples.

30

Example 1: Advantage of using recombinant AdC6 and AdC7 Vaccines

E1-deleted Ad vectors of human and simian serotypes have been tested extensively in the clinic. They are well tolerated at immunogenic doses. They induce very

potent cellular responses and are also able to elicit potent and sustained humoral responses to a wide variety of transgene inserts as has been established in animals. Neutralizing antibodies commonly found to human serotypes of Ad vectors can impair immune responses to the transgene product. In the present invention, the combined sequential usage of two serologically distinct AdC vectors (e.g. AdC6 and AdC7) in a heterologous prime-boost regimen (see Example 6) is of particular interest. The rationale is that such a regimen outperforms homologous prime-boost regimens where neutralizing antibodies to the prime vaccine carrier impair immune responses to the boost. This problem is avoided if two serologically distinct AdC vectors are combined in a prime-boost regimen. In some embodiments, the prime-boost with the two serologically distinct AdC vectors is also followed by additional boosts with a protein vaccine.

Example 2: Goals and Objectives

The safety of the AdC6-HIVgp140 and AdC7-HIVgp140 vectors are assessed herein for the first time in humans. The present invention relates to a method of developing a vaccine regimen in which AdC vectors expressing the viral envelope (Env) are combined with other vaccine components. HIV-1 infection is best prevented by vaccines that induce both antibodies that block infection either by neutralization or by preventing passage of the virus through the mucosa. CD8⁺ T cells rapidly eliminate cells infected with virus that escaped the antibody barrier. The Env protein, including but not limited to gp140 and gp160, is the primary target of virion binding or neutralizing antibodies while the group-specific antigen (Gag) is a prime target for CD8⁺ T cells.

Example 3: Preclinical Immunogenicity/Efficacy Studies in mice

Studies in mice and nonhuman primates were performed herein to evaluate the immunogenicity of study candidates AdC6 and AdC7 vectors. Studies in mice in which animals were primed with an AdC7 vector expressing Env and then boosted with either Env protein constructs or Virus-Like Particles (VLPs) containing Env Clade C were also conducted.

In one of the present study conducted in outbred ICR mice, pre-immunization sera were collected to determine background antibody titers. Animals were then divided into 6 groups of 5 mice each. Groups 1 and 2 were primed 3 times in monthly intervals

intramuscularly (i.m.) with 10 µg of gp145 protein of CO6980v0c22 (gp145_{CO6980}) in alum; four weeks later Group 1 was boosted i.m. with 10¹⁰ vp of an AdC7 vector expressing gp140 of Du172, a clade C virus, and Group 2 was boosted with the same vector at 10⁹ vp. For Groups 3 and 4 the order was reversed; mice were primed with the AdC7-gp140_{Du172} vectors at the two different doses (10¹⁰ vp and 10⁹ vp) respectively, and then boosted 8 weeks later 3 times in monthly intervals with gp145_{CO6980} in alum. Group 5 was primed with 10¹⁰ vp of an AdC7-gp140_{Du172} and were boosted 2 months later with AdC6 expressing Du422, another clade C virus. Group 6 received the same regimen but vectors were used at a reduced dose of 10⁹ vp. Pre-immunization sera and sera collected at 2 - 6 weeks after the last dose (Groups 1 and 2: 6 weeks; Groups 3 and 4: 2 weeks; Groups 5 and 6: 4 weeks) were tested for neutralizing antibodies to pseudoviruses (PV) based on two tier 1 clade C viruses (MW065, GS015), one clade C tier 2 virus (TZBD), one clade A/E tier 1 virus (TH023) as well as to MuLV PVs; the latter to assess non-specific neutralization. Sera from one mouse in Groups 1, 2, 4 and 6 each had neutralizing antibodies at baseline; they were excluded from the analysis. As shown in Figs. 1A-1D, all of the regimens induced significant titers of neutralizing antibodies to MW965 PV when compared to non-specific neutralization of MuLV PV.

Some mice also developed antibodies that neutralized GS015 and/or TZBD PV; neutralization of the clade C tier 2 PV was not achieved. The regimen in which the Ad vector was used for priming achieved higher seroconversion rates compared to regimens in which mice were primed with gp145 protein. Ad vectors given in a prime-boost regimen without protein also induced neutralizing antibodies with seroconversion rates depending on vector dose. Titers of neutralizing antibodies tested against MW965 PV were variable; several mice had titers above 1:1000. Highest median titers (1:860) were achieved by group 3. To assess induction of binding antibodies, sera collected at baseline and after each immunization were tested by ELISA on a baculovirus-derived Du172 gp140 (clade C Du 422) protein as described by Bauer et al. (Bauer et al., 2005 Sep;43(9):4426-33). Trends were similar to those obtained by neutralization assays (Fig. 2A). A prime-boost regimen with the protein resulted in low antibody responses after AdC vector boost. Prime-boosting with the two serologically distinct AdC vectors resulted in slightly higher responses and there was no difference between the groups receiving either of the two vector doses. Highest titers were achieved by priming with the AdC7-gp140 vector followed by protein boosts. In this regimen increasing the dose of AdC vector augmented antibody responses. Unexpectedly, maximal titers were achieved after a single protein boost. Ad vector prime followed by the

protein boost or a boost with another Ad vector also induced antibodies to the V2 loop especially at the higher vector dose (Fig. 2B). Overall these results showed that a combination of AdC vector priming followed by protein boosts results in solid neutralization of several tier 1 viruses as well as binding antibody responses to HIV-1.

5

Example 4: Preclinical Immunogenicity/Efficacy Studies Testing in Nonhuman Primates

AdC7, AdC6 as well as AdC68 and AdC1/C5 vectors expressing sequences from HIV-1 or SIV were tested to assess immunogenicity (Tatsis et al., J Immunol. 2009;182:6587-99) or efficacy against SIV_{mac} challenges in nonhuman primates, (Cervasi et al., J Virol. 2013 Jun 26; Lasaro et al., Mol Ther. 2011;19:417-26). Vectors were immunogenic even in animals with pre-existing immunity to human serotype adenoviruses. In the most crucial rhesus macaque (RM) efficacy trial, animals were vaccinated with an AdC7/AdC6 prime-boost regimen using vectors expressing Gag mixed with vectors expressing gp160 of SIV_{mac239}. Protection from SIV_{mac251} acquisition or disease progression was measured.

The materials and methods employed in the experiments in the study disclosed herein are now described.

20 *Material and Methods*

Vaccine Vectors

Ad vectors were derived from the chimpanzee serotypes 6 (AdC6) or 7 (AdC7) and human serotypes 5 (AdHu5) and 26 (AdHu26). The E1- and E3-deleted Ad vectors expressed Gag or gp160 of SIV_{mac239} (AdHu5gag/gp160, AdHu26gag/gp160, AdC6gag/AdC6gp160 and AdC7gag/AdC7gp160) or the glycoprotein of rabies virus (rab.gp). Vectors were generated, rescued and expanded on HEK 293 cells obtained from the American Type Culture Collection; they were purified, titrated and quality controlled (Zhou et al., Nat Protoc. 5,1775-85 (2010)). Expression of Gag or gp160 from recombinant viruses was confirmed by Western blot analyses of lysates of infected cells.

30 *Non-Human Primates (NHPs)*

Two to three year-old, healthy and SIV-uninfected Indian origin *Macaca mulatta* were purchased and housed at Bioqual, Inc. (Rockville, MD). Animals were typed for Mamu-A*01, A*02, A*08, A*11, B*01, B*03, B*04, B*08 and B*17 alleles (UW AIDS

Vaccine Research Lab, Madison, WI). All procedures involving handling and sacrifice of animals were performed according to approved protocols and upon approval by the relevant Institutional Animal Care and Usage Committees.

Analyses of Ad-Specific Antibodies

5 All NHPs were screened prior to enrollment for nAbs to AdC6 and AdC7 vectors (Patel *et al.*, Proc Natl Acad Sci U S A 110, 2975-2980 (2013)) and were found to be seronegative. Some animals were tested for binding Abs to the Ad vectors by ELISA (Patel V, *et al.* Proc Natl Acad Sci U S A 110, 2975-2980 (2013)). Titers were calculated by determining the area under the curve (AUC) obtained by adsorbance at different dilutions
10 after subtraction of pre-bleed results. Negative values were ignored.

Immunization Regimen

Thirty-six RMs were enrolled. All animals were injected twice in ~ a monthly interval intra-tracheally with 1×10^{11} vp of an AdHu5rab.gp and AdHu26rab.gp vectors. Animals were bled 2 weeks after the last immunization to determine nAb titers to the AdHu
15 viruses. Animals were then distributed according to genotypes and nAbs to the AdHu viruses into 3 groups of 12 animals each. Twelve animals were primed intramuscularly with 5×10^{10} vp of AdC7gag mixed with 5×10^{10} vp of AdC7gp160; they were boosted 6 months later with the same dose of AdC7 vectors expressing the same insert. Another 12 animals were primed with AdHu26 vectors and boosted 6 months later with AdHu5 vectors
20 expressing the same inserts and used at the same doses. The remaining 12 animals were not immunized.

Viral Challenge

Six months after the boost, experimental and control RMs were challenged rectally 10 times in weekly intervals with 1 infectious dose of SIV_{mac251} (most kindly
25 provided by Nancy Miller, DAIDS, Bethesda, MD).

Plasma Viral Load

Plasma SIV viral load was determined by quantitative real-time RT-PCR as previously described (Lewis *et al.*, Retrovirology 7, 21 (2010)). Peak viral loads reflect the
30 highest viral load obtained within an animal. Set-point viral loads reflect viral loads over time by calculating AUC with a Y = 40 as baseline.

Virus Integration

Genomic DNA was extracted from 10^6 peripheral blood mononuclear cells (PBMCs) using DNeasy Blood and Tissue Kit (Qiagen). Ten nanograms of DNA were

amplified by PCR using a mix of forward primers for simian and human Alu sequences, and reverse primers for SIVgag. The following primers were used for the first PCR: simian Alu, 5'-TTCGCGGTGGCTCACGCCTG-3' (SEQ ID NO: 17) ; human Alu, 5'-

TAGTCGGGAGGCTGAGGCAGGAGAA-3' (SEQ ID NO: 18); SIVgagR1, 5'-

5 TCTCTTCTGCGTGAATGCACC-3' (SEQ ID NO: 19); SIVgagR2, 5'-

AAGGCTTTTAAATTTTCTGAGCCTG-3' (SEQ ID NO: 20). The PCR conditions were as

follow: 94°C for 1 min, 20 cycles of 94°C for 30 s, 57°C for 30 s, and 72°C for 30 s, with final elongation at 72°C for 1min. GapDH was used as a sample normalizer in the same

conditions, with primer sequences 5'-TGCCACCCAGAAGACTGTGG-3' (SEQ ID NO: 21)

10 and 5'-ACCAGGAAATGAGCTTGACAAAG-3' (SEQ ID NO: 22). Two microliters of the

amplicon were digested with 10 units of RecJf for 30 minutes at 37°C, followed by enzyme inactivation at 65°C for 20 minutes. The digestion product was used as template for a nested

real-time PCR (50°C for 20s, 95°C for 10 min, and 35 cycles of 95°C for 15 s and 60°C for 1 min). The real-time PCR was performed utilizing the previously described mix of reverse

15 SIVgag primers, and a forward primer specific for the LTR region of SIV: 5'-

AGGAAGAGGCCTCCGGTTG-3' (SEQ ID NO: 23). All real-time PCR samples were

quantified by normalization in comparison to GAPDH sequences using the forward and

reverse primers, respectively: 5'-TCCGGGAAACTGTGGCGTG-3' (SEQ ID NO: 24); 5'-

TCCCGTTTCAGCTCAGGGATG-3' (SEQ ID NO: 25).

20 *CD8⁺ Cell Depletion*

RM's were injected with antibody depleting anti-CD8alpha (cM-T807R1, NIH Reagent Source, NIH) first subcutaneously at 10mg/kg, then intravenously at 5mg/kg on days 0, 3, 7 and 10.

ELISA for Env-specific Abs

25 Sera of individual RM's were tested for gp160-specific antibodies by an ELISA on plates coated with a baculovirus-derived gp160 protein (Lewis *et al.*, Retrovirology 7, 21 (2010)). Antibodies to the V2 loop were measured by a peptide ELISA. Briefly, 10mM of V2 peptide was used to coat wells of Nunc 96-well plates (Thermo Fisher Scientific, Rochester, NY) by incubating 50 µl of the peptide dilution at 85 nmol/l in 0.02 mol/l NaCl at 4 °C overnight.

30 Plates were blocked for 2 hours at room temperature with PBS containing 3% bovine serum albumin. After washing, they were incubated for 1 hour with serial dilutions of sera in PBS + 3% bovine serum albumin followed by incubation with 1:30,00 dilution of alkaline phosphatase- conjugated goat anti-mouse IgG (Sigma) for 1 hour at room temperature. After being washed, plates were incubated for 20 minutes with substrate and then read in an

automated ELISA reader at 405 nm. Titers were calculated by determining the AUC obtained by adsorbance at different dilutions after subtraction of pre-bleed results. Negative values were ignored.

Isolation and Preservation of Lymphocytes

- 5 PBMCs were isolated (Tatsis *et al.*, J Immunol. 182, 6587–6599 (2009)) and tested immediately after isolation or frozen in 90% FBS and 10% dimethyl sulfoxide (Sigma, St. Louis, MO) at -80°C until testing.

Synthetic Peptides

- 10 Peptide pools of 15-mers (overlapping by 11 amino acids) spanning the SIV_{mac239} Gag and Env proteins were reconstituted in DMSO and pools were prepared from individual peptide stocks obtained from the National Institutes of Health AIDS Research and Reference Reagent Program.

Intracellular Cytokine Staining (ICS)

- 15 The function of SIV-specific CD8⁺ T cells was assessed by ICS after stimulation with SIV Gag or Env peptide pools. All peptides were used at a final concentration of 2µg of each peptide per ml. When used, frozen cells were thawed and immediately washed with RPMI media, resuspended with RPMI media, rested overnight and then stimulated for 6 hrs with Brefeldin A and Monensin along with CD107a FITC (H4A3). First, cells were stained with anti-CCR7-PE-Cy7 (clone 3D12) at 37°C. Cells were stained
- 20 with Aqua-fluorescent reactive dye, anti-CD14-QDot 655 (clone TuK4), anti-CD20-QDot 655 (clone 3G8), anti-CD8-QDot 705 (clone 3B5)(Invitrogen, Carlsbad, CA), anti-CD4-APC-Cy7 (clone OKT4) (Biolegend), anti-CD95-PE-Cy5 (clone DX2), and anti-CD28-Texas Red (clone CD28.2, Beckman Coulter, Fullerton, CA) for 30 min at RT. After fixation and permeabilization with Cytofix/Cytoperm (BD Biosciences, San Jose, CA) for 20 min at RT,
- 25 cells were stained with anti-IFN-γ-APC (clone B27), anti-IL-2-PE (clone MQ1-17H12), anti-TNF-α-Alexa 700 (clone MAb11, R&D System) and anti-CD3-Pacific Blue (clone SP34-2) for 1 hr at room temperature. Cells were washed once, fixed with 1% PFA, and then analyzed by FACS using LSRII (BD Biosciences, San Jose, CA) and DiVa software. Flow cytometric acquisition and analysis of samples was performed on at least 400,000 events. Post-
- 30 acquisition analyses were performed with FlowJo (TreeStar, Ashland, OR). Data shown on graphs represent values of Gag or Env peptide-stimulated wells from which background values were subtracted. Polyfunctionality graphs were generated using SPICE v5.1 software (NIH, Bethesda MD). Single color controls used CompBeads. Anti-Mouse Igk (BD

Biosciences, San Jose, CA) were used for compensation. Unless otherwise noted, antibodies were purchased from BD (BD Biosciences, San Jose, CA).

Statistical Analysis

Differences in SIV acquisition and decline of viral loads were determined by Mantel-Cox test. Normality of data was determined by D'Agostino & Pearson omnibus normality test. Data that failed the normality test were analyzed by non-parametric tests, such as Wilcoxon-Mann-Whitney test for two groups comparison or Kruskal-Wallis test with Dunn correction for multiple comparisons. In detail, differences in viral loads and set point viral loads were determined by Kruskal-Wallis test with Dunn correction. Differences in integration and the relationship of integration with various other parameters were tested by 2-way Anova or multiple t-tests both with Holm-Sidak correction. Differences in Ab titers and T cell responses between the groups at various time points were determined by Wilcoxon-Mann-Whitney test. Differences in T cell functions between before and after challenge were analyzed by SPICE software by Wilcoxon sign rank tests. Correlations were determined using Spearman correlation with Bonferroni correction of p-values. For correlations adjusted p-values are shown within the text, figures show unadjusted p – values. Analyses were conducted using GraphPad Prism 6, SAS 9.2, and SPICE v5.1.

The results of the experiments are now described in the following examples.

SIV acquisition, viral loads, and levels of SIV integration in the different vaccine groups.

Protection from SIV_{mac251} acquisition or virus replication was tested in Rhesus Macaques (RMs) immunized with Ad vectors expressing Gag and gp160 of SIV_{mac239}. First to more closely mimic the immune status of humans, AdHu26 and AdHu5 vectors expressing an irrelevant transgene was intra-tracheally administered to 36 healthy Indian-origin RMs. Although this procedure does not fully recapitulate the repeated infections with different Ad serotypes that humans experience during their lifetime it achieves induction of serotype-specific neutralizing (n)Abs as well as non-neutralizing Abs. Most RMs developed moderate nAb titers to AdHu5 and markedly higher titers to AdHu26 (Fig. 3). Non-neutralizing Ad-specific Abs tested in some animals after AdHu administration cross-reacted with SAd-V24, from hereinafter referred to as AdC7 and SAd-V23, from hereinafter referred to as AdC6 (Fig. 9). Animals were distributed with high or low nAb responses to AdHu5 and AdHu26 equally into three groups of twelve RMs each. Each group had eight Mamu-A*01⁺ RMs and groups 1 and 3 each had one Mamu-B*17⁺ animal (Fig. 3). Animals of group 1 were

vaccinated four weeks after the last AdHu pre-exposure with 5×10^{10} vp of AdC7 expressing Gag (AdC7gag) mixed with 5×10^{10} vp of AdC7 expressing gp160 (AdC7gp160). RMs of group 2 were vaccinated with the same doses of AdHu26 vectors expressing the same inserts. RMs of group 3 were not vaccinated and served as controls. Six months after the first vaccine dose RMs of groups 1 and 2 were boosted with AdC6 and AdHu5 vectors, respectively, expressing the same inserts and used at the same doses as for priming. Starting six months after the boost, RMs were challenged rectally in weekly intervals for up to ten times with a low infectious dose (1 mean tissue infective dose) of SIV_{mac251} (kindly provided by N. Miller, NIAID). RMs that developed viral loads above 1,000 RNA copies per ml of plasma received no further challenges.

All of the Mamu-A*01⁺/B17⁻ control RMs became infected within two challenges (Fig. 4A). Virus acquisition was slightly delayed in AdHu-vaccinated RMs, which on average became infected by the fourth challenge; this level of protection was not statistically significant when compared to control animals. In contrast, the AdC-vaccinated Mamu-A*01⁺/B17⁻ RMs showed significant protection against SIV_{mac251} acquisition when compared to control animals ($p = 0.0295$ by Mantel-Cox test). Measurement of virus replication also showed significantly lower set-point viral loads (adjusted [adj.] $p = 0.0209$ by Kruskal-Wallis test with Dunn correction) and peak viral loads (adj. $p = 0.0209$) in Mamu-A*01⁺/B*17⁻ RMs of the AdC but not the AdHu vaccine group as compared to controls (Fig. 4B). Mamu-A*01⁺/B*17⁺ as compared to MamuA*01⁺/B17⁻ control RMs showed insignificant ($p = 0.086$) increases in resistance to infection with median SIV acquisition after four challenges. On average, AdC-and AdHu-vaccinated Mamu-A*01⁺/B*17⁺ animals became infected after the third or fifth challenges respectively, which was not significantly different from acquisition rates of control RMs. Both Mamu-A*01⁺/B*17⁺ vaccine groups developed lower peak viral loads (AdC: $p = 0.0053$, AdHu: $p = 0.0007$) and set-point viral loads (AdC: adj $p = 0.0019$, AdHu: adj $p = 0.0003$) compared to controls. Interestingly all RMs with break-through infections in either of the two vaccine groups regardless of their Mamu genotype controlled viral loads to levels below 1000 copies per ml within a few weeks after the initial SIV acquisition and by 18 weeks after the first challenge all but 2 of the vaccinated RMs (one in each vaccine group) had viral loads below the level of detection. Six of the 12 control animals also showed loss of detectable viral loads although, unlike in the vaccine groups, this was only seen in unvaccinated RMs with controller genotypes. Differences in decline of viral loads were significant comparing controls to AdC ($p = 0.0277$) or AdHu ($p = 0.0213$) vaccinated RMs. Pre-existing nAb titers to AdHu5 or AdHu26 did not

affect peak viral loads, set-point viral loads, number of challenges until infection or time until viral control in either vaccine group.

Relative amounts of integrated SIV were tested at two and twelve weeks after infection in a subset of RMs ($n = 7$ [AdC], $= 11$ [AdHu], $= 4$ ([Co]) (Fig. 4C). The one tested animal that did not show detectable viral load at any time after the ten challenges was found to be negative for integrated SIV genome. Detectable levels of integrated SIV genome were found by two weeks after infection in isolated $CD4^+$ of all RMs with at least one time-point of detectable viremia, with a tendency to increase when tested again at 12 weeks after infection. This increase reached significance for the AdHu group ($p = 0.015$). Of note, at week 12 after infection the relative amounts of integrated SIV in $CD4^+$ T cells were significantly lower in AdC-vaccinated than in control RMs ($p = 0.016$). In the AdHu group of SIV-infected RMs, the animals that maintained relatively stable levels of integrated SIV (i.e., change below 10 fold) became infected at a later time point as compared to those that showed pronounced increases (>100 fold) during this period ($p = 0.03$). Levels of virus integration or their changes over time were not affected by peak viral loads, time to control, Mamu genotype, pre-existing antibody titers to the AdHu vectors or antibody titers to Env.

Antibody responses upon vaccination and challenge

To identify correlates of immunological protection conferred by the used vaccine vectors, vaccine-induced SIV-specific immune responses were retrospectively assessed before and after challenges. In all of the vaccinated RMs Env-specific Ab responses were low after priming, increased after the boost and then contracted by the time of challenges (Figs. 5A-5B). After challenges, vaccinated RMs that did not develop detectable viral loads failed to show increases in Env-specific Ab titers, suggesting true sterilizing immunity. All other vaccinated RMs showed pronounced increases in Ab titers after challenges (Figs. 5A-5B). In the Mamu-A*01⁻/B*17⁻ groups, AdHu-vaccinated RMs developed significantly higher titers of SIV Env-specific Abs compared to AdC-vaccinated animals ($p = 0.0003$ by Mann-Whitney) following infection. This most likely reflects the fact that AdC-vaccinated animals of this subcohort failed to acquire the virus or very rapidly controlled viral loads and thereby lacked sufficiently high levels of antigen to optimally increase Env-specific Ab titers. For the same reason Mamu-A*01⁺/B*17⁺ AdC-vaccinated RMs developed higher Ab titers compared to Mamu-A*01⁻/B*17⁻ RMs ($p = 0.0006$) after challenges. In AdC- but not AdHu-vaccinated RMs (analyzing all animals together regardless of the Mamu genotype), Ab titers after the boost directly correlated with numbers of challenges required to achieve infection ($r = 0.807$, adj. $p = 0.0278$ by Spearman correlation,

Figs. 6A-6B). In the AdHu5 group, correlations were only seen for Ab titers after challenges and set-point viral loads ($r = 0.720$, adj. $p = 0.0425$) and peak viral loads ($r = 0.708$, adj. $p = 0.0494$, Figs. 10A-10D). Control RMs developed robust Ab titers after challenges (Fig. 7C), which were higher than in vaccinated animals with breakthrough infections (AdC: adj. $p = 0.003$, AdHu: adj. $p = 0.0068$). Pre-existing Ab titers to either AdHu5 or AdHu26 had no significant effect on Ab responses in the two vaccine groups. Finally binding Abs directed against the V1/V2 loop, which have been linked to protection in humans and RMs (Zolla-Pazner *et al.*, PLoS One. 8, e53629 (2013); Barouch *et al.*, Nature. 482, 89-93 (2012)), were not detected until after challenges. There were no associations between antibody titers at any of the tested time points and levels of SIV integration.

T cell responses upon vaccination and challenge

Total T cell responses to Gag were measured by intracellular cytokine staining and multicolor flow cytometry in AdC- and AdHu-vaccinated (Figs. 7A-7L) and control RMs (Fig. 11) as the fraction of $CD4^+$ or $CD8^+$ T cells showing at least one functional responses (i.e., production of $IFN\gamma$, IL-2, or TNF, or surface expression of the degranulation marker CD107). Both vaccine regimens induced total Gag-specific T cells responses of comparable magnitude. The only significant difference in T cell responses between animals with or without controller genotypes was seen in the AdC group (Fig. 7A), where the better protected Mamu-A*01/B*17 RMs had significantly higher total Gag-specific $CD8^+$ cell responses ($p = 0.042$ by Wilcoxon-Mann-Whitney test) at the time of first challenge. In the AdC but not the AdHu vaccine group Gag-specific effector memory ($CD8_{EM}$) (Figs. 12A-12F) and central memory ($CD8_{CM}$) (Figs. 12B-12E) $CD8^+$ T cell responses at 4 weeks after the boost correlated with peak viral loads ($CD8_{CM}$: $r = 0.729$, adj. $p = 0.036$, $CD8_{EM}$: $r = 0.746$, adj. $p = 0.0359$); $CD8_{EM}$ responses measured shortly after the boost also correlated with set-point viral loads ($r = 0.725$, adj. $p = 0.0392$) (Figs. 12C-12E). In the AdHu vaccine group correlations for $CD8^+$ T cells were only seen in Mamu-A*01/B*17 RMs; frequencies of total Gag-specific $CD8^+$ and $CD8_{EM}$ cells at the day of challenges showed inverse correlations with time to viral controls (for both $r = -0.9487$, adj. $p < 0.0001$). In the same group unlike in AdC-vaccinated RMs total Gag-specific $CD4^+$ T cells (Fig. 13A and Fig. 13C) and $CD4_{EM}$ cells (Fig. 13B and Fig. 13D) after challenges inversely correlated with peak viral loads (total $CD4$ $r = -0.845$, adj. $p = 0.011$, $CD8_{EM}$: $r = -0.82$, adj. $p = 0.0064$). In the AdHu5 group RMs with lower levels of SIV integration by 2 weeks after infection ($<50,000$) had higher frequencies of Gag-specific $CD8_{EM}$ T cells responses before challenge than those with higher levels of integration ($p = 0.016$), while in the same group animals with

low levels of integrated virus by week twelve after infection ($<10^6$) had higher frequencies of Gag-specific CD8_{CM} ($p = 0.003$) and CD8_{EM} T cells ($p = 0.037$) before challenge (Fig. 14). Env-specific T cell responses, including those of subsets were low and comparable between the vaccine groups and between Mamu-A*01⁺/B17⁺ and Mamu-A*01⁻/B17⁻ RMs (Figs. 15A-15L).

Gag-specific CD8⁺ T cells were also specifically analyzed for each individual function, i.e., production of IL-2, IFN- γ , TNF- α and degranulation of CD107 in response to SIV-Gag peptides. Functionality of virus-specific CD8⁺ T cells between the vaccine groups and within the vaccine groups between Mamu-A*01⁺/B17⁺ and Mamu-A*01⁻/B*17⁻ RMs were largely comparable at the different time points tested (Fig. 16). After priming, CD8⁺ T cell responses were dominated by cells producing IL-2, and after. The boost responses became more polyfunctional with this trend becoming even more pronounced after challenges. Differences between the two vaccine groups were seen shortly before challenges when animals of the AdHu vaccine groups had higher frequencies of CD8⁺ T cells that exhibited all 4 functions ($p = 0.016$ by Wilcoxon Rank test) or produced TNF- α only ($p = 0.026$). After priming CD4⁺ T cell responses of AdC- and AdHu-vaccinated RMs were dominated by cells producing IL-2 only (Fig. 17). After the boost, responses again became more polyfunctional and IFN- γ only producing CD4⁺ T cells became dominant in the AdHu group. Differences between AdC-vaccinated animals with or without controller genotypes were seen just prior to the first challenge when Mamu-A*01⁻/B17⁻ RMs had higher frequencies of Gag-specific CD4⁺ T cells positive for IL-2, CD107a and TNF- α ($p = 0.021$), IL-2 and TNF- α ($p = 0.021$) or TNF- α only ($p = 0.021$). Responses of AdHu-vaccinated animals were not significantly affected by controller genotypes. Pre-existing nAbs to AdHu5 vectors did not affect the magnitude or functions of Gag-specific CD8⁺ or CD4⁺ T cell responses in either vaccine group. An analysis of Gag-specific T cell subsets just prior to challenges revealed in general comparable functions between the vaccine groups or between Mamu-A*01⁻/B*17⁻ and Mamu-A*01⁺/B*17⁺ RMs in either vaccine group (Fig. 18). Differences were seen mainly for CD4_{CM} of AdC-vaccinated RMs; those that were Mamu-A*01⁻/B*17⁻ showed higher frequencies of cells positive for IL-2, CD107a, and TNF- α ($p = 0.013$), IL-2 and TNF- α ($p = 0.013$), IFN- γ and TNF- α ($p = 0.013$), and TNF- α only ($p = 0.013$).

Functional *in vivo* assessment of CD8⁺ T cell responses through CD8⁺ lymphocyte depletion.

The antiviral role of CD8⁺ T cells in the context of SIV infection of RMs has been directly demonstrated in many studies that used *in vivo* depletion of these cells with

CD8 directed antibodies as pioneered in the publication by Schmitz *et al.*, 1999 (Schmitz *et al.*, Science 283, 857-60 (1999)). In the current invention, the role of CD8⁺ T cells in protecting from SIV disease progression was directly assessed by performing CD8⁺ lymphocyte depletion in five AdC- and four AdHu-vaccinated RMs at 28 weeks after

5 completion of challenges. All animals, except one RM of the AdHu vaccine group, which had remained virus-free after 10 challenges, developed detectable viral loads following CD8⁺ cell depletion (Fig. 8), thus confirming that control of virus replication was mediated by CD8⁺ lymphocytes. Once the depleting treatment was stopped and the observed number of CD8⁺ lymphocytes returned to the baseline (pre-depletion levels) viral loads rapidly declined in all
10 but one of the AdC-vaccinated RMs. This animal, which did not develop viral loads above 1,000 RNA copies/ml until five weeks after the tenth challenge but was viremic at the time of CD8⁺ cell depletion, did not show major increases in viral loads after CD8 depletion, perhaps suggesting CD8⁺ T cells had become unable to control SIV replication as a result of the presence and outgrowth of escape mutants.

15 Overall, testing in mice and nonhuman primates showed that a prime-boost regimen using two serologically distinct AdC vectors markedly increases T and B cell responses to the transgene product (McCoy *et al.*, J Virol. 2007;81:6594-604; Santra *et al.*, Vaccine. 2009;27:5837-45; Tatsis *et al.*, Virology. 2007;367:156-67; Zhou *et al.*, Mol Ther. 2010;18:2182-9; Tatsis *et al.*, J Immunol. 2009;182:6587-99; Lasaro *et al.*, Mol Ther.
20 2011;19:417-26).

Example 5: Other Studies

Mice Studies

No side effects were noted in mice at intramuscular doses as high as 5×10^{11} vp
25 using AdC6 and AdC7 vectors with a variety of different inserts including HIV-1 gag. The highest vaccine dose tested in nonhuman primates (NHPs) for AdC6 and AdC7 vectors expressing a truncated version of HIV-1 gag or the rabies virus glycoprotein was 10^{12} vps. These animals also showed no overt symptoms after immunization in an experiment in which animals were primed with AdC7 vectors, boosted 8 months later with AdC6 vectors and then
30 4 months after that with AdHu5 vectors to assess immune responses.

Nonhuman Primate Studies

To assess vector immunogenicity and efficacy a number of nonhuman primate studies were conducted with AdC6 and AdC7 expressing a variety of inserts including, but not limited to, SIVgag, SIVenv, HIV-1env and the rabies virus glycoprotein. Although the primary endpoint of these studies was not to assess vector toxicity, all immunized animals were routinely checked for their health status. Nonhuman primate studies were conducted at three facilities (i.e. at the University of Pennsylvania, at BIOQUAL Inc. (Rockville, Maryland), and at the Yerkes National Primate Research Center (Atlanta, Georgia)). NHP samples (i.e., blood and sera) were screened for Complete Blood Count with differential/absolute numbers (white blood cell counts, red blood cell counts, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin concentration, polymorphonuclear leukocytes, metamyelocytes, lymphocytes, monocytes, eosinophils, basophiles, and platelets) and blood chemistries (calcium, phosphorus, chloride, lactate dehydrogenase, aspartate aminotransferase, total bilirubin, gamma-glutamyl transferase, alanine aminotransferase, alkaline phosphatase, total protein, total globulin, albumin, blood urea nitrogen, creatinin, glucose, creatine kinase, and aldolase). The NHP samples did not show any abnormalities except for some small increases in liver enzymes that were sometimes observed and thought to be a reflection of anesthesia-related stress.

Example 6: Ongoing Studies

In one embodiment, the AdC6-HIVgp140 and AdC7-HIVgp140 vectors of this invention are combined with additional vaccines to enhance and broaden HIV-1-specific T and B cell responses.

Addition of an AdC6-HIVgp140 vector boost:

To optimize B cell responses AdC7-HIVgp140 primed individuals are boosted 6 or more months later with AdC6-HIVgp140 used at the same dose as the priming vector.

Addition of a Protein Boost:

As an alternative or in addition, subjects from the Phase 1 study receive a protein boost 12 or more months after vaccination with a single AdC Env vector vaccine or 12 or more months after the AdC6-HIVgp140 boost of AdC7-HIVgp140 primed individuals as described above herein. A potential protein vaccine candidate is a gp145 protein derived from an early clade C isolate from Tanzania produced in CHO cells that is under development by the National Institute of Allergy and Infectious Diseases (NIAID).

AdC6-HIVgag and AdC7-HIVgag:

In some aspects of this invention, the inclusion of AdC vectors expressing additional HIV antigens broaden and enhance T cell responses. AdC vectors that express gag of a clade B HIV-1 strain (AdC6-HIVgag and AdC7-HIVgag) were developed. Following the completion of the initial Phase 1 trial, additional studies with the AdC6 and AdC7 vectors containing the gag insert are pursued and followed by a study in which subjects receive all four AdC vectors.

Example 7: Vaccines design, construction and characterization : AdC6 and AdC7**Vectors**

The vaccines of the present invention were based on recombinant viruses derived from clones of two chimpanzee adenoviruses, AdC6 and AdC7 also referred to as SAdV-23 and SAdV-24. The parent viruses were obtained from ATCC (AdC6 – ATCC-VR-592, AdC7 – ATCC-VR-593). The Ad genome contains five segments that encode early gene products, i.e., E1-E5, and five segments that encode five late gene products, i.e., L1-L5. The E1, E2 and E4 gene products regulate the transcription and translation of the later genes and are necessary for viral replication. The E3 gene products subvert immune responses by altering antigen presentation and cytokine and apoptosis pathways but are unnecessary for viral replication. Deletion of the E3 in addition to the E1 domain increases the permitted size of the inserted expression cassette to ~7.5 kilobases (Kb).

To generate the E1-deleted AdC6 molecular clone, the 5' right inverted terminal repeat (ITR) was amplified by Polymerase Chain Reaction (PCR) and cloned into the pNEB193 vector. Using restriction enzyme sites that are unique in assembly but not necessarily unique to the full AdC6 genome, the right half of the AdC6 genome was then cloned piecemeal into the pNEB193 vector. The left ITR was amplified by PCR and cloned into a different pNEB193 vector. Using the same strategy as above, the remainder of the left fragment of the AdC6 genome was assembled into the pNEB193 vector. Approximately 2.6 Kb of the E1 region between *Sna*BI and *Nde*I sites were omitted and replaced with a linker that contains the rare enzyme sites of I-*Ceu*I and PI-*Sce*I. These steps remove the entire E1a and E1b 19-kDa homolog-coding regions and 74% of the E1b 55-kDa homolog-coding region. Finally, using two suitable enzymes, the E1-deleted left fragment of AdC6 was released from the pNEB193 vector and inserted into the vector containing the right fragment of the genome, effectively generating the E1-deleted infectious molecular clone of AdC6.

To delete the E3 domain, a fragment was cut from the E1-deleted AdC6 molecular clone by digestion with SbfI. The ends of this SbfI fragment were joined by ligation and the ~4 Kb E3 region was removed from this SbfI fragment using suitable restriction enzymes, i.e., Eco47III and SmaI. The resulting E3-deleted SbfI fragment was then swapped into the E1-deleted molecular clone to replace the original SbfI fragment and generate an E1/E3-deleted AdC6 molecular clone. For AdC6-HIVgp140 viral molecular clone, which also contains a partial E3 deletion, ORF3, ORF4, ORF5, ORF6 and ORF7 of E3 were removed using similar strategy as described.

To create an E1- and E3-deleted viral molecular clone of AdC7, a similar cloning strategy was adopted. The E1-deleted AdC7 clone was generated first in the pBR322 plasmid to harbor most of AdC7 genome and both ITRs, except the E1 region. Approximately 2.6 Kb between the sites of SnaBI and NdeI were deleted to remove E1 (nucleotide number 455 to 3028). Two sites for endonucleases I-CeuI and PI-SceI were incorporated within the deleted E1 domain to facilitate insertion of the transgene cassette. In the partially E3-deleted viral molecular clone a fragment from nucleotide number 27775 to 31298 was excised removing ORF3, ORF4, ORF5, ORF6 and ORF7 of E3.

Table 1 below illustrates the nucleotide number of the deleted portion of E1 and E3 domain (based on Genbank Accession numbers AY530877 and AY530878 that are sequences for wildtype AdC6 and AdC7 respectively) in the recombinant AdC vector described in this invention.

Table 1. Nucleotide Numbers of the Deleted Portion of E1 and E3 Domain in the rAdC Vectors

Vector Name	Nucleotide Number of E1 Deleted Region*	Nucleotide Number of E3 Deleted Region*
AdC6-HIVgp140	455 – 3022 bp	27835 – 31052 bp
AdC7-HIVgp140	455 – 3028 bp	27775 – 31298 bp

* Nucleotide numbers are based on Genbank accession numbers that are AY530877 for AdC6 (wildtype) and AY530878 for AdC7 (wildtype) type

Example 8: Vaccines design, construction and characterization : recombinant AdC6 and AdC7 vectors

Maps of AdC6 and AdC7 vectors expressing Env are shown in Figs. 19A-19B. Maps of pShuttle plasmids containing gp140 (DU172 and DU422) are shown in Fig. 19C. During the manufacturing process, restriction mapping analysis or a PCR-based identification assay is performed on Master Viral Bank and Vaccine Bulk Substance to assess the integrity of the viral genome.

The nucleotide and amino acid sequences of the AdC vectors of the present invention (AdC6 and AdC7) expressing gp140, Gag or gp160 are provided herein Figs. 20-27 (SEQ ID NOs: 1-16).

Example 9: Manufacturing Process

Master Viral Bank (MVB)

The plasmids containing the sequence of the AdC vector with the HIV gene inserts were linearized by restriction enzyme digestion and then transfected into SAFC Pharma's AC-2 cell line that is a HEK-293 based cell line (SAFC[®] Pharma, MilliporeSigma - Carlsbad, California). After the transfections, recombinant viral clones were selected by three rounds of plaque purification. Six to twelve clones from each transfection were produced and an aliquoted. Six clones from each transfection with the highest infectious titers were amplified and tested for production yield (in virus particle and infectious particle), immunogenicity in mice, and genetic integrity (by restriction mapping analysis). Following a selection of one final clone for each construct, each final vector clone was expanded to generate a primary seed stock that was tested (for bioburden, endotoxin, mycoplasma and infectious titer) prior to use in subsequent processes. The primary viral seed stocks were characterized for production parameters (multiplicity of infection and time to harvest) for use in later development and production activities.

The primary viral seed stocks were used to manufacture Master Viral Banks (MVBs) with AC-2 Working Cell Bank under cGMP conditions (SAFC[®] Pharma). AC-2 cells were grown in adherent form in conditioned medium supplied with fetal bovine serum (purchased from Cell Genesys Inc. for AdC-HIVgp140 vectors) prior to adaptation to suspension in serum-free medium. The MVBs were produced in suspension (without fetal bovine serum) in five liter WAVE[™] scale. Cells were harvested, lysed by freeze thawing, and then clarified by low speed centrifugation followed by filtration. The cleared supernatants from cell lysates were filled into approximately two hundred cryovials for each MVB.

Tests performed on each MVB samples and release specifications are listed in Table 2. In some embodiments, the clinical vaccine products release and stability specification of vp to IU ratio to be used is 600 : 1.

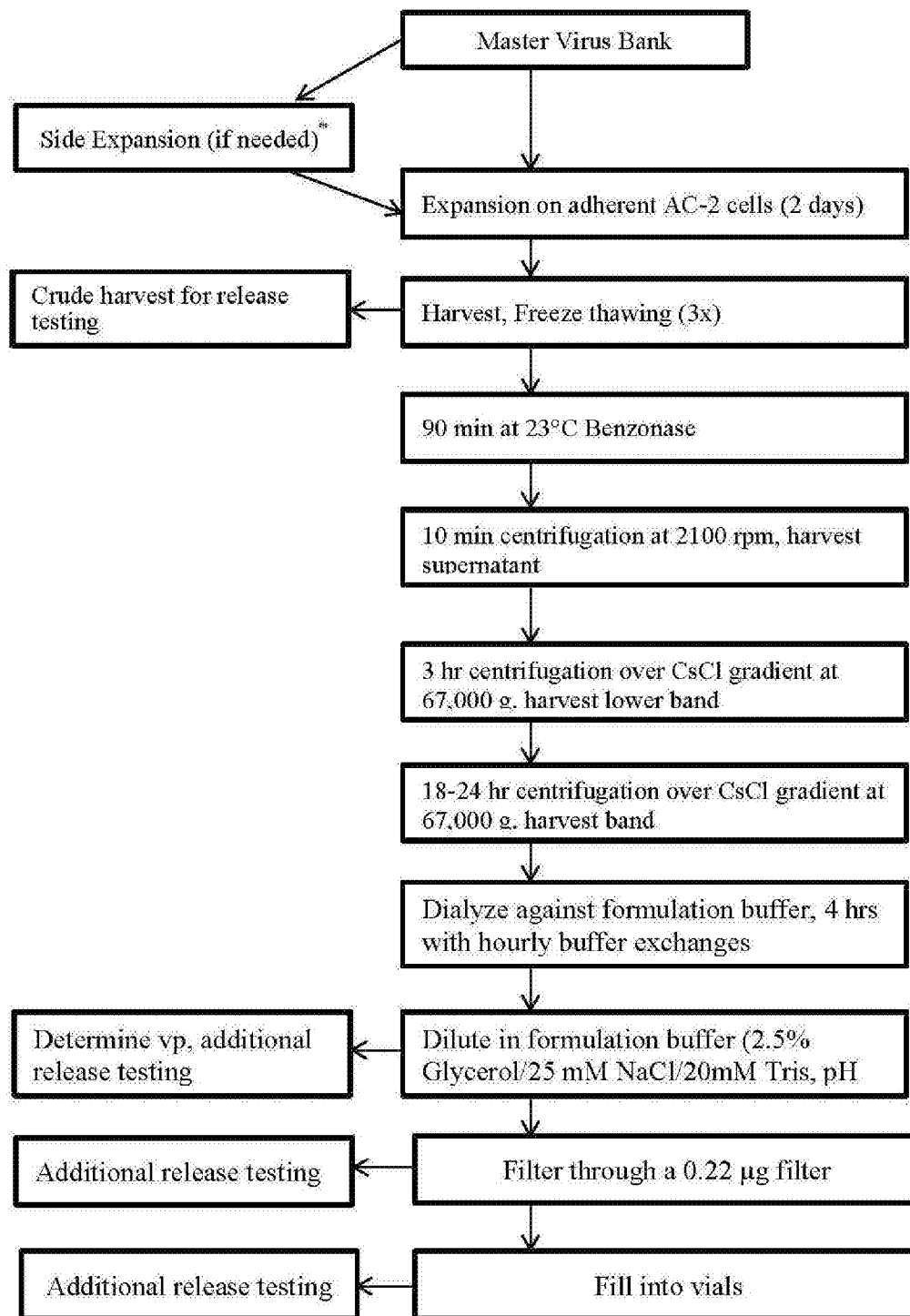
Table 2. Release Tests and Specifications for AdC Recombinant vector MVBs

Test	Method	Release Specification	AdC6-gp140	AdC7-gp140
Sterility	Immersion (Direct inoculation) (USP/21 CFR 610.12)	No bacteria or fungus found	Pass	Pass
Sterility Method Suitability	Immersion (Direct inoculation) (EP/USP)	No interference	Pass	Pass
Mycoplasma	Indirect method and direct cultivation (Points To Consider)	Negative	Pass	Pass
Endotoxin	Kinetic chromogenic Limulus Amebocyte Lysate assay	< 10 EU/mL	Pass	Pass
In Vitro assay for adventitious viral contaminants	Inoculation of 3 cell lines with hemadsorption and hemagglutination endpoints	Negative		Pass
In Vivo assay for adventitious viral contaminants	Inoculation of embryonated hen eggs, adult and newborn mice	Negative		Pass
Detection of Porcine Circovirus DNA	Polymerase chain reaction (PCR)	Negative		Pass
Detection of Adventitious bovine viruses	Cultivation on detector cell lines and fluorescent antibody staining (9 CFR)	Negative		Pass
Detection of Adventitious porcine viruses	Cultivation on detector cell lines and fluorescent antibody staining (9 CFR)	Negative		Pass
Quantitative PCR (qPCR) assay for potency determination	qPCR assay of hexon from cells infected with serial dilutions of AdC vector	Vp to IU ratio = 600 : 1		
Detection of 14 viruses (SV-40, HIV-1, HIV-2, HTLV-I, HTLV-II, hepatitis A virus, CMV, EBV, parvovirus B-19, human herpes viruses-6, -7, -8)	Real Time PCR (Human Panel I)	Negative		Pass
Quantification of Reverse Transcriptase Activity	QFPERT	Negative		Pass
Detection of adeno-associated virus	Real-time PcR	Negative		Pass

MVBs for both recombinant vectors have been completed and are stored at $\leq$

5 -65°C at SAFC Pharma under cGMP conditions.

Manufacturing Flow Chart



* In the event the MVB is not large enough to provide sufficient material at the stipulated dose level required for preclinical and clinical studies, the virus from the MVB will undergo one round of further expansion and virus from this expansion is used for GMP production.

The above manufacturing flow chart depicts the production process for the AdC6 and AdC7 vaccines. Release testing of the AdC6-HIVgp140 and AdC7-HIVgp140 were finalized.

Vaccine Drug Substance

5 Production of the Current Good Manufacturing Practice (cGMP) drug substance AdC vector lots are in process, thus far the bulk lot for AdC7-HIV-gp140 has been produced and conditions for AdC6-HIVgp140 production have been established. Several process development (PD) runs were performed for the two gp140-expressing vector constructs utilizing the vector MVBs and AC-2 Working Cell Bank. The PD runs showed
10 that viral yields were higher when virus was grown on adherent rather than suspension cells. For this reasons AC-2 cells were grown in adherent form in medium supplied with 10% fetal bovine serum, gamma-irradiated and grown in CellSTACK[®] Cell Culture Chambers (8 for AdC7 and 40 for AdC6). Cells were plated for 3 days and then infected with 0.08 moi of virus per 90% of the cell monolayer shows cytopathic effects (CPEs). Cells were lysed by 3
15 rounds of freeze thawing. The lysate were treated for 90 min at 23°C with Benzonase to remove cellular DNA. Debris were then removed by a 10 min low speed (2100 rpm) centrifugation at room temperature. Supernatant is centrifuged at 67,000 g for 3 hrs at 4°C over a CsCl₂ gradient. The viral band were harvested and centrifuged over a CsCl₂ gradient at 67,000 g at 4°C for 18-24 hrs. The band is harvested and dialyzed against formulation
20 buffer for a total of 4 hours with hourly buffer exchanges. An aliquot of the dialyzed material is used to determine (vp) content. The material is diluted to 10¹² vp per ml in formulation buffer (2.5% Glycerol / 25 mM NaCl / 20 mM TRIS, pH 8.0) and then filtered through a 0.22 µm filter. The vaccine bulk filled lot were stored at ≤ -65°C under cGMP conditions. Samples from each bulk lot is tested for release and the release specifications and results are listed
25 below in Tables 3 and 4.

Table 3. Release Tests and Specifications for Bulk Harvest Lots

Test	Method	Release Specification	AdC6-gp140	AdC7-gp140
Mycoplasma	Direct cultivation by PTC/EP/USP	Negative		Pass
Mycoplasmastasis	Indirect method by PTC/EP/USP (Points To Consider)	Negative		Pass
In Vitro assay for adventitious viral contaminants	Inoculation of 3 cell lines with hemadsorption and hemagglutination endpoints	Negative		Pass
In Vivo assay for adventitious viral contaminants	Inoculation of embryonated hen eggs, adult and newborn mice	Negative		Pass
Detection of Porcine Circovirus DNA	Polymerase chain reaction	Negative		Pass
Detection of Adventitious bovine viruses	Cultivation on detector cell lines and fluorescent antibody staining (9 CFR)	Negative		Pass
Detection of Adventitious porcine viruses	Cultivation on detector cell lines and fluorescent antibody staining (9 CFR)	Negative		Pass
Detection of 15 human viruses (SV-40, HIV-1, HIV-2, HTLV I, HTLV II, HAV, HBV, HCV, CMV, EBV, Parvovirus B-19, HHV-6, HHV-7, HHV-8)	Real-time polymerase chain reaction	Negative		
Quantification of reverse transcriptase activity	Ultracentrifugation and quantitative fluorescent product enhanced reverse transcriptase assay (QFPERT)	Negative		Pass
Quantitative PCR (qPCR) assay for potency determination	qPCR assay of hexon from cells infected with serial dilutions of AdC vector	Vp to IU ratio = 600 : 1		
Detection of residual host cell DNA	Polymerase chain reaction assay	≤ 10 ng/dose		
Detection of AAV	qPCR	< 0.2 ng/mL		Pass

Table 4. Release Tests and Specifications for Drug Substance Bulk Lots

Test	Method	Release Specification	AdC6-gp140	AdC7-gp140
Bioburden	Microbial enumeration test (USP/61)	Negative		Pass
Determination of virus concentration	UV spectrophotometry UV/OD	Report results		Pass
Endotoxin	Kinetic chromogenic Limulus Amebocyte Lysate assay	< 10 EU/mL		Pass
Detection of residual benzonase	Enzyme immunoassay	< 0.2 ng/mL		Pass
Detection of Human DNA	qPCR	Negative		Pass
Detection of replication competent adenovirus (RCA)	Using A549 detector cells	< 1 RCA/3x10 ¹⁰ vp		
Quantitative PCR (qPCR) assay for potency determination	qPCR assay of hexon from cells infected with serial dilutions of AdC vector	Vp to IU ratio = 600 : 1		
Viral safety assay	In vivo toxicity in mice and rabbits	Report results		

Vaccine Fill and Finish

Bulk vaccine is diluted in 2.5% Glycerol, 25 mM Sodium chloride, 20 mM Tris pH 8.0 formulation buffer for filling. To fill and finish the final clinical recombinant

- 5 AdC vector vaccines one product fill per vector are performed under cGMP conditions. Following the completion of the product fill at ~ 1 ml for a dose of 5 x 10¹⁰ vp per ml, a review of the lot file and receipt of satisfactory test results for sterility, endotoxin and mycoplasma, a Certificate of Compliance is issued. Moreover, a Certificate of Analysis is issued by the Quality Assurance (SRI International, Menlo Park, California) after obtaining
- 10 all satisfactory release testing results and reviewing the related production batch records. The final release testing for the recombinant AdC vector vaccines filled product is presented in Table 5. The product is stored frozen at ≤ -65°C.

Table 5. Final Release Tests and Specifications for Recombinant AdC Vector Vaccines

Test	Method	Release Specification
Appearance	Visual	Clear to slightly cloudy
Sterility	Immersion (Direct inoculation) (USP/21 CFR 610.12)	No bacteria or fungus found.
Endotoxin	Kinetic chromogenic Limulus Amebocyte Lysate assay	< 10 EU/mL
Determination of virus concentration	UV spectrophotometry	Report results
Quantitative PCR (qPCR) assay for potency determination	qPCR assay of hexon from cells infected with serial dilutions of AdC vector	Vp to IU ratio = 600 : 1
Sequencing of viral DNA	Massively Parallel Sequencing	Report results
General safety	21 CFR 610.11	No sign of toxicity

Stability

- 5 Stability of filled drug product is tested over time. Vialled vector vaccine (stored at <-65°C) and is tested the first year in 3 monthly intervals for potency and appearance. The second year the vialled vaccine is tested every 6 months and thereafter annually.

Example 10: preclinical studies

10 Immunogenicity

During selection of the two adenovirus vectors, AdC6 and AdC7, immunogenicity evaluations were conducted in mice and nonhuman primates as described in the Example 8 above.

Non-clinical Safety and Biodistribution Studies

- 15 Preclinical safety and biodistribution studies are conducted in accordance with the U.S. FDA "Good Laboratory Practice for Nonclinical Laboratory Studies," as described in 21 CFR Part 58.

1. GLP single dose safety toxicology studies that include Day 4 and Day 29 biodistribution analysis in rabbits with AdC6-HIVgp140 and AdC7-HIVgp140

2. GLP single dose 12 week biodistribution study in rabbits for AdC6-HIVgp140 and AdC7-HIVgp140
3. Prime-boost study in rabbits consisting of AdC7-HIVgp140 prime followed by a AdC6-HIVgp140 boost 29 days later.

Information from these studies is used to define a no-observed-adverse-effect-level (NOAEL) and to identify potential target organs of toxicity. In each of these preclinical studies, New Zealand white rabbits receive a single dose of vector that is higher than the highest dose planned for use in humans.

Single Vector Dose Ranging Safety Studies with Early Time Point Biodistribution

Analysis

The study design for the single-dose definitive safety studies is presented in Table 6. In these studies, New Zealand white rabbits is administered vaccine or control article via intramuscular (i.m.) immunization on Day 1. The study design includes a vehicle control (Group 1) and two vaccine-treatment groups (1×10^{10} vp Group 2 and 1×10^{11} vp Group 3) with 10 male and 10 female rabbits per dose group. Half of the rabbits per group (n=5/sex) are sacrificed on Day 4 which is 4 days after immunization. The other 5 rabbits per sex per group are sacrificed on Day 29 which is 4 weeks after immunization in order to study the reversibility of toxicity or delayed toxicity of the single immunization.

Table 6. Design of Safety Study for AdC6-HIVgp140 or AdC7-HIVgp140

Group ^A	Dose Route	Vaccine Dose Level (vp)	Number of Animals	
			Main Group ^B	Recovery Group ^C
1	i.m.	Vehicle control	5M + 5F	5M + 5F
2	i.m.	1×10^{10}	5M + 5F	5M + 5F
3	i.m.	1×10^{11}	5M + 5F	5M + 5F

^A Ten per sex per group are immunized once with the vaccine or vehicle.

^B Main Group, five animals/sex/group are sacrificed 4 days after immunization.

^C Recovery Group, five animals/sex/group are sacrificed 4 weeks after immunization.

The Vaccine Safety Studies include the parameters listed below herein:

- Mortality: at least once daily.
- Clinical Observation: pre dose, 2-4 hr post-dose, once daily for 5 days post-dose, otherwise once weekly, and at necropsy.
- Body Weight: Pre-study, weekly thereafter, and at sacrifice.

- Body Temperature: pre-dose, 3, 24, and 48 hr post-dose or until the rabbit's temperature returns to normal.
- Food Consumption: daily for the 3 days post-dose and otherwise once weekly (quantitatively measured over a 24 hr period).
- 5 • Local Reactogenicity: Local irritation at the injection sites is evaluated by a modified Draize scoring method at pre-dose, 2-4, 24, 48, and 72 hr after each injection. Any animals with irritation at the last time point, are evaluated once daily until irritation resolves..
- Ophthalmology: Pre-Study and post-dose within 1 week prior to scheduled sacrifice.
- 10 • Clinical Pathology: hematology, serum chemistry, and coagulation are pretested, 1 day after immunization (5/sex/group), and at the recovery necropsy.
- Urinalysis: at necropsy
- Antibody Response: Serum samples are collected pretest and at sacrifice and archived for possible antibody analysis (e.g. anti-HIV antibodies, neutralizing antibodies).
- 15 • Necropsy and Organ Weight: All animals at main and recovery sacrifice.
- Histopathology: All tissues in the control and high dose groups at the main study sacrifice. Any target organs is examined in the other dose groups and from the recovery group animals. All gross lesions are examined.
- Biodistribution: All high dose Group 3 rabbits (5/sex/time point) and 3
- 20 rabbits/sex/time point from vehicle control Group 1 are analyzed for biodistribution of the vector at sacrifice (Days 4 and 29).

The final report includes a discussion correlating clinical signs, body weight changes, clinical pathology, hematopoietic and immune function changes, histopathology, and when applicable, biodistribution. Statistical evaluation of body weight, food

25 consumption, body temperature, clinical pathology parameters, and organ weights are conducted. The no observed adverse effect level (NOAEL) and maximum tolerated dose (MTD), is also determined.

Clinical Pathology

Clinical pathology determinations (hematology and clinical chemistry panel)

30 is conducted on blood samples collected at selected time-points from the ear vein without anesthesia. Hematology samples are collected using EDTA as the anticoagulant. Smears for reticulocytes and differentials are prepared within one hour of sample collection (including MeOH fixation but excluding staining and reading). Blood for coagulation tests is collected

using sodium citrate as the anticoagulant and the plasma frozen until analyzed. Clinical chemistry and antibody response samples are collected without the use of an anticoagulant, centrifuged, and the serum stored frozen until analysis.

Hematology evaluations include standard erythrocyte and leukocyte parameters: red and white blood cell (RBC and WBC) counts, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin and hemoglobin concentration, platelet count, mean platelet volume, reticulocyte count, and differential leukocyte count.

Clinical chemistry evaluations include a standard panel: alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, albumin, albumin/globulin ratio, blood urea nitrogen, bilirubin, calcium, chloride, cholesterol, creatinine, creatine kinase, globulin, glucose, phosphorus, potassium, total protein, sodium, and triglycerides.

Coagulation parameters include prothrombin time, activated partial thromboplastin time, and fibrinogen.

Necropsy/Histopathology

At sacrifice, terminal body weights and *ante mortem* observations are recorded for each animal and commented on at necropsy. All protocol-specified tissues and the identification mark from each animal are saved in cold, buffered neutral 10% formalin at necropsy. Any gross findings noted at the time of necropsy is recorded and then confirmed in the subsequent microscopic evaluation. Animals in moribund condition are euthanized and receive a full necropsy as for scheduled necropsies. The recommended list of tissues to be retained for conduct of a general and comprehensive evaluation of potential target organs has been standardized. The list of tissues routinely evaluated microscopically is:

Adrenal glands (pair), Aorta, Bone marrow (histology, sternum), Bone marrow (cytology, sternum), Bone (femur with joint surface), Brain (fore-, mid-, and hindbrain), Cecum, Cervix, Colon, Duodenum, Epididymes, Esophagus, Eyes (with optic nerve), Gall bladder, Gross lesions (including tissue masses and abnormal regional lymph nodes), Heart, Identification (tattoo, collected not analyzed), Injection site(s), Ileum, Jejunum, Kidneys, Liver, Lungs with bronchi, Lymph nodes (mandibular, and mesenteric and inguinal or iliac depending on dose site), Mammary gland (from both sexes; to include nipple and surrounding tissue), Ovaries, Pancreas, Pituitary gland, Prostate, Rectum, Salivary gland, Seminal vesicle, Sciatic nerve, Skeletal muscle, Skin (included with mammary gland), Spinal cord (thoracic only), Spleen, Stomach, Testes, Thymus, Thyroid and parathyroid, Trachea, Uterus, Urinary bladder, and Vagina.

Toxicologic Evaluations

Effects on the parameters evaluated in each study, e.g., microscopic lesions, are categorized as vaccine-related or non-vaccine-related, with further clarification, when possible, on whether a vaccine-related lesion is primary or secondary. The evaluation of anatomic pathology results consider and, where possible, integrate related clinical and clinical pathology data.

Biodistribution

Biodistribution analysis is conducted on DNA extracted from the tissues by a quantitative PCR (Q-PCR) assay (with sensitivity of at least 50 copies/ μ g of genomic DNA) using primers corresponding to the vector insert. Because each of the vaccines is manufactured from different adenovirus serotypes, the biodistribution of each vaccine is assessed. Replicate wells spiked with plasmid encoding the insert are used to monitor PCR inhibition.

The following tissues are collected from each animal at necropsy and analyzed from each of the animals sacrificed 4 days post-dose: blood, bone marrow, brain, heart, lungs, liver, injection site muscle, kidneys, testes/ovaries, draining lymph nodes, and spleens. If vector sequence is detected 4 days post-dose, that tissue is analyzed from later time points. Expression of the transgene is also be tested using quantitative Reverse Transcription (RT)-PCR on RNA isolated from positive tissues. The results of these studies show the distribution of the vector in different tissues as a function of time post-injection.

12 Week Biodistribution Study

The study design for the 12 week biodistribution study of both vaccines tested singly is presented in Table 7. In this study, animals receive a single dose of vehicle or vaccine at 1×10^{11} vp on Day 1 by i.m. injection and are sacrificed 12 weeks later. The tissue list for the 12 week study depends on the results of the prior studies; tissues with detectable vector at 4 weeks post-dose are analyzed for the presence of vector at 12 weeks post-dose. The biodistribution parameters (e.g., methods and endpoints) discussed above is be applied herein. This study includes weekly body weights and clinical observations to monitor the general health of the animals.

Table 7. Design of 12 Week Biodistribution Study for AdC6-HIVgp140 and AdC7-HIVgp140

Group	Dose Route	Vaccine	Dose Level (vp)	Number of Animals Sacrificed at 12 wk
1	i.m.	Vehicle control	0	3M + 3F
2	i.m.	AdC6-HIVgp140	1×10^{11} vp	5M + 5F
3	i.m.	AdC7-HIVgp140	1×10^{11} vp	5M + 5F

5 Prime-Boost Safety Study

The study design for the prime-boost safety study is presented in Table 8. New Zealand white rabbits (5 animals/sex/group) are administered by i.m. injection vehicle control or the highest vaccine dose determined to have an acceptable safety profile in the previous single vector safety studies. A single administration of AdC7-HIVgp140 is used as the prime injection on Day 1. A single administration of AdC6-HIVgp140 is used as the boost and occur 4 weeks after the prime. The study is divided into a main and recovery study phase. Animals in the main group are sacrificed on Day 33 which is 4 days after the boost immunization. The recovery group animals are sacrificed on Day 57 which is 4 weeks after the boost immunization. All of the safety study parameters described for the single dose study (as listed above herein) are included in this study with the exception of the biodistribution analysis.

Table 8. Design of Safety Study for Prime-Boost Regimen

Group ^A	Dose Route	Vaccine Dose (Prime-Boost)	Prime (Day 1)	Boost (Day 29)	Number of Animals	
					Main Group ^B	Recovery Group ^C
1	i.m.	0	Vehicle Control	Vehicle Control	5M + 5F	5M + 5F
2	i.m.	1×10^{11} vp	AdC7-HIV gp140	AdC6-HIVgp140	5M + 5F	5M + 5F

^A Ten rabbits per sex per group are immunized once with the vaccine prime or vehicle on Day 1 and once with the vaccine boost or vehicle on Day 29.

^B Main Group, five animals/sex/group are sacrificed on Day 33, 4 days after the boost immunization.

^C Recovery Group, five animals/sex/group are sacrificed on Day 57, 4 weeks after the boost immunization.

25 Example 11: Objectives and Endpoints

Primary objective

- To evaluate the safety and tolerability of AdC6HIVgp140 and AdC7HIVgp140 at doses from 1×10^9 vp to 5×10^{10} vp in HIV-1 uninfected adults

Primary endpoints

- Frequency and severity of local reactogenicity signs and symptoms
- 5 - Frequency and severity of systemic reactogenicity signs and symptoms
- Frequency of AEs categorized by MedDRA body system, MedDRA preferred term, severity and assessed relationship to study products. Detailed description of all AEs meeting DAIDS criteria for expedited reporting.

Secondary objective

- 10 - To gain preliminary data on the immunogenicity of AdC6HIVgp140 and AdC7HIVgp140 in HIV-1 uninfected adults

Secondary endpoints

- HIV-specific CD4⁺ and CD8⁺ T-cell response rates
- Magnitude of HIV-specific CD4⁺ and CD8⁺ T-cell responses
- 15 - Frequency, magnitude and breadth of HIV-specific binding antibody responses as assessed by multiplex assay
- Neutralizing antibody frequency, magnitude and breadth against tier 1 and, if applicable, tier 2 HIV-1 isolates as assessed by area under the magnitude-breadth curves

20

The disclosures of each and every patent, patent application, and publication cited herein are hereby incorporated herein by reference in their entirety.

While this invention has been disclosed with reference to specific embodiments, it is apparent that other embodiments and variations of this invention may be
 25 devised by others skilled in the art without departing from the true spirit and scope of the invention. The appended claims are intended to be construed to include all such embodiments and equivalent variations.

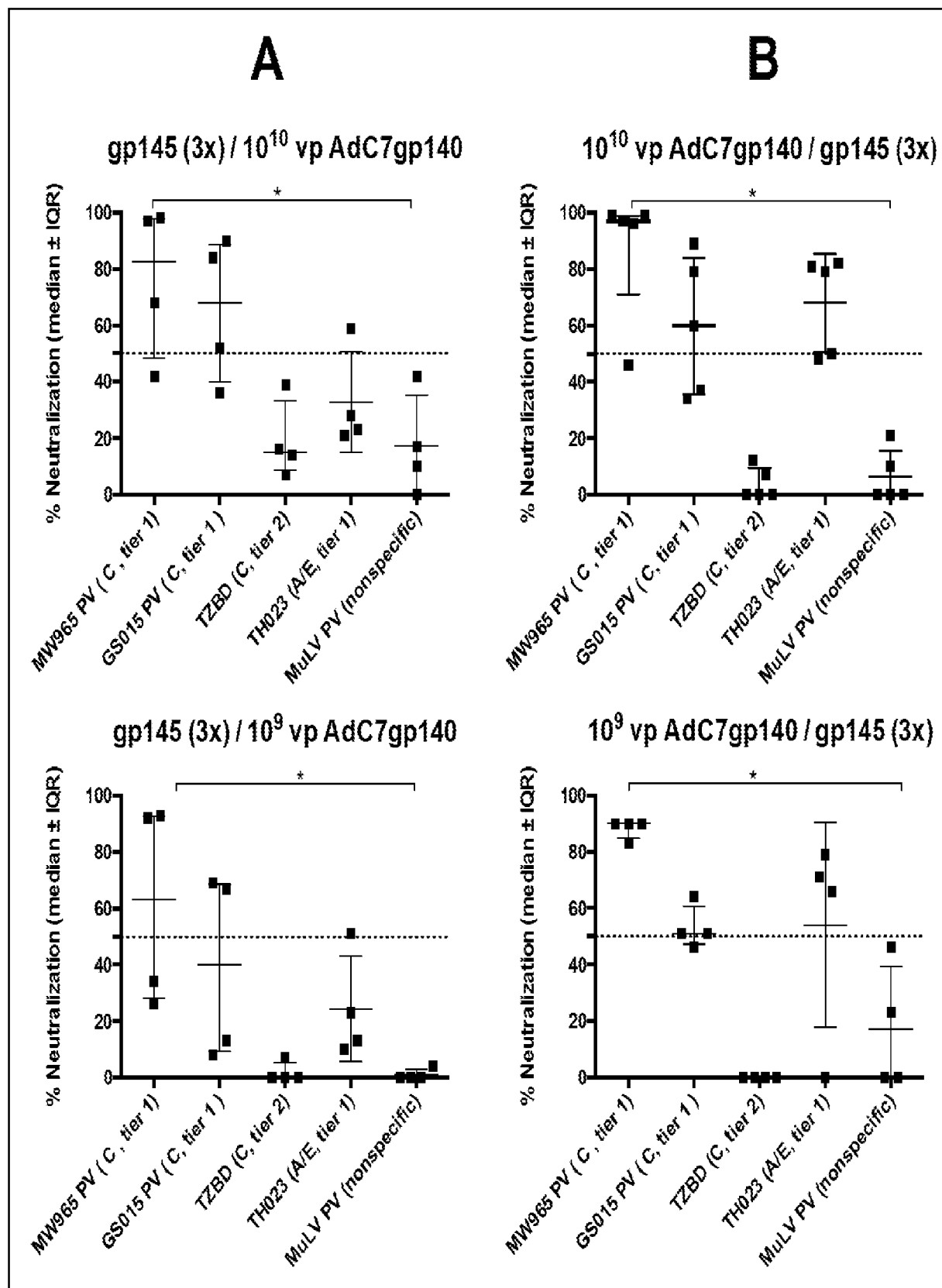
CLAIMS

What is claimed:

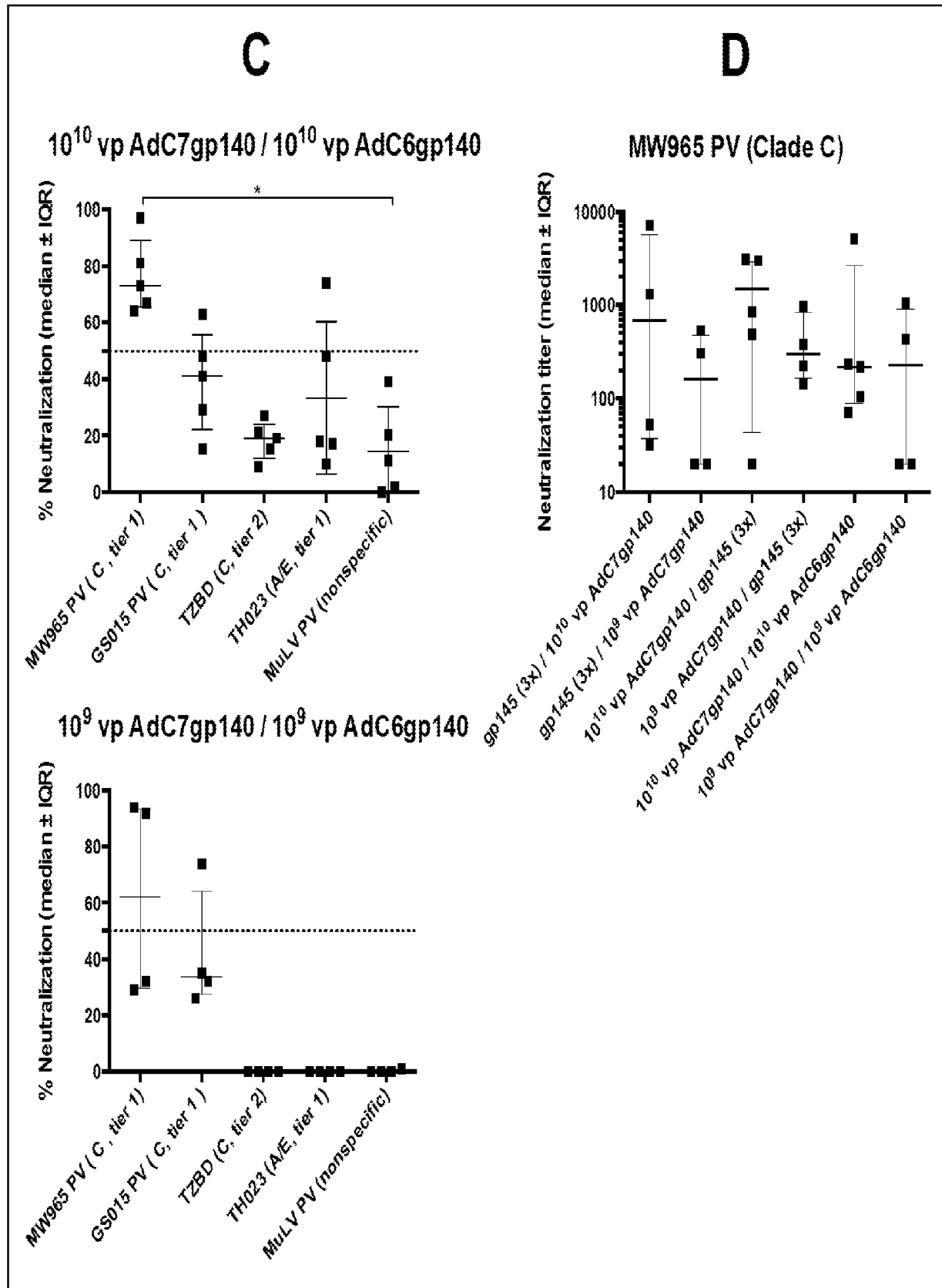
1. A composition comprising a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, wherein the early gene E1 is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted, and wherein the nucleic acid sequence further comprises a promoter sequence linked to a sequence encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag.
2. The composition of claim 1, wherein the promoter is a constitutive promoter.
3. The composition of claim 1, wherein the promoter is a cytomegalovirus immediate early promoter (CMV).
4. The composition of claim 1, wherein the nucleic acid sequence is selected from the group consisting of SEQ ID NOs: 1-8.
5. A protein expression system comprising the composition of claim 1, wherein the nucleic acid sequence is selected from the group consisting of SEQ ID NOs: 1-8.
6. A protein expression system comprising the composition of claim 1, wherein the nucleic acid sequence encodes an amino acid sequence selected from the group consisting of SEQ ID NOs: 9-16.
7. A method of eliciting an immune response in a mammal against a heterologous protein, the method comprising administering to the mammal a composition comprising a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, wherein the early gene E1 is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted, and wherein the nucleic acid sequence further comprises a promoter sequence linked to a sequence encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag.

8. The method of claim 7, wherein the nucleic acid sequence is selected from the group consisting of SEQ ID NOs: 1-8.
9. A method of treating and/or preventing HIV in a mammal, the method comprising administering a therapeutically effective amount of a composition encoded by a nucleic acid sequence selected from the group consisting of SEQ ID NOs: 1-8.
10. A method of vaccinating a mammal against HIV infection, the method comprising administering to the mammal a pharmaceutically acceptable amount of the composition of claim 1, wherein administration of the composition elicits an immune response in the mammal.
11. The method of claim 10, wherein the composition is administered prophylactically to the mammal.
12. The method of claim 10, wherein the composition is administered therapeutically to the mammal.
13. The method of claim 10, wherein the composition is administered in combination with an adjuvant.
14. A method of generating a effector and memory T cell immune response to a heterologous protein in a mammal, the method comprising the steps of: (a) administering the composition of claim 1 to a mammal in an amount effective to elicit an immune response in the mammal; (b) administering a second effective amount of the chimpanzee-derived adenovirus vector of claim 1 at a second, subsequent time period, wherein T memory cells directed against the heterologous protein are reactivated in the mammal.
15. The method of claim 14, wherein the composition administered first in (a) and second in (b) comprises a same or a different HIV heterologous protein selected from the group consisting of gp140, gp160 and Gag.

16. The method of claim 14, wherein the composition administered first in (a) and in (b) has a same or a different serotype selected from the group consisting of AdC6 and AdC7.
17. A method of generating an adaptive B cell immune response to a heterologous protein in a mammal, the method comprising the steps of: (a) administering the composition of claim 1 to a mammal in an amount effective to elicit an immune response in the mammal; (b) administering a second effective amount of the composition of claim 1 at a second, subsequent time period, wherein B memory cells directed against the heterologous protein are reactivated in the mammal.
18. The methods of any one of claims 7, 9, 10, 14 and 17, wherein the mammal is a human.



Figs. 1A-1B



Figs. 1C-1D

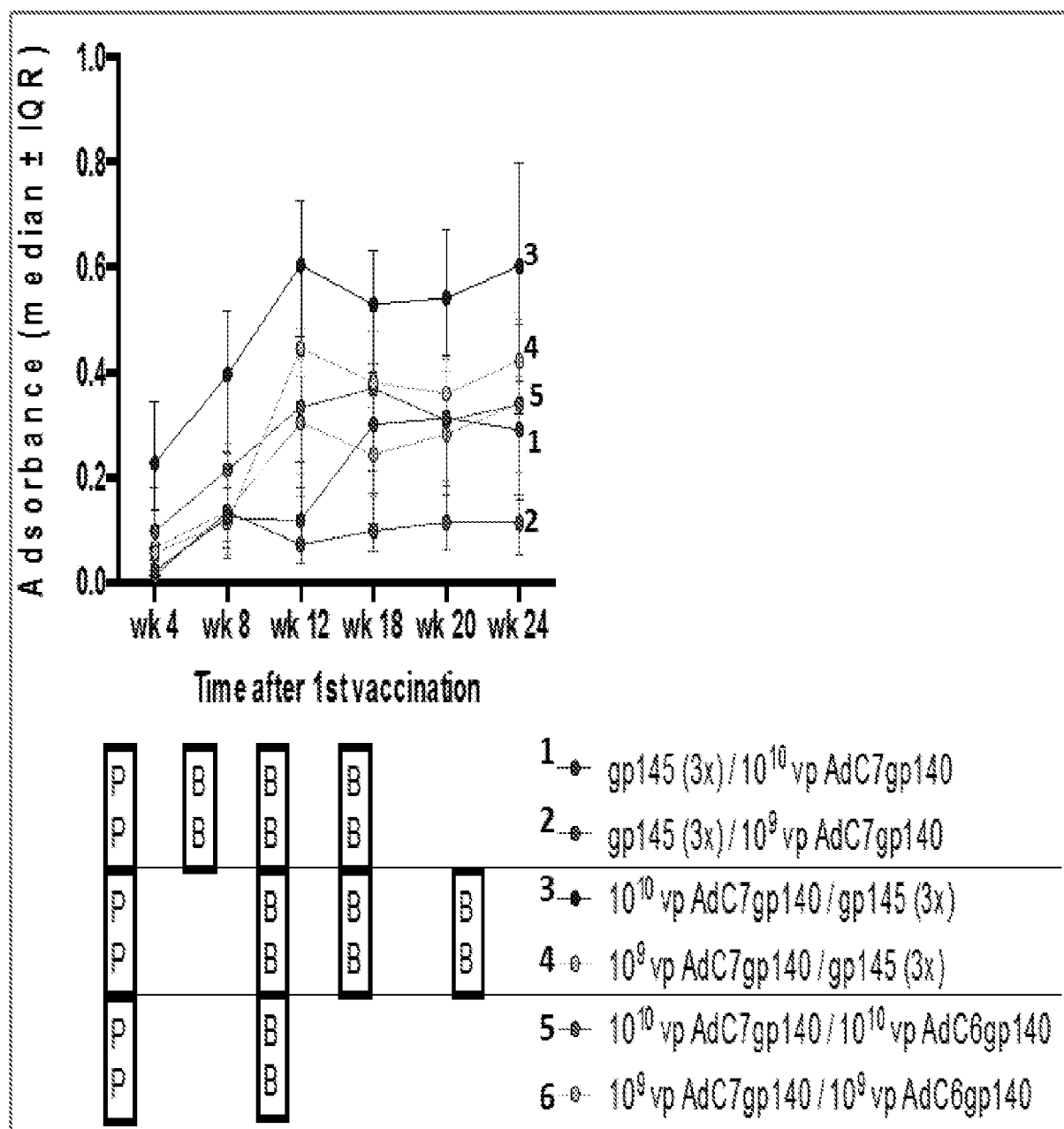


Fig. 2A

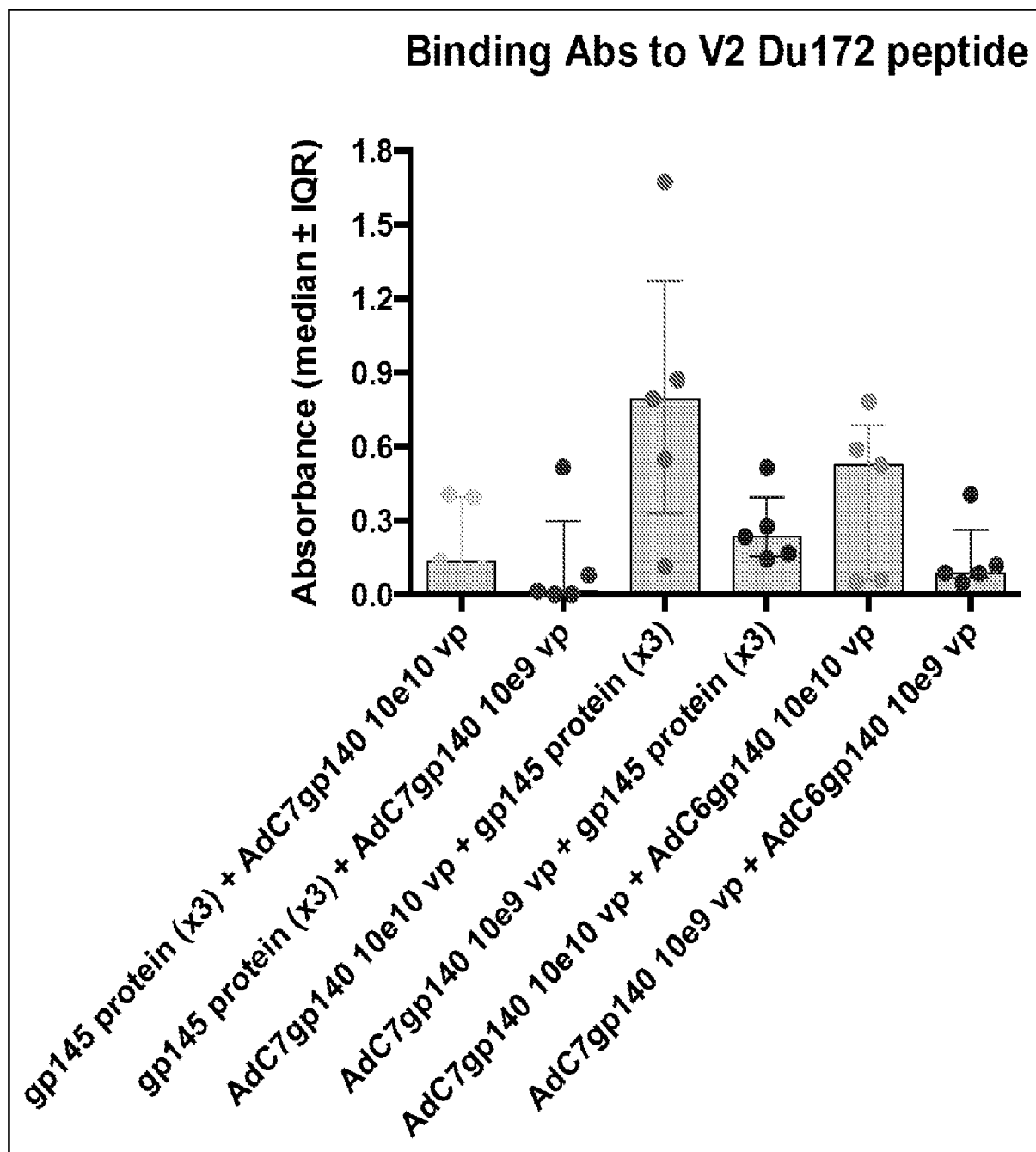


Fig. 2B

Group/ Vaccine	NHP ID	Genotype	Gender	AdHu5 Titer	AdHu26 Titer
1 AdC7/C6	4825	-*	M	20	640
	4826	-	M	20	640
	4889	-	M	0	>1280
	4372	A01, A02	F	20	1280
	4395	A01, A02	M	0	320
	4400	A01	M	160	640
	4552	A01	M	20	160
	4553	A01	M	40	>1280
	4770	A01	M	40	10
	4773	A01	M	80	40
	4774	A01	M	160	20
	4894	A02, B17	M	0	160
2 AdHu26/Hu5	4389	A02	F	0	160
	4892	A02	M	0	1280
	4893	B01	M	20	80
	4916	-	M	40	>1280
	4381	A01, A02	M	40	1280
	4394	A01	M	20	1280
	4547	A01	M	160	1280
	4776	A01	F	40	20
	4777	A01	M	160	40
	4778	A01	M	80	80
	4779	A01	M	20	640
	4781	A01	M	10	320
3 None	4824	-	M	0	160
	4886	-	M	0	0
	4891	-	M	0	20
	4365	A01	F	10	1280
	4398	A01, B01	F	10	0
	4546	A01	M	80	640
	4769	A01	M	80	20
	4771	A01	M	40	1280
	4772	A01	F	160	80
	4775	A01	M	640	40
	4780	A01	M	20	160
	4392	A02, B17	F	40	0

* animals were not positive for A01, A02, B01 or B17

Fig. 3

Serum Virus titers

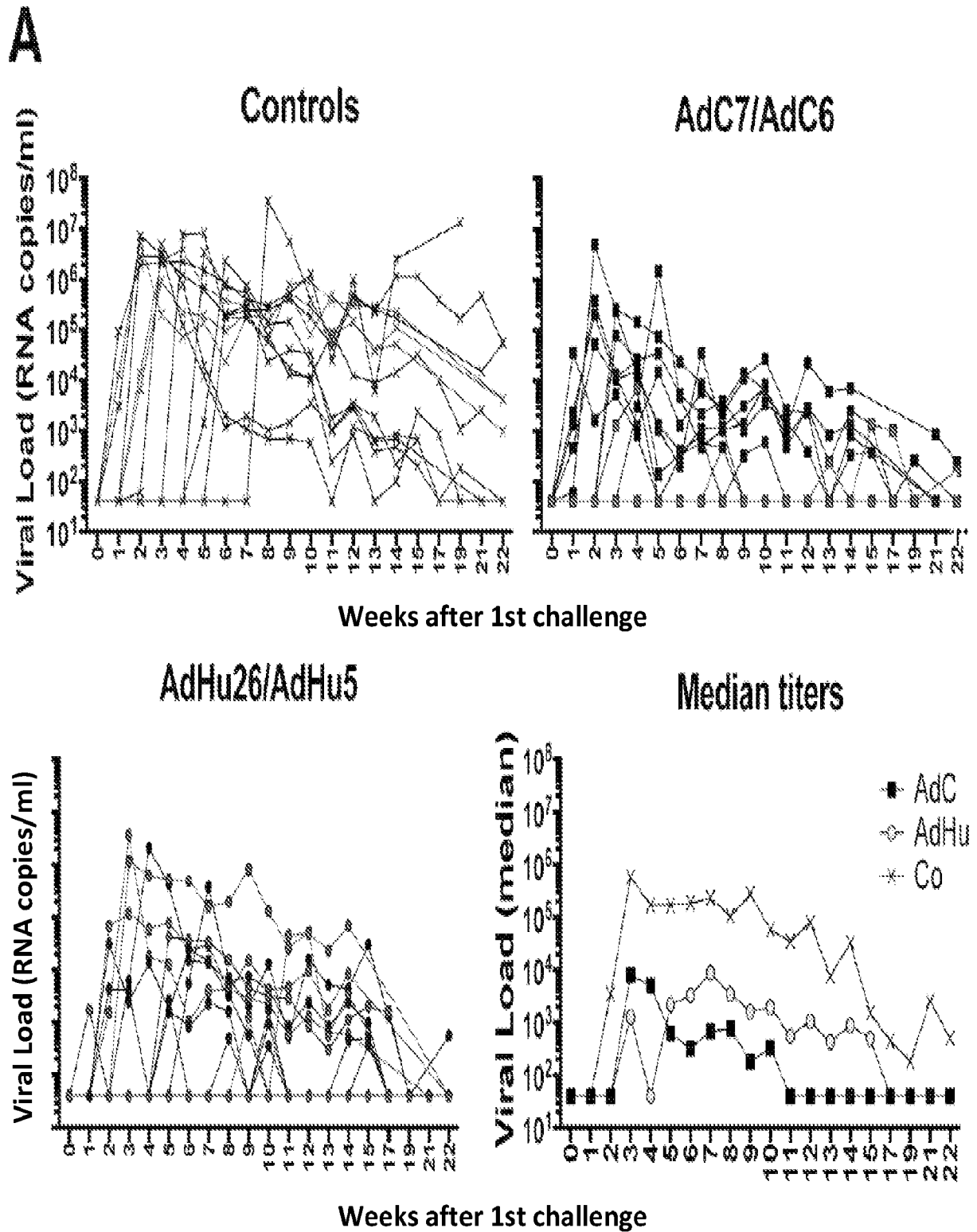
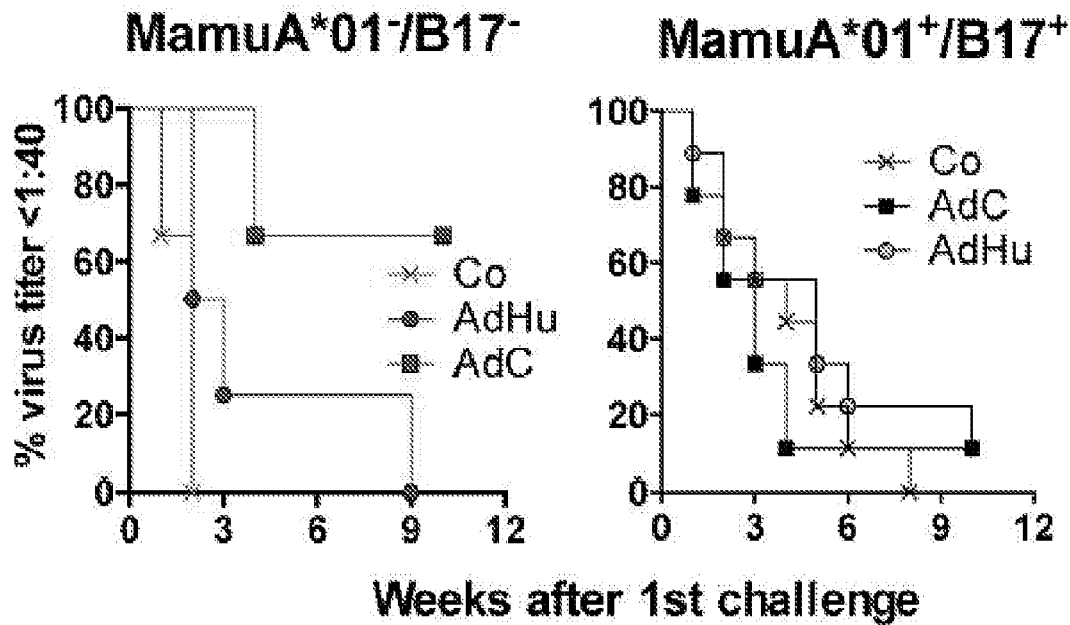
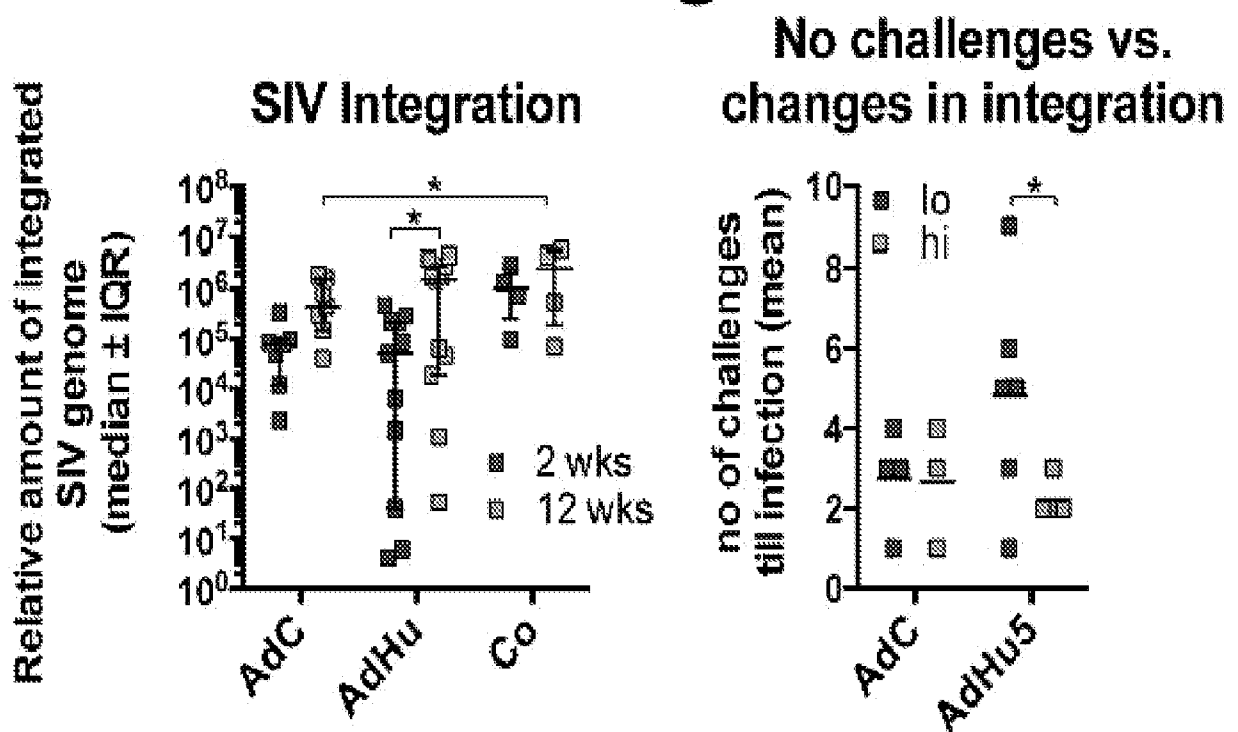


Fig. 4A

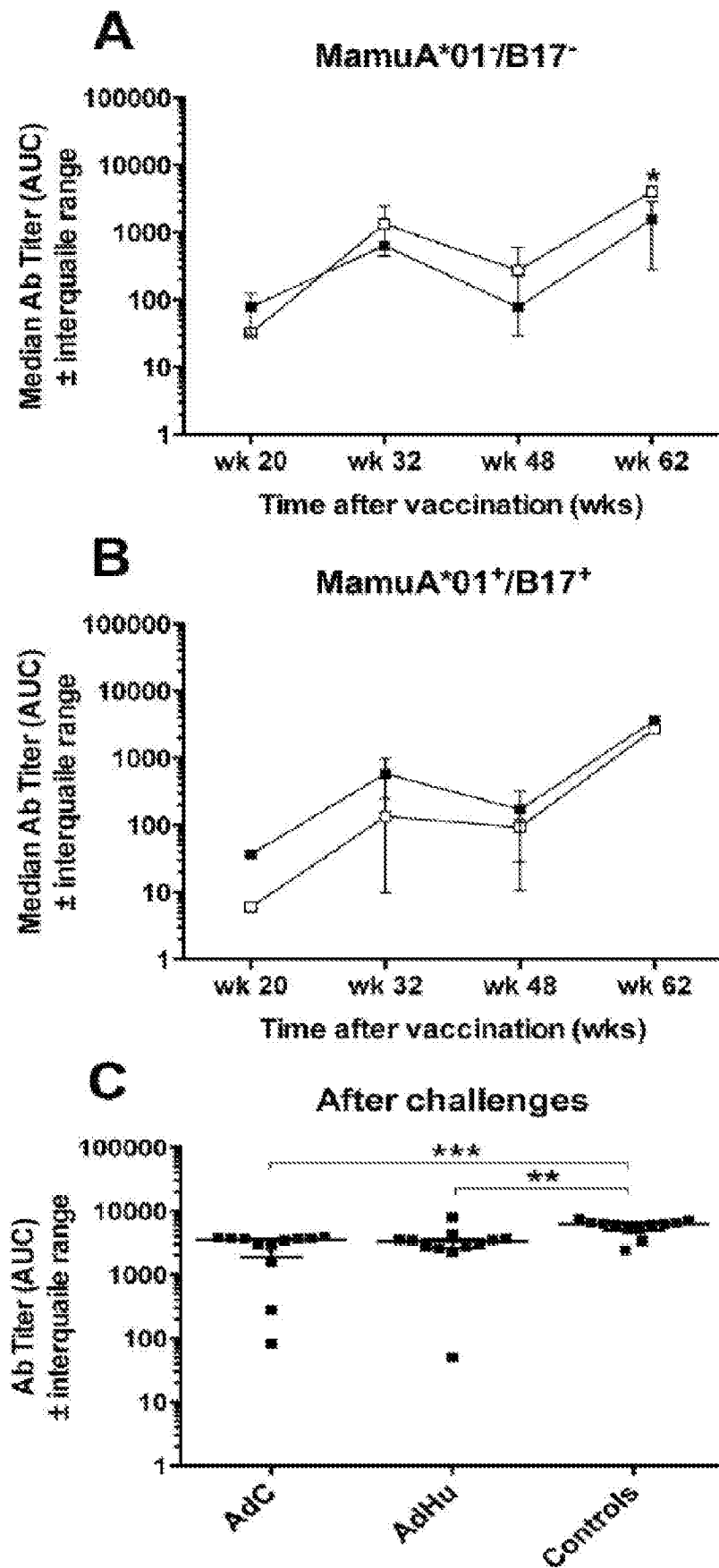
B Control of serum virus titers



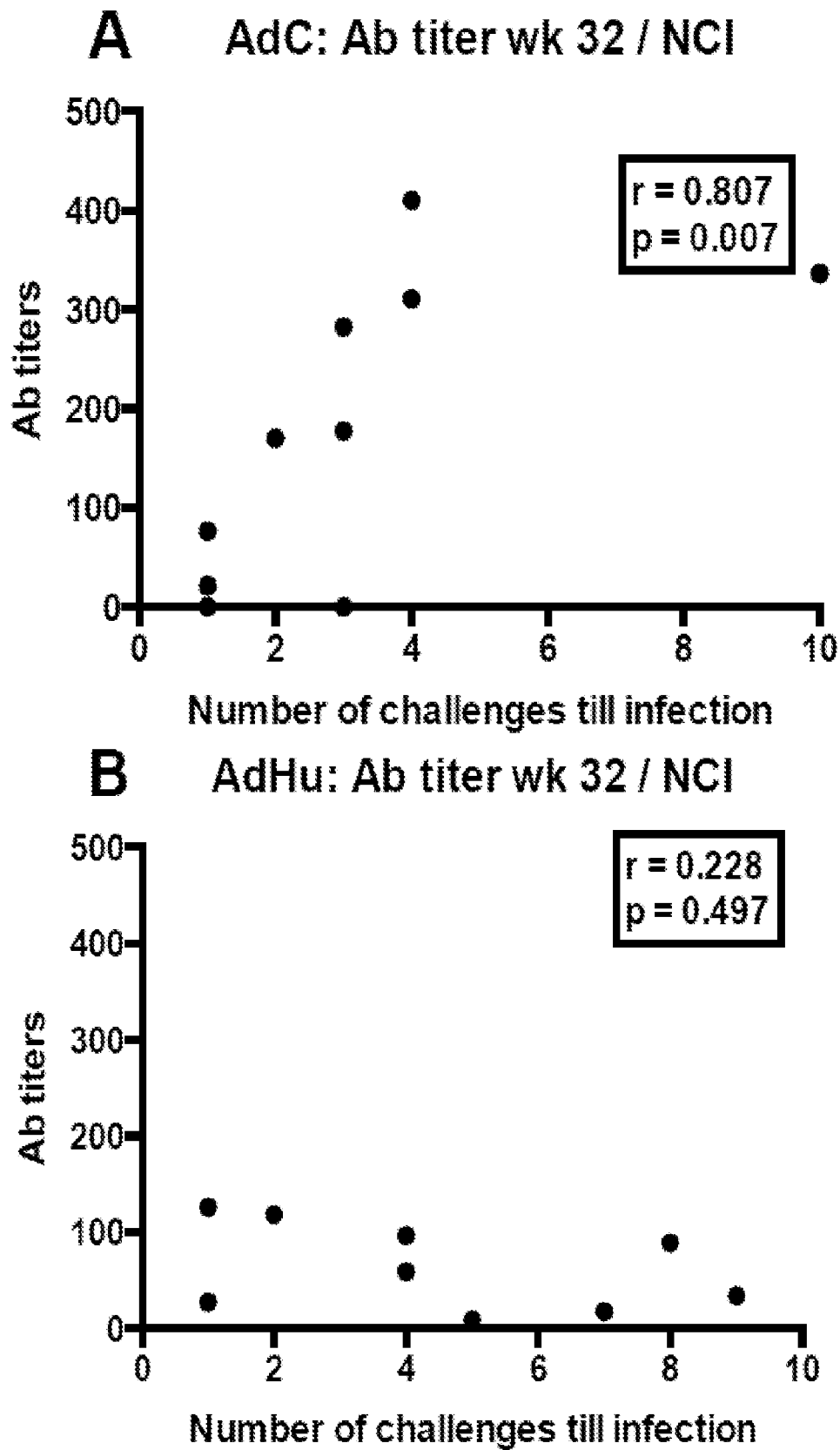
C Virus integration



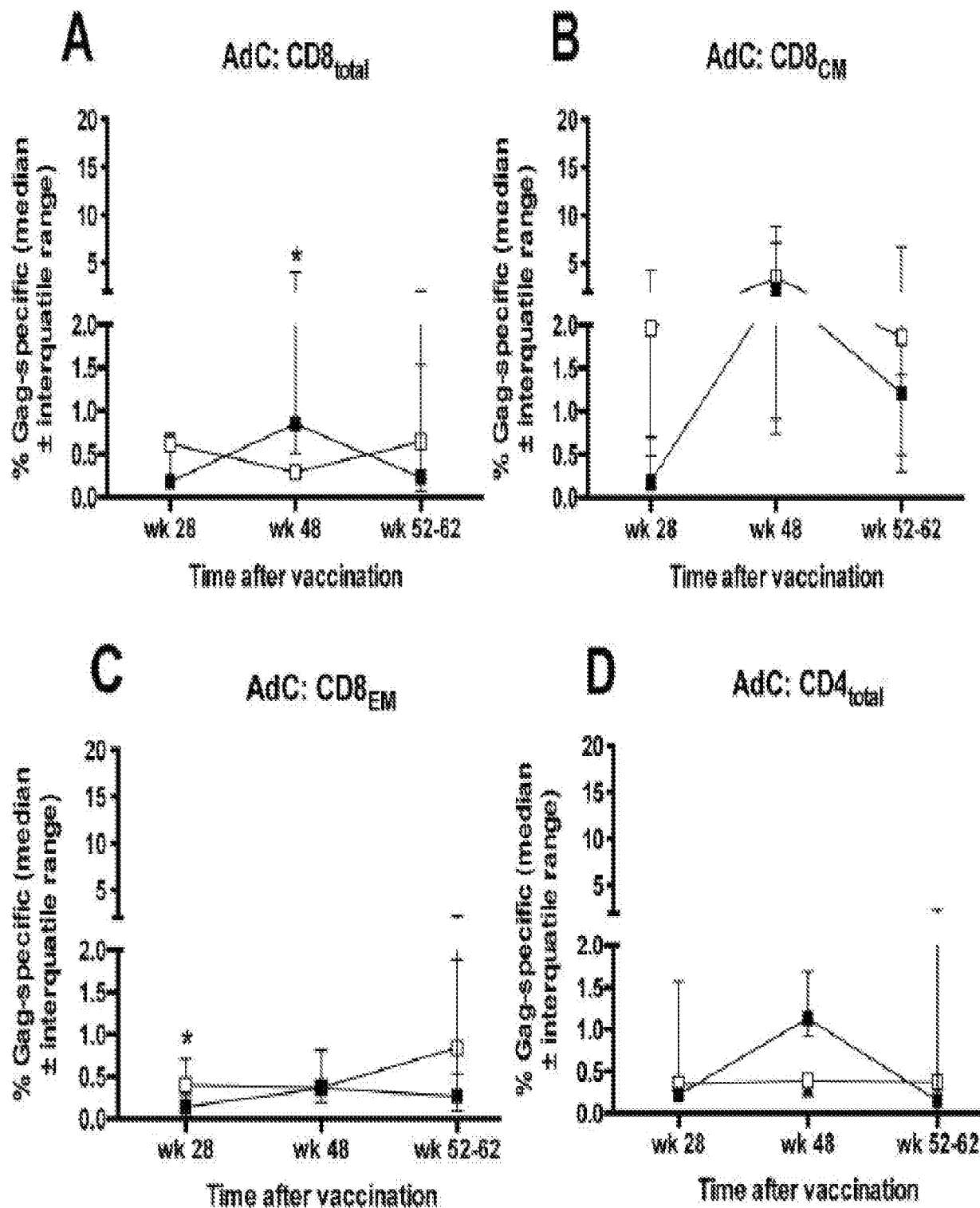
Figs. 4B-4C



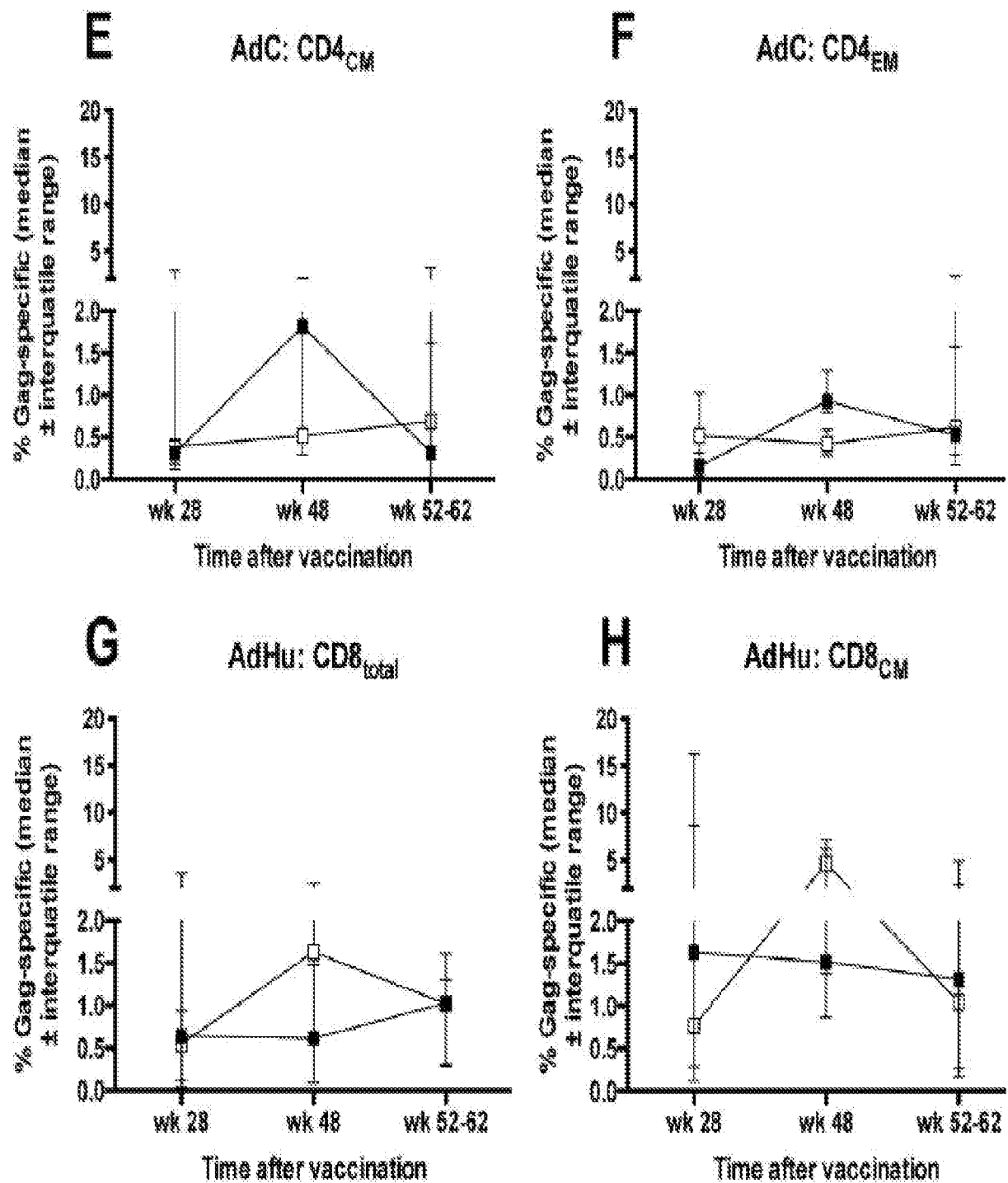
Figs. 5A-5C.



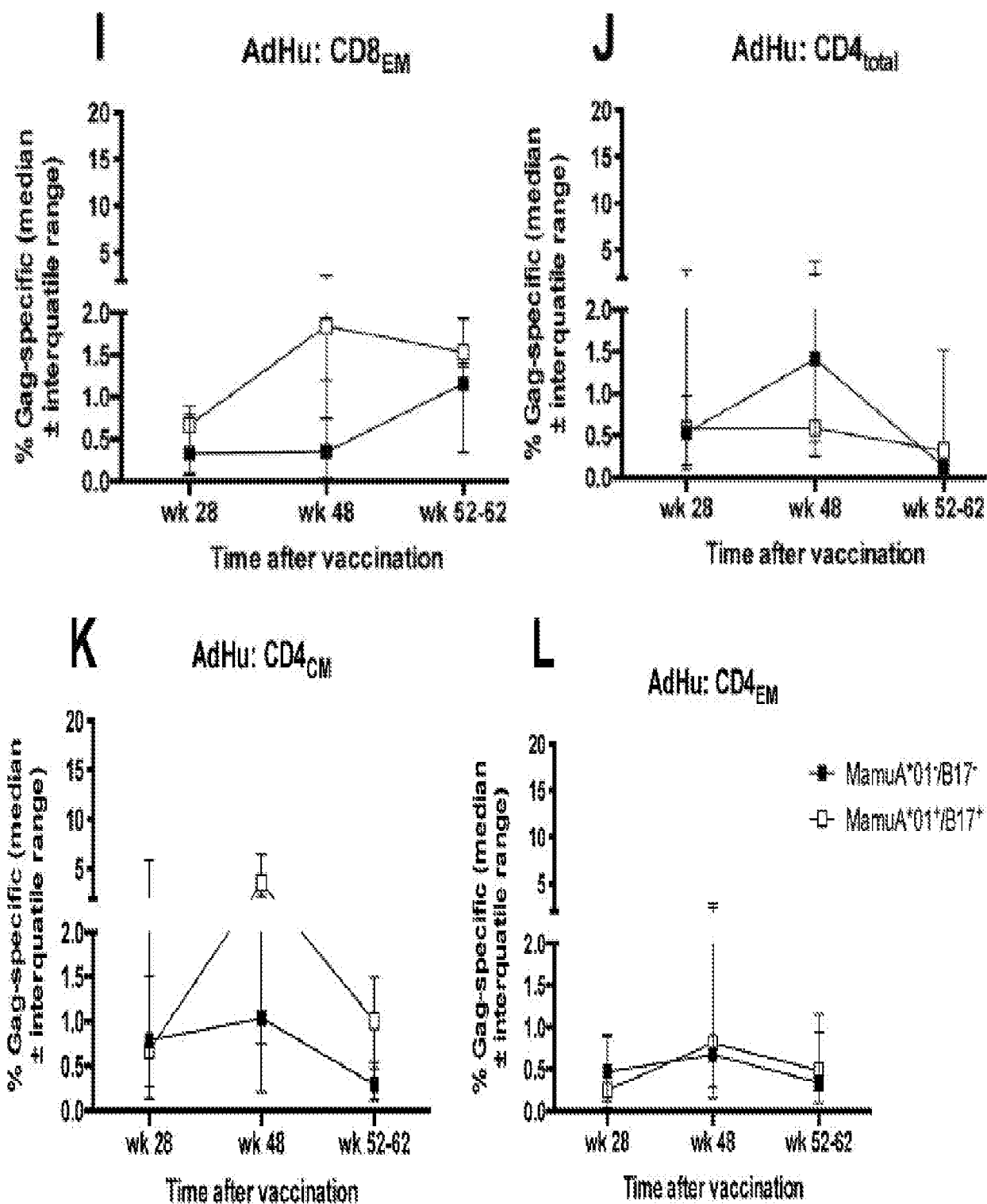
Figs. 6A-6B



Figs. 7A-7D



Figs. 7E-7H



Figs. 7I-7L

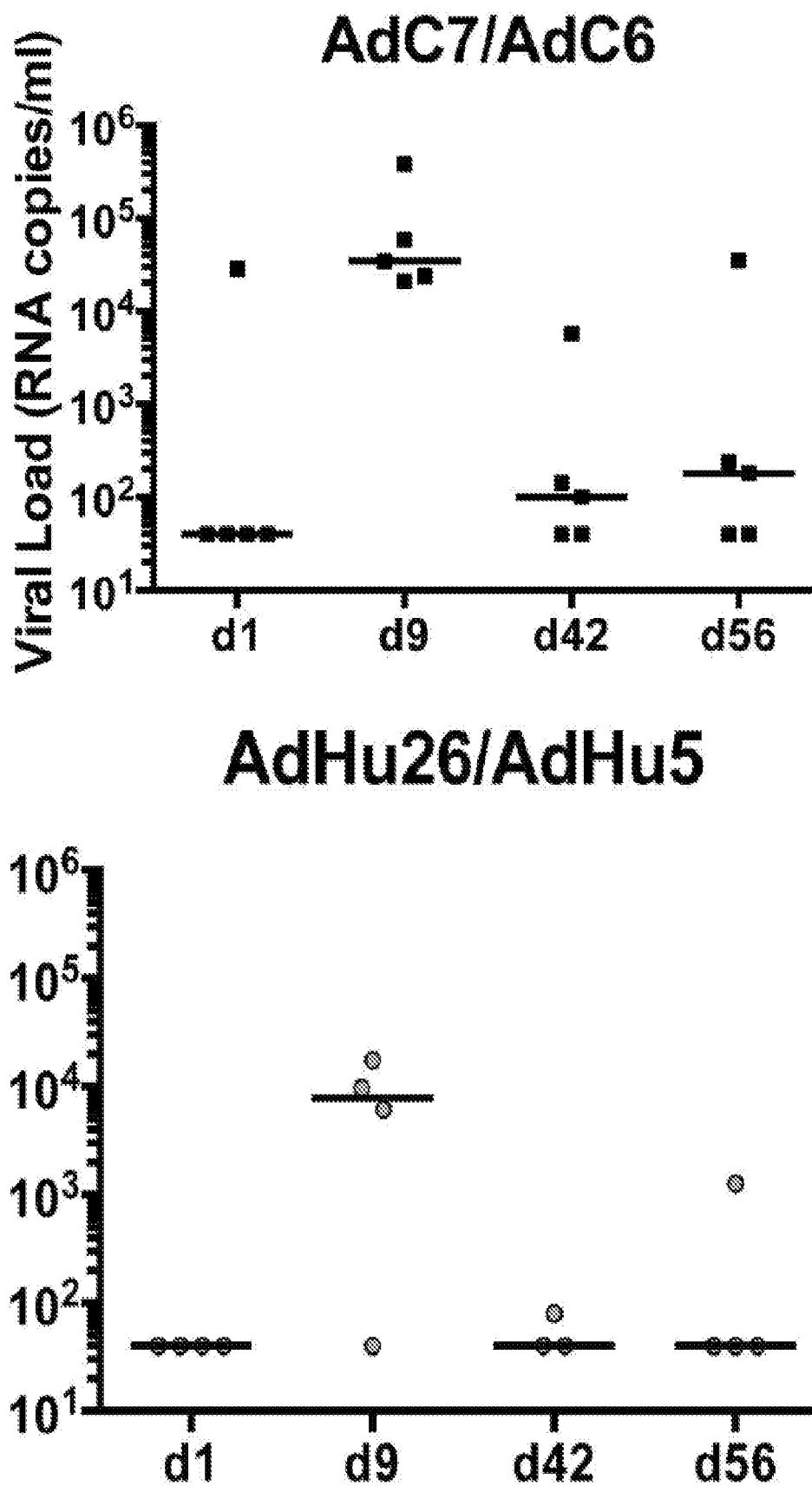


Fig. 8

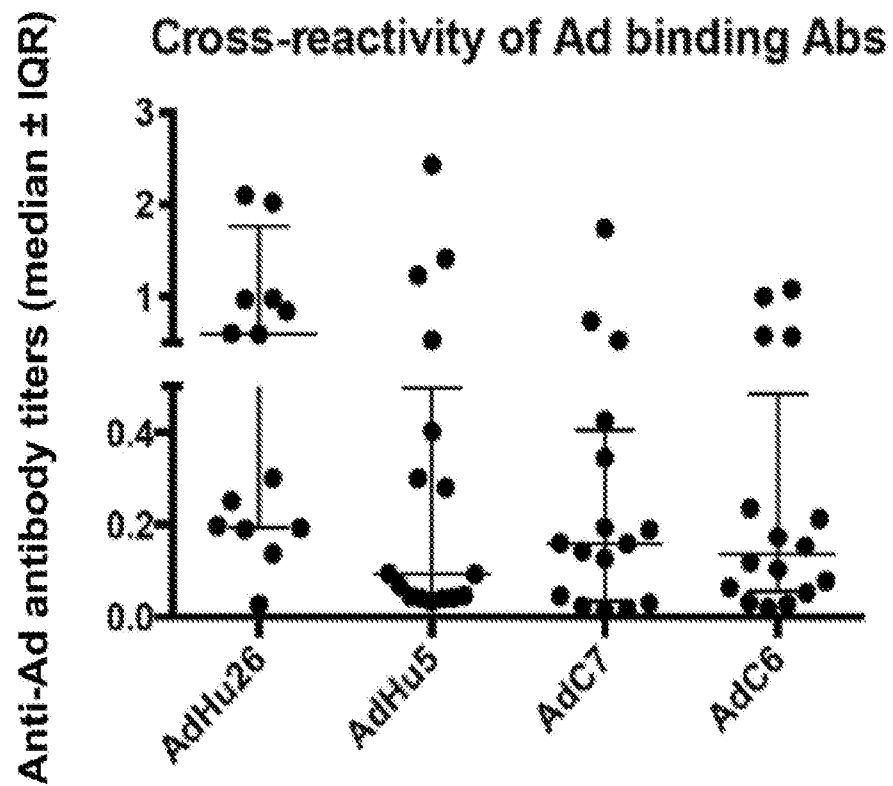
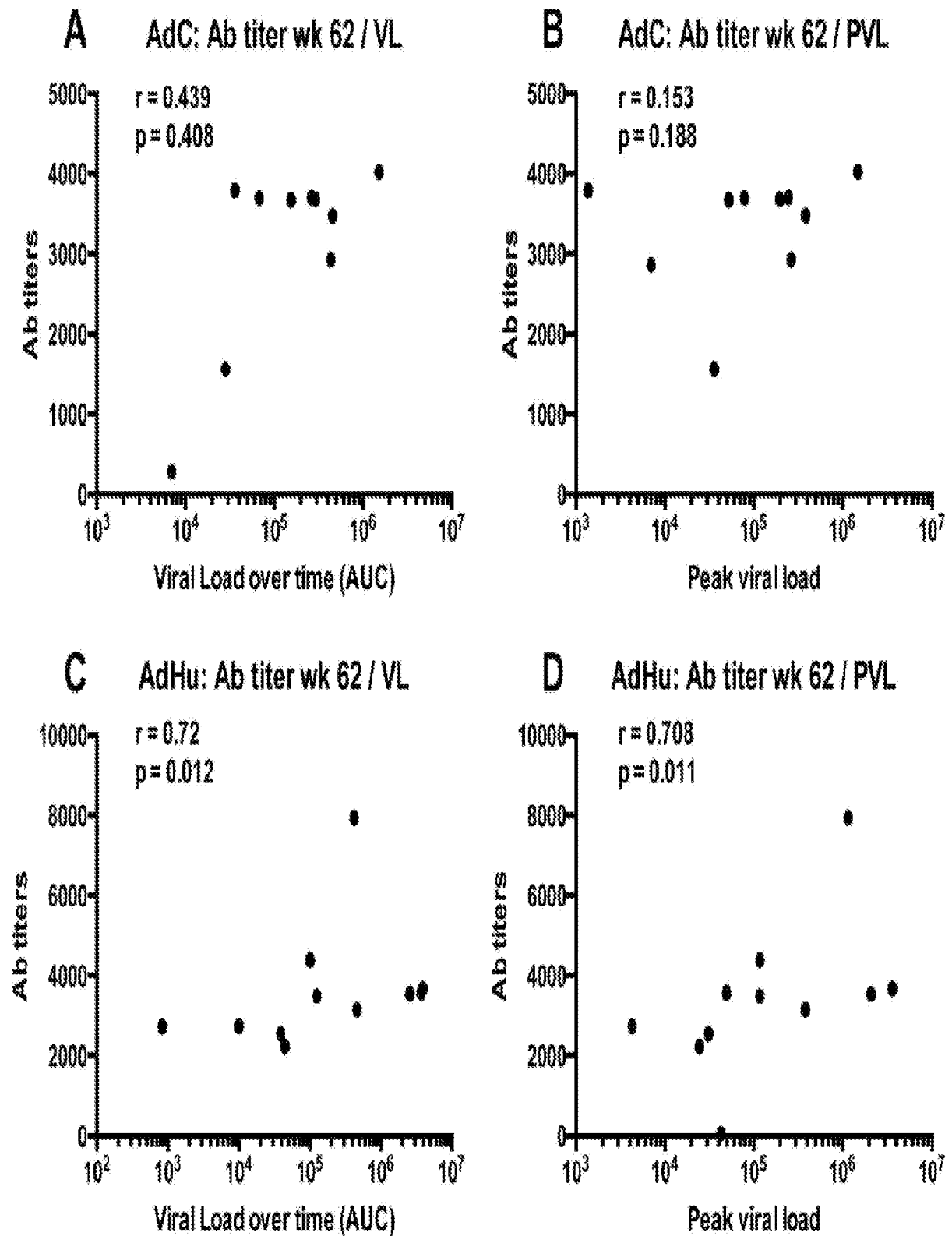


Fig. 9



Figs. 10A-10D

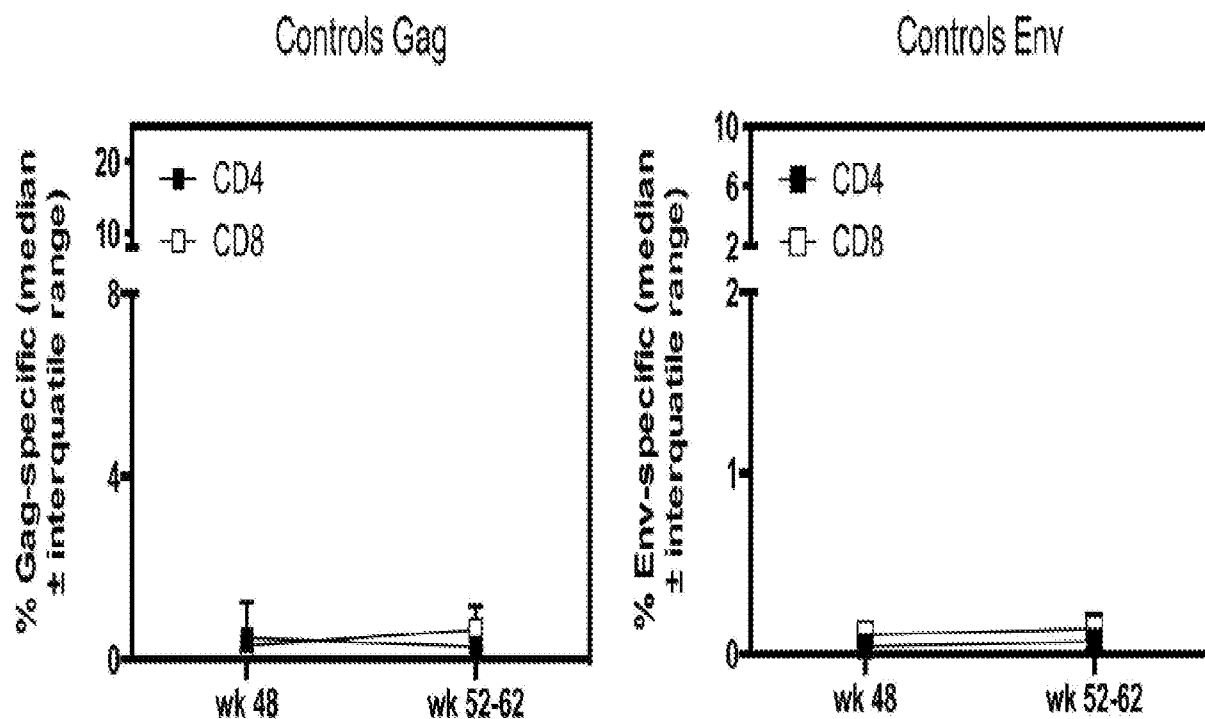
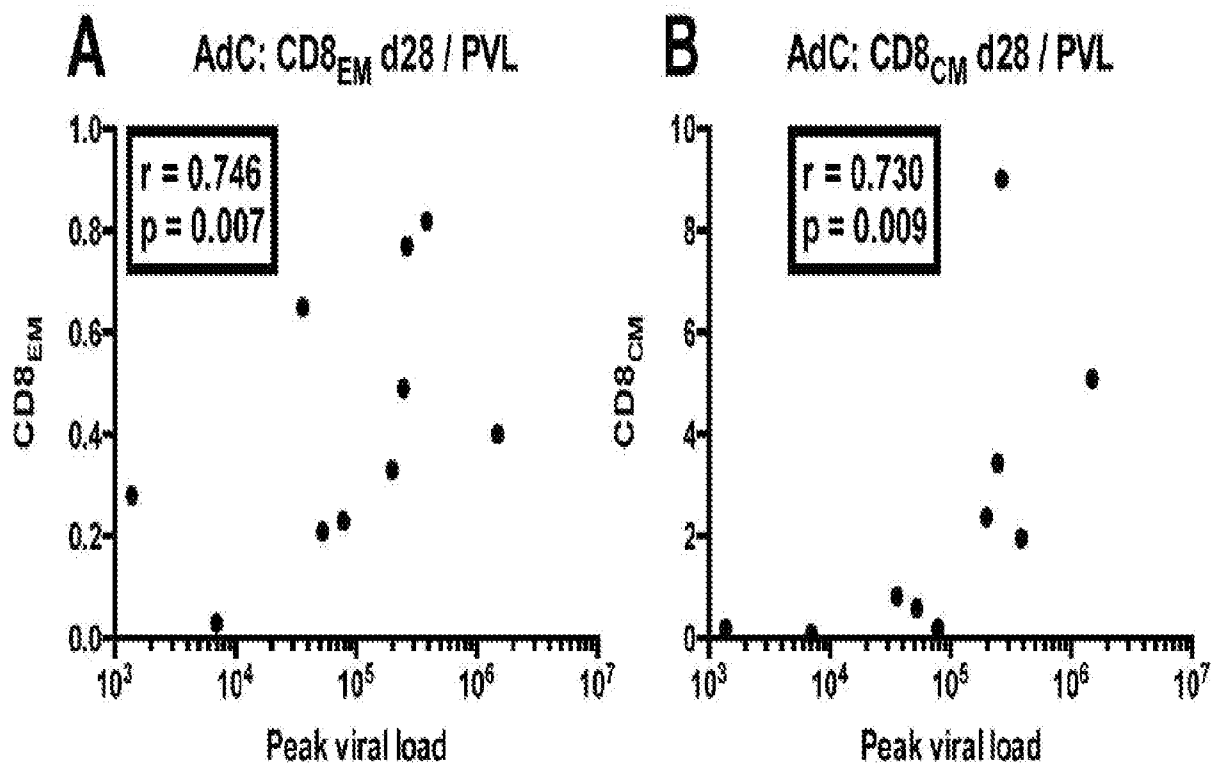
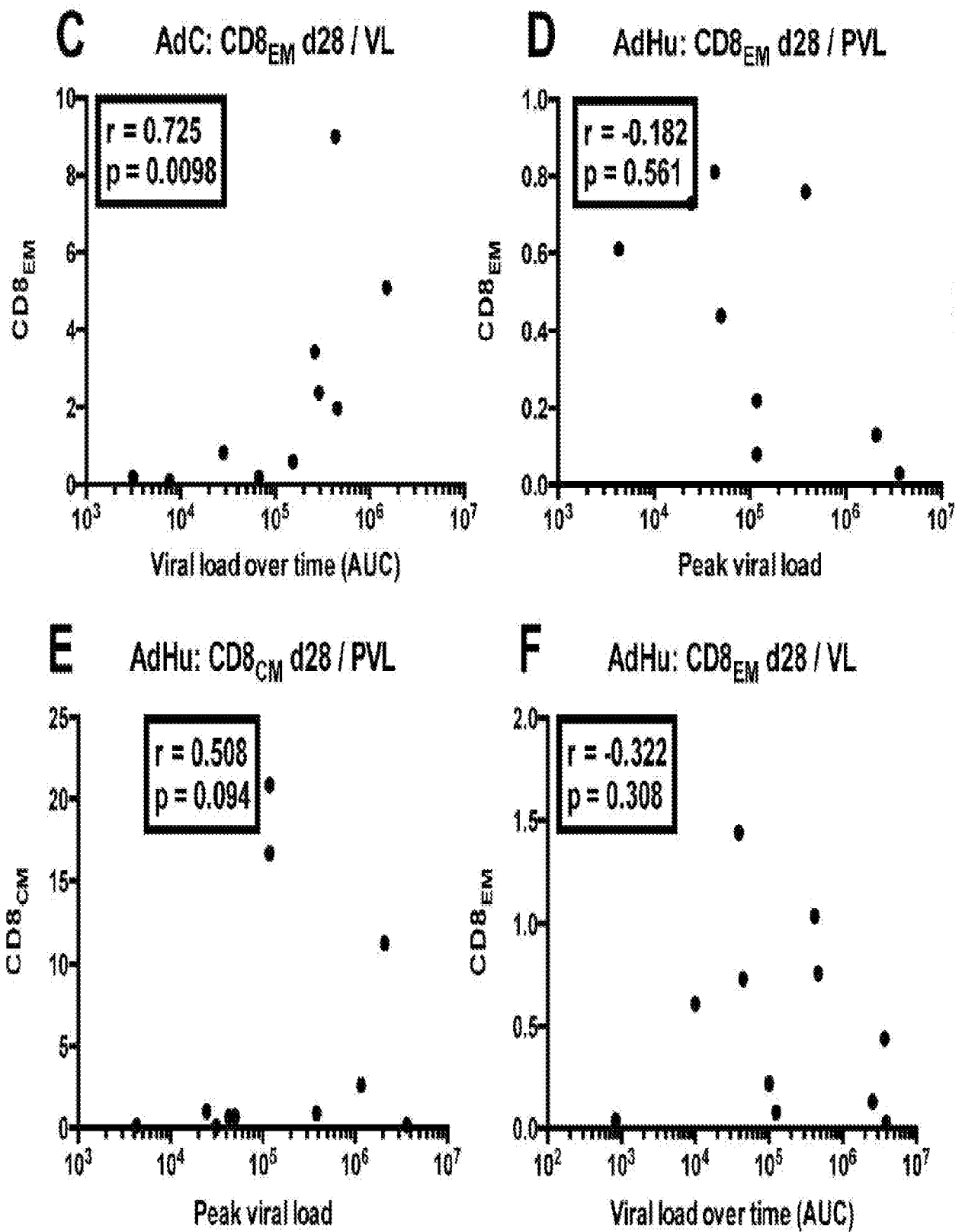


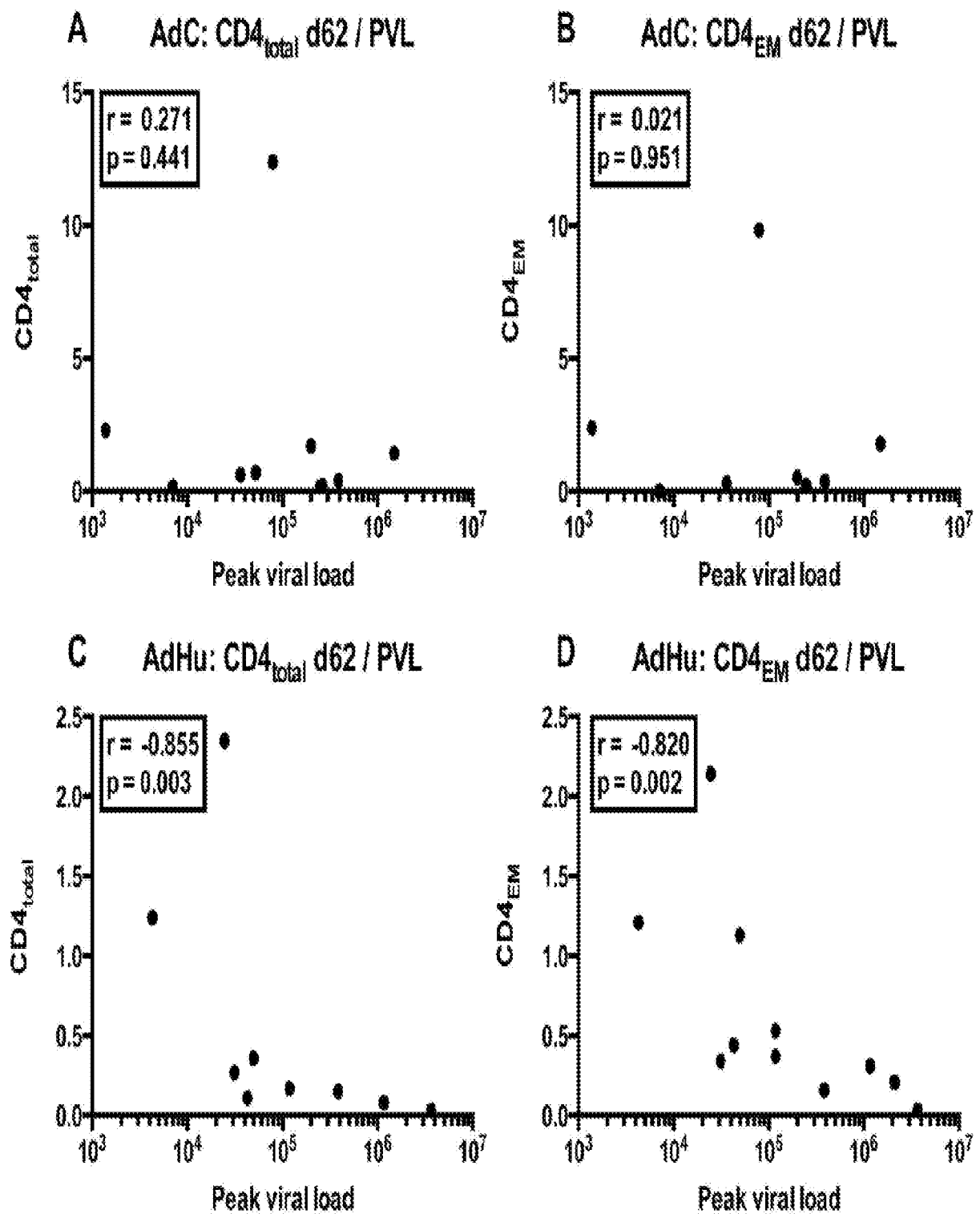
Fig. 11



Figs. 12A-12B



Figs. 12C-12F



Figs. 13A-13D

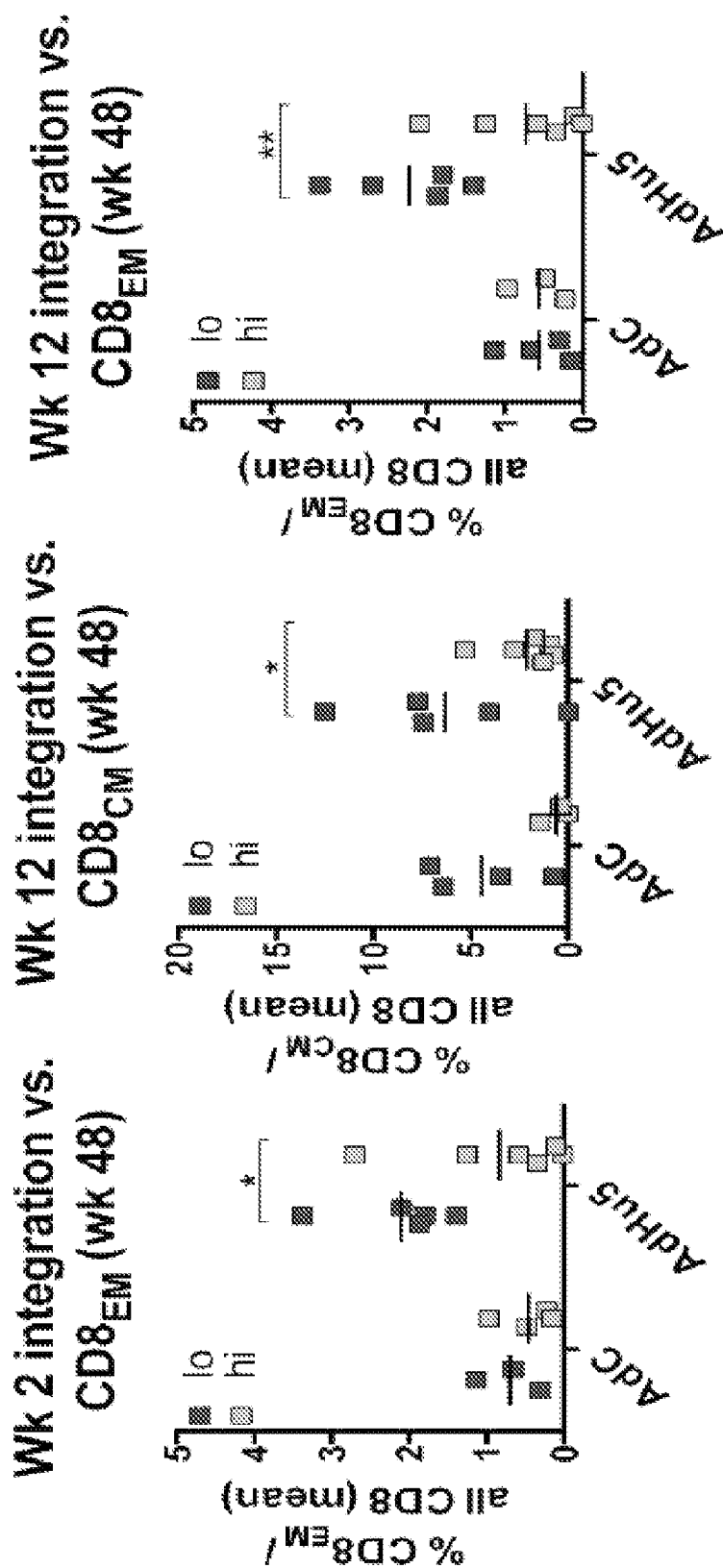
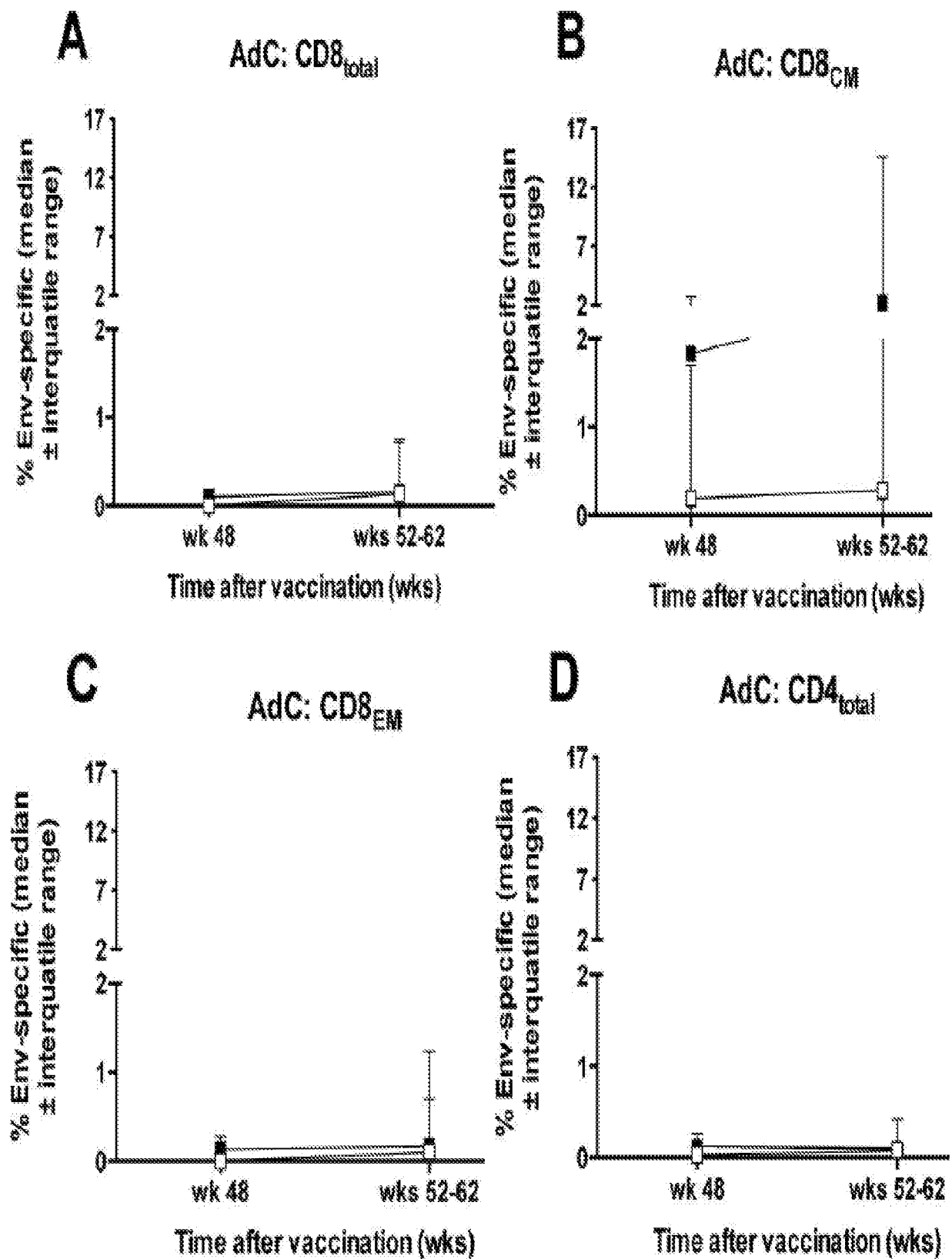
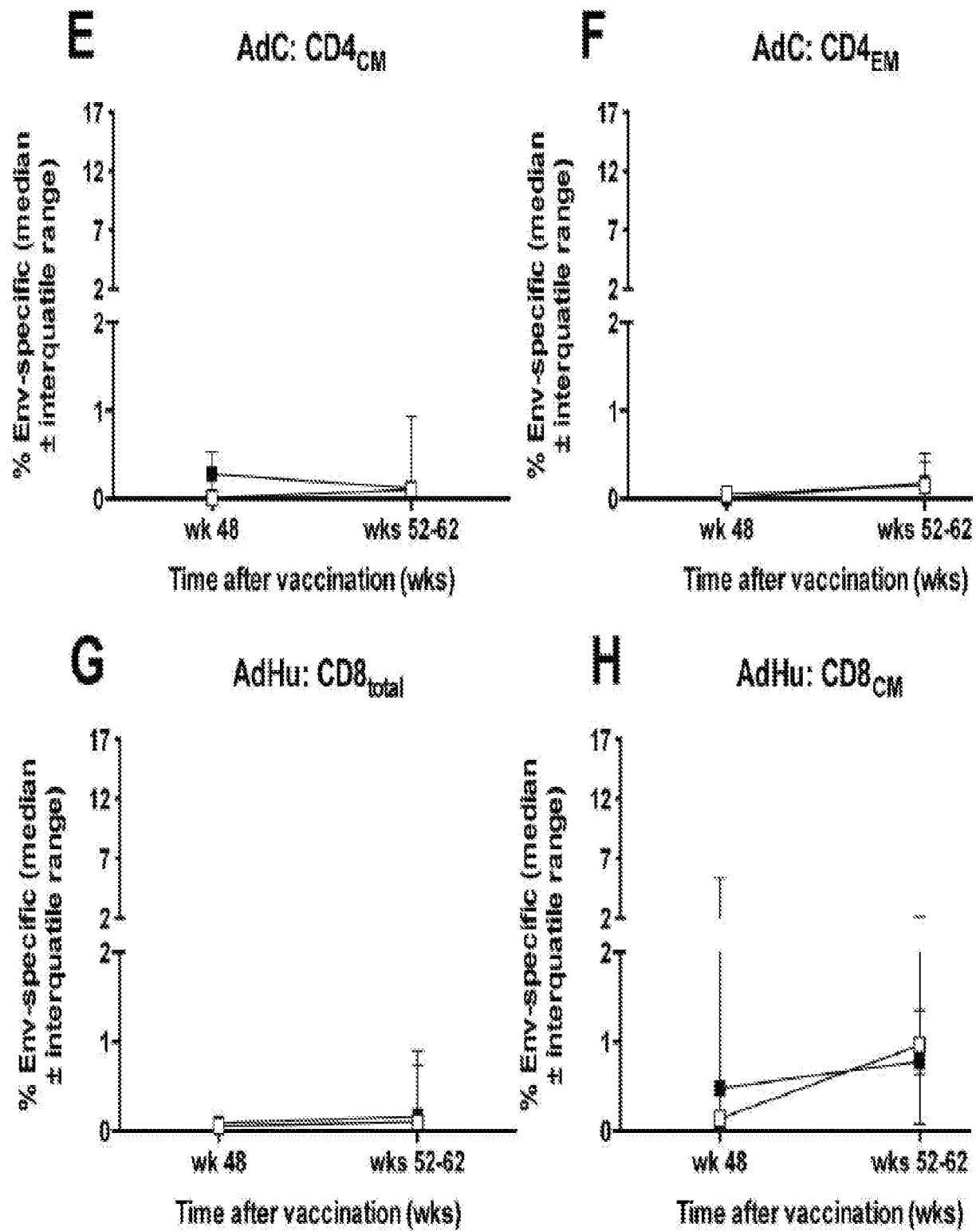


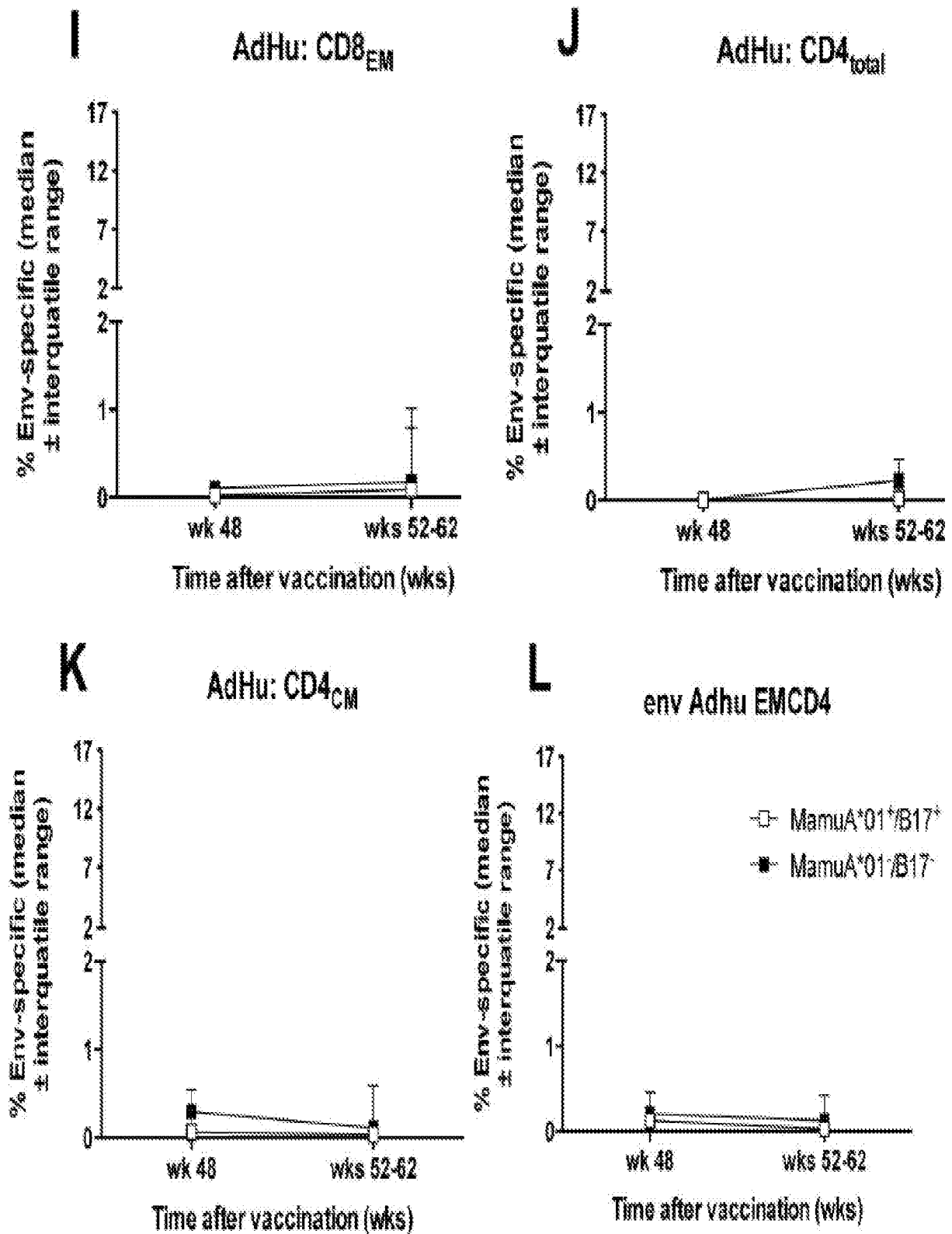
Fig. 14



Figs. 15A-15D



Figs. 15E-15H



Figs. 15I-15L

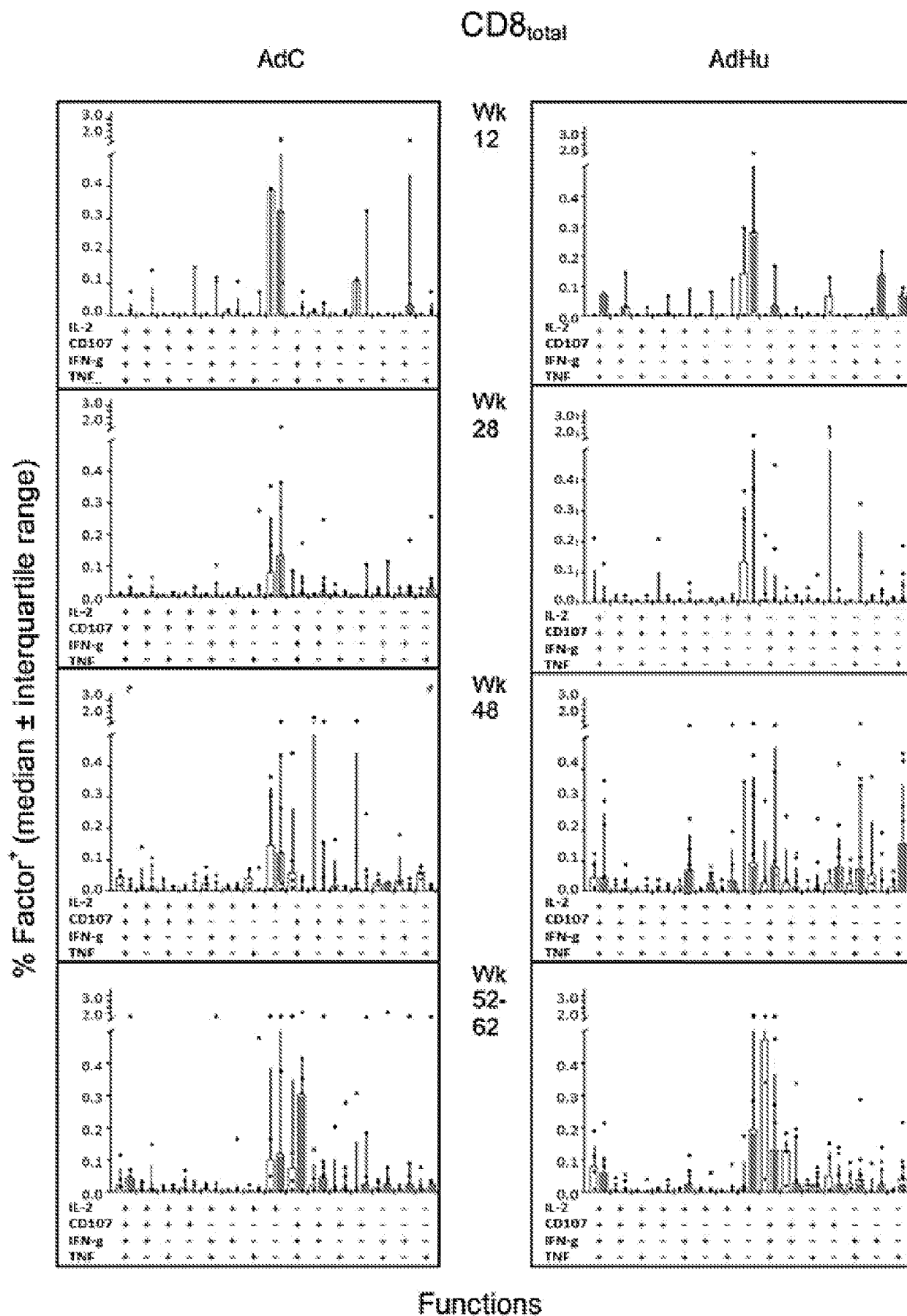


Fig. 16

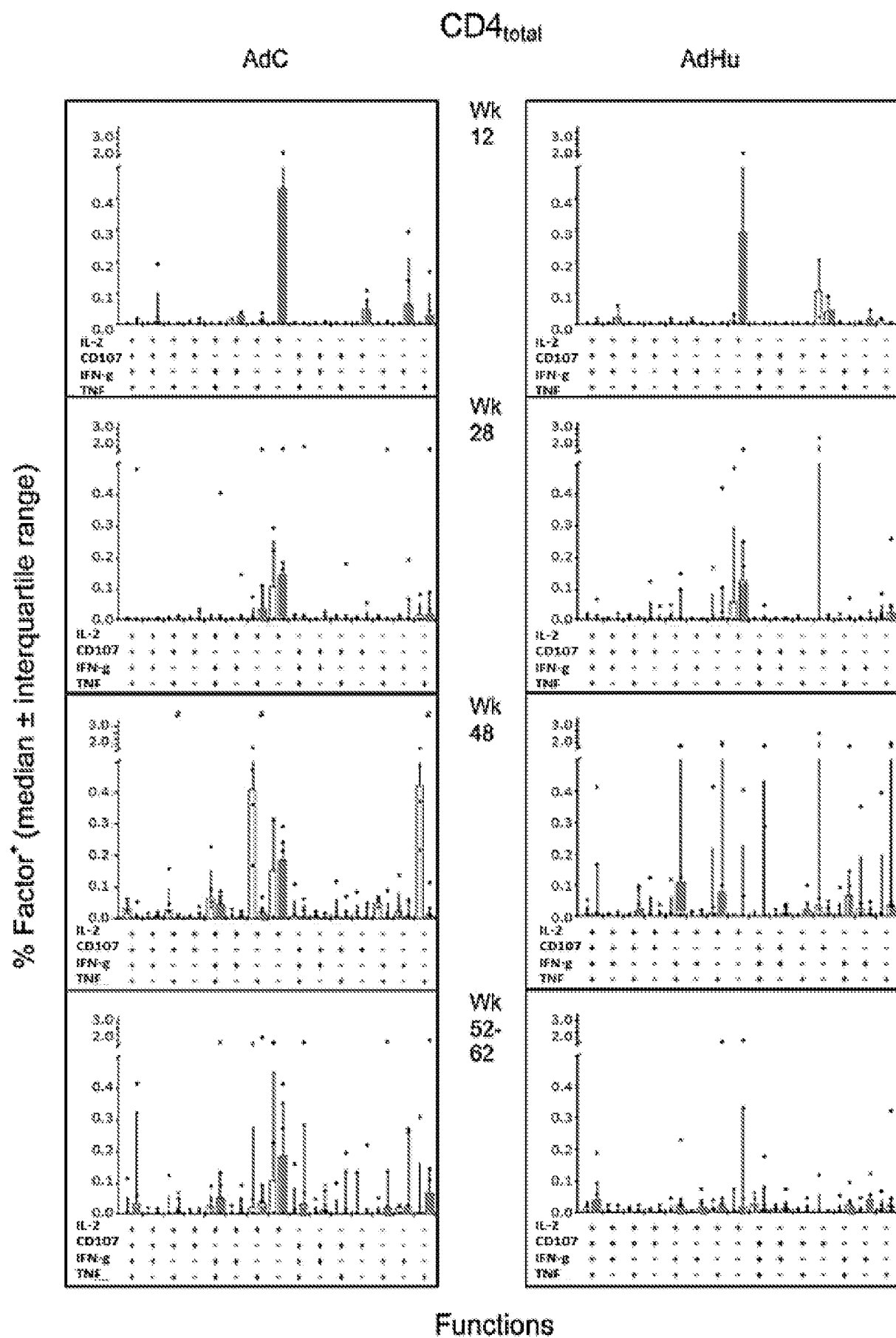


Fig. 17

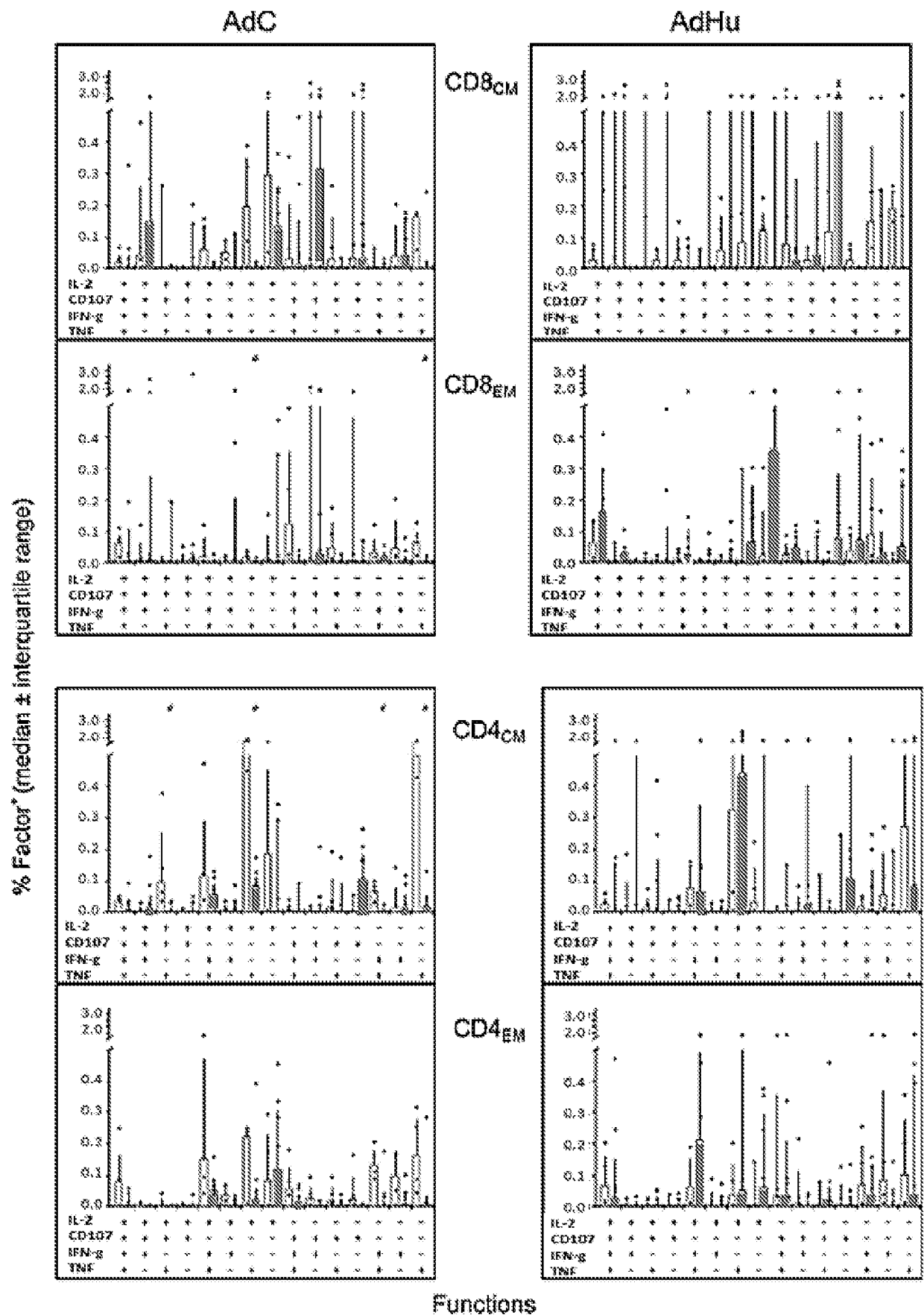


Fig. 18

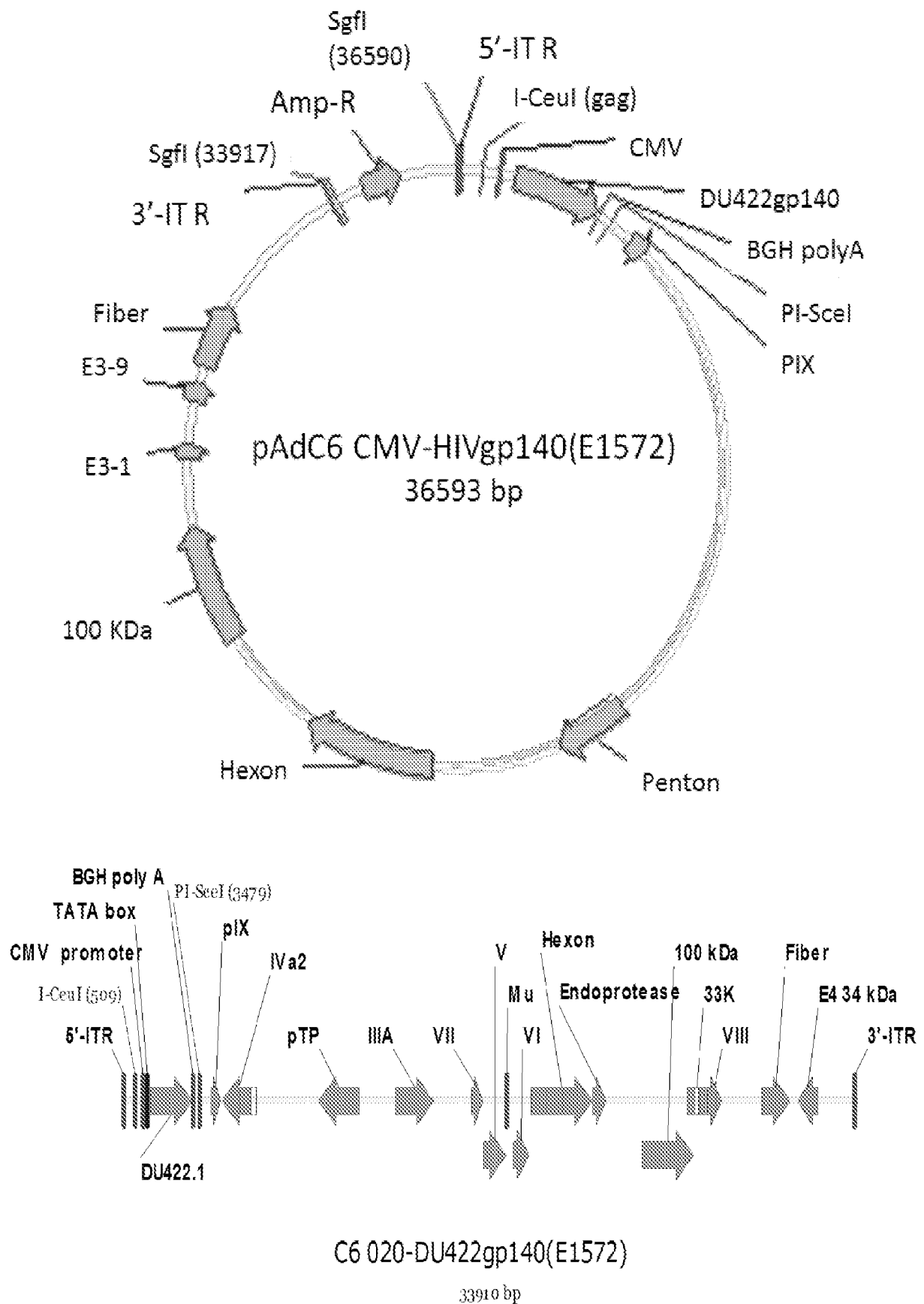


Fig. 19A

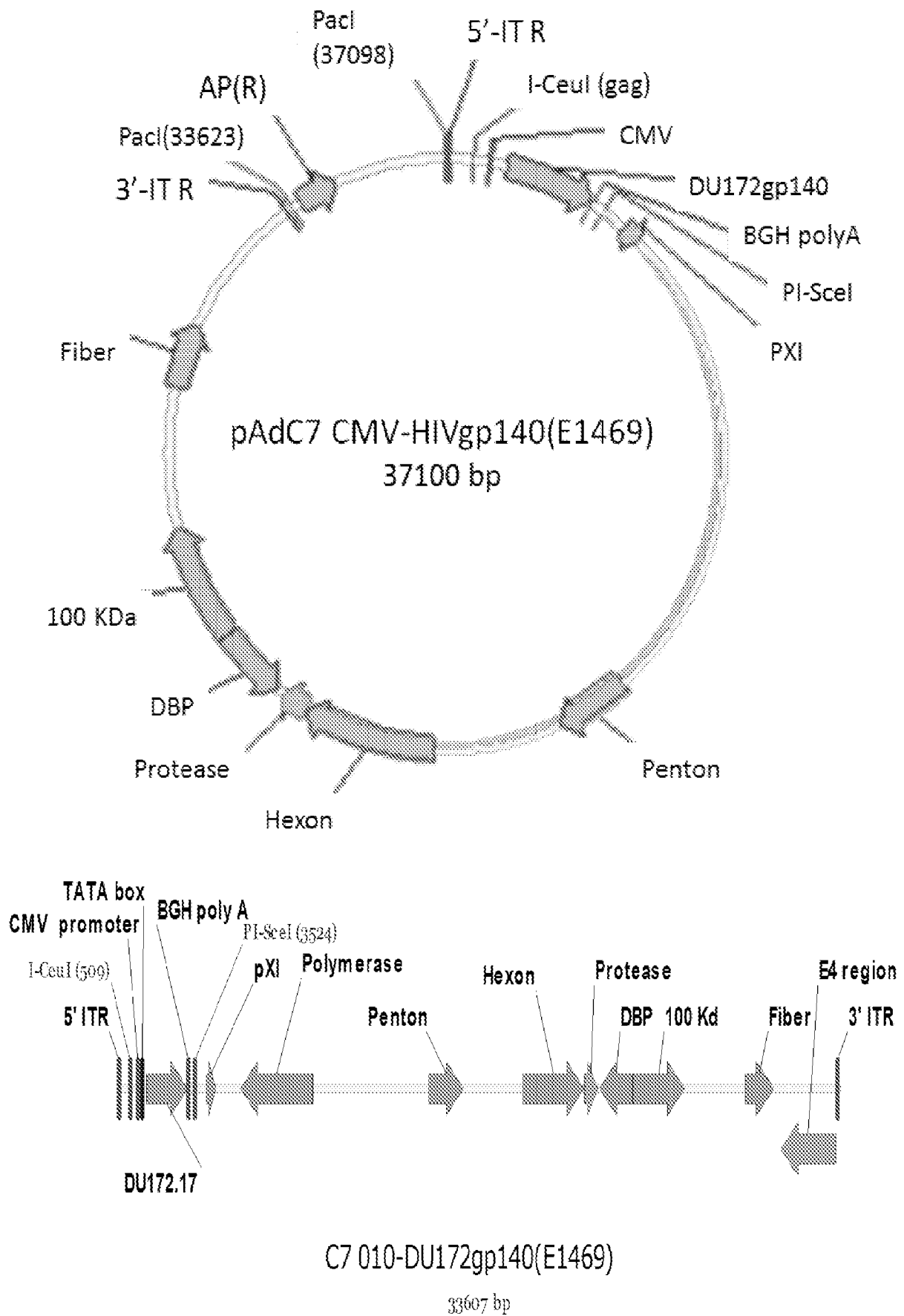


Fig. 19B

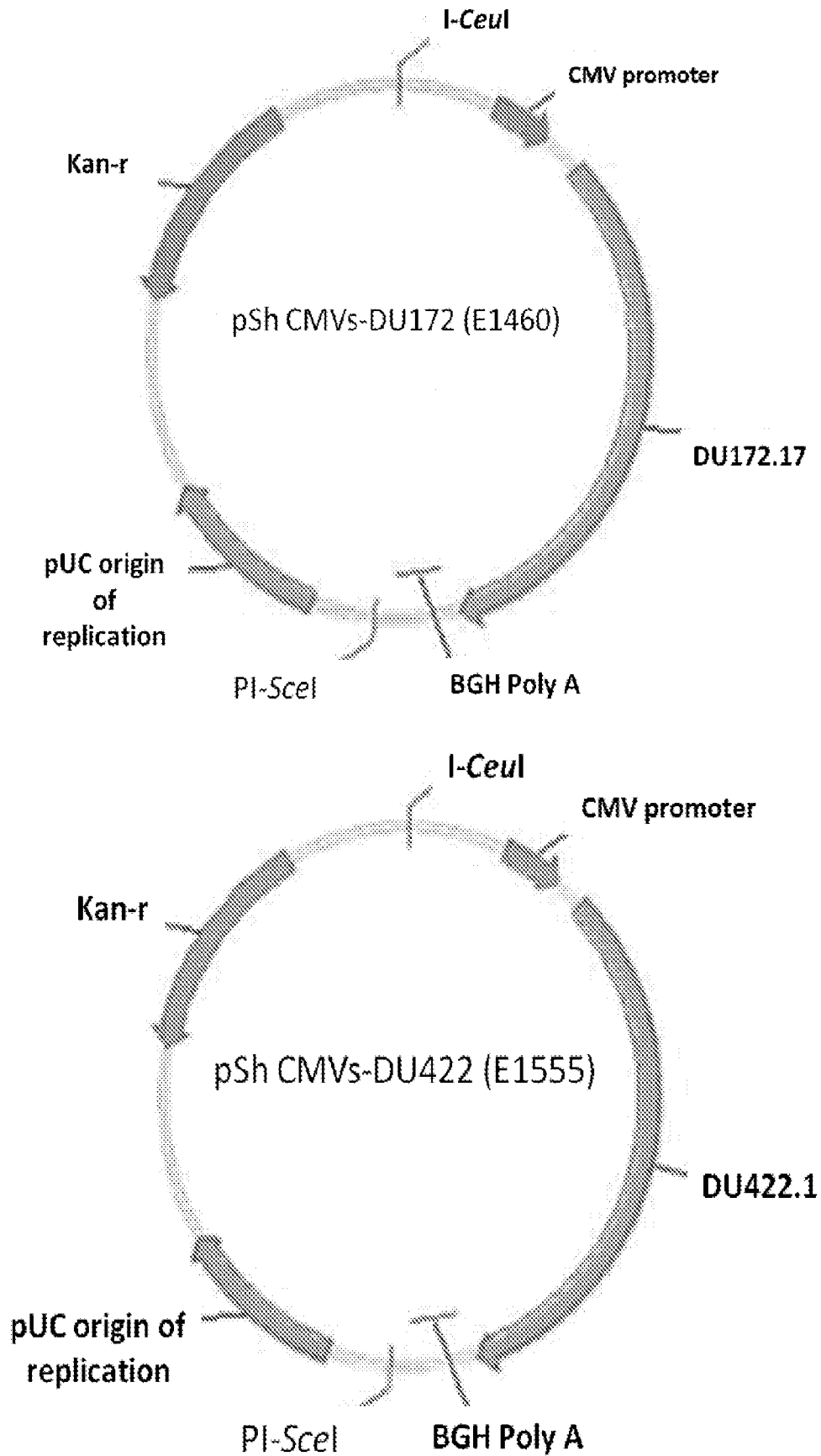


Fig. 19C

Fig. 20A

AdC6 020-HIVgp140(E1572) Nucleic Acids - SEQ ID NO: 1

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Fig. 20B

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TCTCGATCATTGAGCACCCGGTGGATCTTTCCAGGACCCGGTAGAGGTGGGCTTGATGTTGAGGTACATGGGCATGAGCCC
GTCCCGGGGGTGGAGGTAGCTCCATTGCAGGGCCTCGTGCTCGGGGATGGTGTGTAATCACCCAGTCATAGCAGGGGCGC
AGGGCGTGCTGCTGCACGATGCTCTTGAGGAGGAGACTGATGGCCACGGGCAGCCCTTGGTGTAGGTGTTGACGAACCTGT
TGAGCTGGGAGGGATGCATGCGGGGGGAGATGAGATGCATCTTGGCCTGGATCTTGAGATTGGCGATGTTCCCGCCAGATC
CCGCCGGGGTTTCATGTTGTGACGAGACCACAGCACGGTGTATCCGGTGCACCTGGGGAATTTGTCATGCAACTTGGAAAGG
AAGGCGTGAAAGAATTTGGAGACGCCCTTGTGACCGCCAGGTTTTTCATGCACTCATCCATGATGATGGCGATGGGCCGTG
GGCGGGCGCCTGGGCAAAGACGTTTCGGGGGTGCGACACATCGTAGTTGTGGTCCTGGGTGAGCTCGTCATAGGCCATTTTA
ATGAATTTGGGGCGGAGGGTGGCGACTGGGGACGAAGGTGCCCTCGATCCCGGGGGCGTAGTTGCCCTCGCAGATCTGC
ATCTCCAGGCCTTGAGCTCGGAGGGGGGATCATGTCCACCTGCGGGGCGATGAAAAAACGGTTTCGGGGCGGGGGAG
ATGAGCTGGGCCGAAAGCAGGTTCCGGAGCAGCTGGGACTTGCCGCAACCGGTGGGGCCGTAGATGACCCCGATGACCGGC
TGCAGGTGGTAGTTGAGGGAGAGACAGCTGCCGTCTCGCGAGGAGGGGGCCACCTCGTTCATCATCTCGCGCACATGCA
TGTTCTCGCGCACGAGTTCGCCAGGAGCGCTCGCCCCAGCGAGAGGAGCTTTCAGCGAGGCGAAGTTTTTCAGCGG
CTTGAGTCCGTGCGCCATGGGCATTTTGAGAGGGTCTGTTGCAAGAGTTCAGACGGTCCAGAGCTCGGTGATGTGCTCTA
GGGCATCTCGATCCAGCAGACCTCCTCGTTTCGCGGGTGGGGCGACTGCGGGAGTAGGGCACCGATGGGCGTCCAGC
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TGGGCGCTTGCGAGGGTGCGCTTCAGGCTCATCCGGCTGGTTCGAGAACCGTCCCGGTGCGCGCCCTGCGCGTGGCCAGGT
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CTTTATGGGCGGTCTCGAGCGGGGTGCCGCGTCTCGTCTAGAGGAACCCGCCACTCCGAGACGAAGGCCCGGGTC
CAGGCCAGCACGAAGGAGGCCACGTGGGAGGGGTAGCGGTGTTGTCCACCAGCGGTCCACCTTCTCAGGGTATGCAAG
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GGGCGTTGGAGAGCAGCTTGGCGATGGAGCGCATGGTCTGGTCTTTTCTTGTGCGCGCGTCTTGGCGGCGATGTTGAGC
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GGTTGTGCAGGGTGTAGAGTCCACGCTGGTGGCCACCTCGCCGCGCAGGGGCTCGTTGGTCCAGCAGAGGCGCCGCCCTT
GCGCGAGCAGAAGGGGGGCGAGCGGTCCAGCATGAGCTCGTGGGGGGGTGCGCTCCACGGTGAAGATGCCGGGCAGGA
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GGGGCTGAGGGGCGTGCCCCAGGGCATGGGTGCGTGAGCGCGGAGGCGTACATGCCGAGATGTCGTAGACGTAGAGGG
GCTCTCGAGGACCCGATGTAGGTGGGTAGCAGCGCCCCCGCGGATGCTGGCGCGCACGTAGTCGTACAGCTCGTGCGA
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GAAAGTAACATCGTTGAAGAGGATCTTCCCCGCGCGGGGCATGAAGTTGCGAGTGATGCGGAAAGGTGGGGCACCTCGGC
CCGTTGTTGATGACCTGGGCGGCGAGGACGATCTCGTCAAGCCGTTGATGTTGTGCCCGACGATGTAGAGTTCACGAATC
GCGGGCGGCCCTTGACGTGGGGCAGCTTCTGAGCTCGTCTAGGTGAGCTCGGCGGGGTGCTGAGCCCGTGTGCTCGAG

GCGCCAGTCCGCGACGCTGGGGGTTGGCGCTGAGGAAGGAAGTCCAGAGATCCACGCGCCAGGGCGGTCTGCAAGCGGTCCCG
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 CGGAGAGCGAGGACGAGGGCGCGCAGGCCGGAGCTGTCCAGGGTCTGAGACGCTGCGGAGTCAGGTCACTGGGCAGCGG
 CGGCGCGCGGTTGACTTGACAGGAGCTTTCCAGGGCGCGCGGGAGGTCCAGATGGTACTTGATCTCCACGGCGCCGTTGGTG
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 TCCTGAAGGTCTCGCGGCCGCGCGCTCGACGGTGCGCGGAGGTGTTGGAGATGCGGCCCATGAGCTGCGAGAAGGCG
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 TGAGCTCGACGTGGCGCGTGAAGACCGCGTAGTTGAGAGGCGCTGGTAGAGGTAGTTGAGCGTGGTGCGATGTGCTCGG
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 GAAGTCCACGGCGAAGTTGAAAACTGGGAGTTGCGCGCCGAGACGGTCAACTCTCTCTCCAGAAGACGGATGAGCTCGGCG
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 CTTCTCTCTCAGGAGGCGGTGGCGGGGAGGGGCCCTGCGTCGCGGCGGCGCGACGGGCGAGCGTCTGATGAAGCGCTCGA
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 CATCTCCAGGTGGCCGCGGGGGGGTCTCCGTTGGGCAGGGAGAGGGCGCTGACGATGCATCTTATCAATTGACCCGTAGGG
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 AAGGTAGGCTGAGCCCGGTTTCTTGTTCTTCGGGTATTTGGTTCGGGAGGCGGGCGGGCGATGCTGCTGGTGATGAAGTTGAA
 GTAGGCGGTCTGAGACGGCGGATGGTGGCGAGGAGCACAGGTCTTGGGCCCGGCTTGCTGGATGCGCAGACGGTCTGGC
 CATGCCCCAGGCGTGGTCTGACACCTGGCGAGGTCTTGTAGTAGTCTGCGATGAGCCGCTCCACGGGCACTCTCTCTCGCC
 CGCGCGGCGTGCATGCGCGTGAGCCCGAACCCGCGCTGCGGCTGGACGAGCGCCAGGTGCGCGACGACGCGCTCGGTGAG
 GATGGCCTGCTGGATCTGGGTGAGGGTGGTCTGGAAGTCGTGAAGTCGACGAAGCGGTGGTAGGCTCCGGTGTGATGGT
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 GGAAGTAGTTCATGGTGCCGCGGTCTGGCCGTGAGGCGCGCGCAGTCGTGGATGCTCTAGACATACGGGCAAAAACGAA
 AGCGGTGACGCGCTCGACTCCGTGGCCTGGAGGCTAAGCGAACGGGTTGGGCTGCGCGTGTACCCCGTTTCAATCTCGAAT
 CAGGCTGGAGCCGACGTAACGTGGTACTGGCACTCCCGTCTCGACCAAGCCTGCTAACGAAACCTCCAGGATACGGAGGC
 GGGTCGTTTTTTGGCCTTGGTCTGCTGGTCATGAAAACTAGTAAGCGCGGAAAGCGGCGCCCGCGATGGCTCGCTGCCGTA
 GTCTGGAGAAAGAATCGCCAGGGTTGCGTTGCGGTGTGCCCCGTTTCGAGCCTCAGCGCTCGGCGCCGGCCGGATTCGCGG
 CTAACGTGGGCGTGGCTGCCCCGTCGTTTCCAAGACCCCTTAGCCAGCCGACTTCTCCAGTTACGGAGCGAGCCCTCTTTTTT
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 CAACAGCCGGCGCTTCTGCCCCCGCCAGCAGCAGCCAGCCACTACCGCGGCGGCGCGCGGTGAGCGGAGCCGGCGTTCACT
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 GCCTCCCGCTTCCACGCGGGGCGGGAGCTGCGGCGCGGCTGGACCGAAAGCGGGTGTGAGGGACGAGGATTTGAGGGCG
 GACGAGCTGACGGGGATCAGCCCCGCGCGCGCACGTGGCCGCGGCCAACCTGGTACGCGGTACGAGCAGACCGTGAAG
 GAGGAGAGCAACTTCAAAAATCTTCAACAACCAGTGCACGCTGATCGCGCGGAGGAGGTGACCTGGGCTGATGC
 ACCTGTGGGACCTGCTGGAGGCCATCGTGCAGAACCCACGAGCAAGCCGCTGACGGCGCAGCTGTTTCTGGTGGTGACGA
 CAGTCGGGACAACGAGACGTTAGGGAGGCGCTGCTGAATATACCAGAGCCCGAGGGCGCTGGCTCTGGACCTGGTGAAC
 ATTTTGACGAGCATCGTGGTGACGAGGCGGGGCTGCCGCTGTCCGAGAAGCTGGCGGCCATCAACTTCTCGGTGCTGAGTC

Fig. 20D

TGGGCAAGTACTACGCTAGGAAGATCTACAAGACCCCGTACGTGCCCATAGACAAGGAGGTGAAGATCGACGGGTTTACAT
GCGCATGACCCTGAAAGTGCTGACCCTGAGCGACGATCTGGGGGTGTACCGCAACGACAGGATGCACCGCGCGGTGAGCGC
CAGCCGCCGGCGCGAGCTGAGCGACCAGGAGCTGATGCACAGCCTGCAGCGGGCCCTGACCGGGGCCGGGACCGAGGGGG
AGAGTACTTTGACATGGGCGCGGACCTGCGCTGGCAGCCCAGCCGCCGGGCCTTGAAGCTGCCGGCGGTTCCCCCTACGT
GGAGGAGGTGGACGATGAGGAGGAGGAGGGCGAGTACCTGGAAGACTGATGGCGCGACCGTATTTTGTAGATGCAGCA
ACAGCCACCGCCGCCGCTCTGATCCCGCATGCGGGCGGCGCTGCAGAGCCAGCCGTCCGGCATTAACTCCTCGGACGATT
GGACCCAGGCCATGCAACGCATCATGGCGCTGACGACCCGCAATCCCGAAGCCTTTAGACAGCAGCCTCAGGCCAACCGGCTC
TCGGCCATCCTGGAGGCCGTGGTGCCCTCGCGCTCGAACCCACGCACGAGAAGGTGCTGGCCATCGTGAACCGCGCTGGTGG
AGAACAAGGCCATCCGCGGTGACGAGGCCGGGCTGGTGTAACGCGCTGCTGGAGCGCGTGCCCCGCTACAACAGACCA
ACGTGCAGACGAACCTGGACCGCATGGTGACCGACGTGCGCGAGGCGGTGTCGACGCGGAGCGGTTCCACCGCGAGTCGA
ACCTGGGCTCCATGGTGGCGCTGAACGCCTTCTGAGCACGCAGCCCGCAACGTGCCCCGGGGCCAGGAGGACTACACCAA
CTTCATCAGCGCGCTGCGGCTGATGGTGGCCGAGGTGCCCCAGAGCGAGGTGTACAGTCGGGGCCGGACTACTTCTTCAG
ACCACTGCCAGGGCTTGAGACCGTGAACCTGAGCCAGGCTTTCAAGAACTTGACGGGACTGTGGGGCGTGACGGCCCCGG
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CGGCAGCGTGAGCCGCGACTCGTACCTGGGCTACCTGCTTAACCTGTACCGCGAGGCCATCGGACAGGCGCAGCTGGACGAG
CAGACCTACCAGGAGATACCCACGTGAGCCGCGCGCTGGGCCAGGAGACCCGGGCAACCTGGAGGCCACCTGAACCTCC
TGCTGACCAACCGTGCAGAAAGATCCCGCCCCAGTACGCGCTGAGCACCGAGGAGGAGCGCATCCTGCGCTACGTGCAGCA
GAGCGTGGGGCTGTTCTGATGAGGAGGGGGCCACGCCAGCGCGGCGCTCGACATGACCGCGCGCAACATGGAGCCCAG
CATGTACGCCCGCAACCGCCGTTTCATCAATAAGCTGATGGACTACTTGATCGGGCGGCGCCCATGAACCTCGGACTACTTTAC
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TCCTGTGGGACGACGTGGACAGCAGCGTGTCTCGCCGCGTCCAGGAACCAATGCCGTGTGGAAGAAAGAGGGCGGGGACC
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CTTTTCGTGAACAGCGTGCGCAGCAGCGAGCTGGGTGCGCTGACGCGACCGCGCCTGCTGGGCGAGGAGGAGTACCTGAAC
GACTCCTTGTGAGGCCCCGAGCGCGAGAAGAACTTCCCAATAACGGGATAGAGAGCCTGGTGACAAGATGAGCCGTGGA
AGACGTACGCGCACGAGCACAGGGACGAGCCCCGAGCTAGCAGCGCAGGCACCCGTAGACGCCAGCGGCACGACAGGCAGC
GGGACTGGTGTGGGACGATGAGGATTCCGCCGACGACAGCAGCGTGTGGACTTGGGTGGGAGTGGTGGTAACCCGTTCCG
CTCACCTGCGCCCCGTATCGGGCGCTGATGTAAGAACTGAAAAAATAAAAGACGGTACTACCAAGGCCATGGCGACCAG
CGTGCGTTCTTCTCTGTTGTTGTAGTAGTATGATGAGGCGCGTGTACCCGAGGGTCTCTCCTCGTACGAGAGCGTGATG
CAGCAGGCGGTGGCGGCGCGATGCAGCCCCGCTGGAGGCGCCTTACGTGCCCCGCGGTACCTGGCGCTACGGAGGGG
CGGAACAGCATTCTTACTCGGAGCTGGCACCTTGTACGATACCACCCGTTGTACCTGGTGGACAACAAGTCGGCAGACAT
CGCCTCGTGAACCTACCAGAACGACCACAGCAACTTCTGACCACCGTGGTGCAGAACAAACGATTTACCCCCACGGAGGCCA
GCACCCAGACCATCAACTTTGACGAGCGCTCGCGGTGGGGCGGCCAGTGAACCAACATCATGCACACCAACATGCCAACGT
GAACGAGTTCATGTACAGCAACAAGTTCAAGGCGCGGGTGTGGTCTCGCGCAAGACCCCCAACGGGGTGGATGATGATTAT
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ATCTGATGAACAACGCCATCATCGAACAATACTTGGCGGTGGGGCGGCAGAACGGGGTGTGGAGAGCGACATCGGCGTGA
AGTTCGACACGCGCAACTTCCGGCTGGGTGGGACCCCGTGACCGAGCTGGTGTGTCGGGGCGGTGTACACCAACGAGGCCTT
CCACCCCGACATCGTCTGCTGCCCGGCTGCGGCGTGGACTTCACCGAGAGCCGCTCAGCAACCTGCTGGGCATCCGCAAGC
GGCAGCCCTTCCAGGAGGGCTTCCAGATCCTGTACGAGGACCTGGAGGGGGGCAACATCCCCGCGCTCTTGGATGTGGAAGC
CTACGAGAAAAGCAAGGAGGATAGCACCGCCGCGCGGACCGCAGCCGTGGCCACCGCCTTACCGAGGTGCGGGGCGATAA
TTTTGCTAGCGCTGCGGCAGCGGCCGAGGCGGCTGAAACCGAAAGTAAGATAGTCATCCAGCCGGTGGAGAAGGACAGCAA
GGACAGGAGCTAACAGTGCTCGCGGACAAGAAAAACACCGCCTACCGCAGCTGGTACCTGGCCTACAACCTACGGCGACCCC
GAGAAGGGCGTGCGCTCCTGGACGCTGCTACCACTCGGACGTACCTGCGGCGTGGAGCAAGTCTACTGGTCTGCTGCCCCG
ACATGATGCAAGACCCGTCACCTCCGCTCCACGCGTCAAGTTAGCAACTACCCGGTGGTGGGCGCGGAGCTCTGCCGTC
TACTCCAAGAGCTTCTTCAACGAGCAGGCCGTCTACTCGCAGCAGCTGCGCGCCTTACCTCGCTCACGCACGTCTTCAACCGC
TTCCCCGAGAACCAGATCCTCGTCCGCCCGCCGCGCCACCATTACCACCGTCAGTGAACACGTTCTGCTCTCACAGATCAC
GGGACCCTGCCGCTGCGCAGCAGTATCCGGGGAGTCCAGCGCGTGACCGTCACTGACGCCAGACGCCGACCTGCCCTACG
TCTACAAGGCCCTGGGCGTAGTCGCGCCGCGCGTCTCTCGAGCCGCACCTTCTAAAAATGTCCATTCTCATCTCGCCAGTA
ATAACACCGGTTGGGGCTGCGCGCGCCAGCAAGATGTACGGAGGCGCTCGCAACGCTCCACGCAACACCCCGTGGCGGT
GCGCGGGCACTTCCGCGTCCCTGGGGCGCCCTCAAGGGCGCGTGGCGCTCGCGCACCAACCGTCGACGACGTGATCGACAG
GTGGTGGCCGACGCGCGCAACTACACGCCCGCCGCGCGCCGCTCTCCACCGTGGACGCCGTATCGACAGCGTGGTGCCG

Fig. 20E

ACGCGCGCCGGTACGCCCCACCAAGAGCCGGCGGGCGGCATCGCCCGGGCGGACCGGAGCACCCCGCCATGCGCGCGG
CGCGAGCCTTGCTGCGCAGGGCCAGGCGCACGGGACGCAGGGCCATGCTCAGGGCGGCCAGACGCGCGGCCTCCGGCAGCA
GCAGCGCCGGCAGGACCCGAGACGCGCGGCCACGGCGGGCGGGCGGCCATCGCCAGCATGTCCCGCCCGCGCGCGGCA
ACGTGTACTGGGTGCGCGACGCCGCCACCGGTGTGCGCGTGCCCGTGCGCACCCGCCCCCTCGCACTTGAAGATGCTGACTT
CGCGATGTTGATGTGTCCAGCGGCGAGGAGGATGTCCAAGCGCAAATACAAGGAAGAGATGCTCCAGGTATCGCGCCTGA
GATCTACGGCCCCGCGGCGGCGGTGAAGGAGGAAAGAAAGCCCGCAAACCTGAAGCGGGTCAAAAAGGACAAAAGGAGG
AGGAAGATGACGGAAGTGTGGAGTTTGTGCGCGAGTTCGCCCCCGGGCGGCGGTGCAAGTGGCGGGGCGGAAAGTGAAAC
CGGTGCTGCGGCCCGGCACACGGTGGTCTTACGCCCCGGCGAGCGTTCGGGCTCCGCCTCCAAGCGCTCCTACGACGAGGT
GTACGGGGACGAGGACATCCTCGAGCAGGCGGTGAGCGTCTGGGCGAGTTTGCCTACGGCAAGCGCAGCCGCCCGCGCC
CTTGAAAGAGGAGGCGGTGTCCATCCCGTGGACACGGCAACCCACGCCGAGCCTGAAGCCGGTGACCCTGCAGCAGGTG
CTACCGAGCGCGGCGCCGCGCGGGGCTTCAAGCGGAGGGCGGCGAGGATCTGTACCCGACCATGCAGCTGATGGTGCCC
AAGCGCCAGAAGCTGGAGGACGTGCTGGAGCACATGAAGGTGGACCCGAGGTGCAGCCCGAGGTCAAGGTGCGGCCCATC
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GCAAGTACGGCGCGGCCAGCCTGCTGATGCCAACTACGCGCTGCATCCTTCCATCATCCCCACGCCGGGCTACCGCGGCACG
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GACTTCCGCTTGGTGCGGAGAGTGTATCGCAGCGGGCGCGAGCCTCTGACCTGCCGCGCGCGCTACACCCGAGCATC
GCCATTTAACTACGCCTCTACTTGCAGATATGGCCCTCATATGCCGCTCCGCGTCCCCATTACGGGTACCGAGGAAGAAA
GCCGCGCGGTAGAAGGCTGACGGGGAACGGGCTGCGTCGCCATCACACCGGCGGCGGCGGCCATCAGCAAGCGGTTGGG
GGGAGGCTTCTGCCCGCGTGTATCCCATCATCGCCGCGCGATCGGGGCGATCCCCGGCATAGCTTCCGTGGCGGTGCAG
GCCTCTCAGCGCCACTGAGACACAAAAAGCATGGATTTGTAATAAAAAAATGGACTGACGCTCCTGGTCTGTGATGT
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GGTGGTTGATGGCCTGGCCTCAGGCATCAACGGGGTGGTTGACCTGGCCAACAGGCGGTGCAGAAACAGATCAACAGCCGC
CTGGACGCGGTCCCGCCCGCGGGGTCCGTGGAGATGCCCCAGGTGGAGGAGGAGCTGCCTCCCCTGGACAAGCGCGGCGAC
AAGCGACCGGTCCCGACGCGGAGGAGACGCTGCTGACGCACACGACGAGCGCCCGCTACGAGGAGGCGGTGAAACTG
GGCCTGCCACACGCGGCGCCGTGGCGCCTCTGGCCACCGGAGTGTGAAACCCAGCAGCAGCCAGCCCGCGACCTGGACT
TGCTCCGCTCGCCCTCCACAGTGGCTAAGCCCTGCCCGGTGGCCGTGCGTGCAGCGCCCCCGAGGCGCCCCCAG
GCGAACTGGCAGAGCACTCTGAACAGCATCGTGGGTCTGGGAGTGCAGAGTGTGAAGCGCGCGCGTCTATTAAAAAGACAC
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GCAAGATGGCCACCCATCGATGCTGCCCCAGTGGGCGTACATGCACATCGCCGACAGGACGCTTCGGAGTACCTGAGTCC
GGGTCTGGTGCAGTTCGCCCCGCGCACAGACACCTACTTCAGTCTGGGGAACAAGTTAGGAACCCACGGTGGCGCCACGC
ACGATGTGACCACCGACCGCAGCCAGCGGTGACGCTGCGCTTCGTGCCCGTGGACCGGAGGACAACACCTACTCGTACAA
AGTGCGCTACACGTGGCCGTGGGCGACAACCGGTGCTGGACATGGCCAGCACCTACTTTGACATCCGCGGCGTGTGGAC
CGGGGCCCTAGCTTCAAACTACTCTGGCACCGCTACAACAGCCTAGTCCCAAGGGAGCTCCCAATTCAGCCAGTGGGA
GCAAGCAAAAACAGGCAATGGGGGAACATGGAACACACACATATGGTGTGGCCCCAATGGGCGGAGAGAATATTACAAA
AGATGGTCTTCAAATTGGAAGTACGTTACAGCGAATCAGAATAAACCAATTTATGCCGACAAAACATTTCAACCAGAACCGC
AAGTAGGAGAAGAAAATTGGCAAGAACTGAAAACCTTTATGGCGGTAGAGCTCTAAAAAAGACACAAACATGAAACCTTG
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AATTCGACATAGACCTGGCTTTCTTTGATACTCCCGGTGGCACCGTGAACGGTCAAGACGAGTATAAAGCAGACATTGTCATGT
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GGCAATATGGGTGTGCTTGTGCTGAGGCTCCAGCTGAATGCTGTGGTTGATTGCAAGACAGAAAACCGAGCTGCTCTA
CCAGCTCTTGTGCTTACTTTGGGTGACAGAACCCGGTATTTAGTATGTGGAACAGGCGGTGGACAGTTATGACCCCGATG
TGCGCATCATGAAAACCATGGTGTGGAGGATGAATTGCCAACTATTGCTTCCCCTTGGACGGCTCTGGCACTAACGCCGCA
TACCAAGGTGTGAAAGTAAAGATGGTCAAGATGGTGATGTTGAGAGTGAATGGGAAAATGACGATACTGTTGCAGCTCGAA
ATCAATTATGTAAGGTAAATTTTCGCCATGGAGATTAATCTCCAGGCTAACCTGTGGAGAAGTTTCTCTACTCGAACGTGG
CCCTGTACCTGCCCCGACTCTACAAGTACAGCCGACCAACGTACGCTGCCGACCAACACCAACACCTACGATTACATGAATG
GCAGAGTGACACCTCCCTCGTGGTAGACGCTACCTAACATCGGGGCGCGTGGTGTGCGTGGACCCCATGGACAACGTCAAC

Fig. 20F

CCCTTCAACCACCACCGCAACGCGGGCCTGCGCTACCGCTCCATGCTCCTGGGCAACGGGCGCTACGTGCCCTTCCACATCCAG
GTGCCCCAAAAGTTTTTCGCCATCAAGAGCCTCTGCTCCTGCCC GGCTCTACACCTACGAGTGGAAGTTCGCCAAGGACGTC
AACATGATCCTGCAGAGCTCCCTAGGCAACGACCTGCGCACGGACGGGGCCTCCATCGCCTTACCAGCATCAACCTCTACGC
CACCTTCTCCCCATGGCGCACAAACCCGCTCCACGCTCGAGGCCATGCTGCGCAACGACACCAACGACCAGTCTTCAACGA
CTACCTCTCGGCGGCAACATGCTCTACCCCATCCCGGCCAACGCCACCAACGTGCCCATCTCCATCCCCTCGCGCAACTGGGC
CGCCTTCCGCGGATGGTCTTACGCGCCTGAAGACCCGCGAGACGCCCTCGCTCGGCTCCGGGTTGACCCCTACTTCTGCTA
CTCGGGCTCCATCCCCTACCTAGACGGCACCTTCTACCTCAACCACACCTTCAAGAAGGTCTCCATCACCTTCGACTCCTCCGTC
AGCTGGCCCCGCAACGACCGCTCCTGACGCCAACGAGTTCGAAATCAAGCGCACCGTCGACGGAGAGGGATACAACGTGG
CCCAGTGCAACATGACCAAGGACTGGTTCCTGGTCCAGATGCTGGCCCACTACAACATCGGCTACCAGGGCTTCTACGTGCCC
GAGGGCTACAAGGACCGCATGTACTCTTCTTCCGCAACTTCCAGCCCATGAGCCGCCAGGTCTGGACGAGGTCAACTACAA
GGACTACCAGGCCGTACCCCTGGCCTACCAGCACAACAACTCGGGCTTCGTGCGCTACCTCGCGCCACCATGCGCCAGGGCC
AGCCCTACCCCGCAACTACCCCTACCCGCTCATCGCAAGAGCGCGCTCGCCAGCGTCACCCAGAAAAAGTTCCTCTGCGACC
GGGTCTGTGGCGCATCCCCTTCTCAGCAACTTCATGTCCATGGGCGCGCTCACCGACCTCGGCCAGAACATGCTCTACGCCA
ACTCCGCCACGCGCTAGACATGAATTTCAAGTGCACCCCATGGATGAGTCCACCCTTCTCTATGTTGTCTTCAAGTCTTCGA
CGTCGTCCGAGTGACCAAGCCCCACCGCGCGCTCATCGAAGCGTCTACCTGCGCACGCCCTTCTCGGCCGGCAACGCCACCA
CCTAAGCCGCTCTTGCTTCTTGAAGATGACGGCGGGCTCCGGCGAGCAGGAGCTCAGGGCCATCCTCCGCGACCTGGGCTGC
GGGCCCTGCTTCTGGGCACCTTCGACAAGCGCTTCCCTGGATTTCATGGCCCCGACAAGCTGGCCTGCGCCATCGTGAACAC
GGCCGGCCGCGAGACCGGGGCGAGCACTGGCTGGCCTTCGCTGGAACCCGCGCTCCACACATGCTACCTTCTGACCCCT
TCGGGTTCTCGGACGAGCGCTCAAGCAGATCTACCAGTTCGAGTACGAGGGCTGCTGCGTGCAGCGCCCTGGCCACCGA
GGACCGTGCCTGACCTGAAAAAGTCCACCCAGACCGTGCAGGTCCGCGCTCGGCCGCTGCGGGCTTCTGCTGCATGT
TCCTGCACGCCTTCGTGCACTGGCCCGACCGCCCATGGACAAGAACCCACCATGAAGTACTGACGGGGGTGCCAACGGC
ATGCTCCAGTCGCCCCAGGTGGAACCCACCCTGCGCCGCAACCAGGAAGCGCTCTACCGCTTCTCAATGCCCACTCCGCTAC
TTTCGCTCCACCGCGCGCATCGAGAAGGCCACCGCCTTCGACCGCATGAATCAAGACATGTAAAAAACCGGTGTGTGTAT
GTGAATGCTTTATTATAATAAACAGCACATGTTTATGCCACCTTCTCTGAGGCTCTGACTTTATTTAGAAATCGAAGGGTTCT
GCCGGCTCTCGGCATGGCCCGCGGGCAGGGATACGTTGCGGAAGTGGTACTTGGGCAGCCACTTGAAGTCCGGGGATCAGCAG
CTTGGGCACGGGGAGGTCCGGGAACGAGTCCGCTCCACAGCTTGCAGGTGAGTTGCAGGGCGCCAGCAGGTCCGGGCGCGGA
GATCTTGAAATCGCAGTTGGGACCCGCGTTCGCGCGCGAGAGTTGCGGTACACGGGGTTGCAGCACTGGAACACCATCAGG
GCCGGGTGCTTCACGTTGCCAGACCGTCGCGTCGGTGATGCCCTCCAGTCCAGATCCTCGGCGTTGGCCATCCCGAAGGG
GGTCATCTTGCAAGTCTGCGGCCCATGCTGGGCACGACCGGGCTTGTGGTTGCAATCGCAGTGCAGGGGGATCAGCATC
ATCTGGGCTGCTCGGAGCTCATGCCCCGGTACATGGCCTTCATGAAAGCTCCAGCTGGCGGAAGGCCTGCTGCGCTTGCC
GCCCTCGGTGAAGAAGACCCCGCAGGACTTGCTAGAGAACTGGTGGTGGCGCAGCCGGCGTCTGTCACGCAGCAGCGCGC
GTGTTGTTGGCAGCTGCACACGCTGCGCCCCAGCGTTCTGGGTGATCTTGGCCGGTTGGGGTTCTCTTACGCGCGC
GCTGCCCGTTCTCGCTCGCCACATCCATCTCGATAGTGTGCTCCTTCTGGATCATCACGGTCCCGTGCAGGCACCCGAGCTTGC
CCTCGGCTTCGGTGCAAGCGTGACGCCACAGCGCGCAGCCGGTGCACTCCAGTTCTTGTGGCGATCTGGGAGTGCGAGTG
CACGAAGCCCTGCAGGAAGCGGCCCATCATCGCGTCAAGGTCTTGTGCTGGTGAAGGTGAGCGGGATGCCGCGGTGCTCC
TCGTTACATACAGGTGGCAGATGCGGCGGTACACCTCGCCCTGCTCGGCATCAGCTGGAAGGCGGACTTCAGGTGCTCTC
CACGCGGTACCGGTCCATCAGCAGCGTCACTTCCATGCCCTTCTCCAGGCCGAAACGATCGGCAGGCTCAGGGGGTTCT
TCACCGCCATTGTCATCTAGTCGCGCGCCCGAGGTGAGGGGTGCTTCTCGTCCAGGGTCTCAAACACTCGCTTGGCGTCT
TCTCGATGATGCGCACGGGGGAAAGCTGAAGCCACGGCCGCCAGCTCCTCCTCGGCTGCTTTCTGCTCCTCGCTGTCTGG
CTGATGTCTTGCAAAGGCACATGCTTGGTCTTGGCGGGTTCTTTTTGGGCGGCAGAGGGCGCGCGATGTGCTGGGAGAGC
GCGAGTTCTGTTACACGACTATTTCTTCTTGGCCGTGCTCCGAGACCACGCGCGGTAGGCATGCCTTCTTGGGGCA
GAGGCGGAGGCGACGGGCTCTCGCGTTCCGCGGGCGGCTGGCAGAGCCCTTCCGCGTTCCGGGGTGCCTCTGGCGGC
GCTGCTCTGACTGACTTCTCCGCGGCCGCGCATTGTGTTCTCTAGGGAGCAACAACAAGCATGGAGACTCAGCCATCGTCG
CCAACATCGCCATCTGCCCCCGCGCCACCGCCGACGAGAACCAGCAGCAGAATGAAAGCTTAACCGCCCCGCGCCAGCCC
CACCTCCGACGCGCGGCCCCAGACATGCAAGAGATGGAGGAATCCATCGAGATTGACCTGGGCTACGTGACGCCCCGCGAG
CACGAGGAGGAGCTGGCAGCGCGCTTTTACGCCCCGAAGAGAACCACCAAGAGCAGCCAGAGCAGGAAGCAGAGAACGA
GCAGAACCAGGCTGGGCACGAGCATGGCGACTACCTGAGCGGGGAGAGGACGTGCTCATCAAGCATCTGCCCCGCAATG
CATCATCGTCAAGGACGCGCTGCTCGACCGCGCCGAGGTGCCCTCAGCGTGGCGGAGCTCAGCCGCGCTACGAGCGCAAC
CTCTTCTCGCCGCGCGTGGCCCCAAGCGCCAGCCCAACGGCACCTGTGAGCCCAACCCGCGCCTCACTTCTACCCGGTCTTC
GCGGTGCCCCGAGGCTGGCCACCTACCACCTTTTTTCAAGAACCAAGGATCCCCGTCTCTGCGCGCCAACCGCACCCGC

Fig. 20G

GCCGACGCCCTGCTCAACCTGGGCCCCGGCGCCCGCTACCTGATATCACCTCCTTGAAGAGGTTCCCAAGATCTTCGAGGG
TCTGGGCAGCGACGAGACTCGGGCCGGAACGCTCTGCAAGGAAGCGGAGAGGAGCATGAGCACCACAGCGCCCTGGTGGA
GTTGGAAGGCGACAACGCGCGCCTGGCGGTCTCAAGCGCACGGTCGAGCTGACCCACTTCGCCTACCCGGCGCTCAACCTGC
CCCCAAGGTCATGAGCGCCGTCATGGACCAGGTGCTCATCAAGCGCGCCTCGCCCTCTCGGAGGAGGAGATGCAGGACCC
CGAGAGTTCGGACGAGGGCAAGCCGTGGTCAGCGACGAGCAGCTGGCGCGCTGGCTGGGAGCGAGTAGCACCCCCAGAG
CCTGGAAGAGCGGGCGCAAGCTCATGATGGCCGTGGTCTGGTGACCGTGGAGCTGGAGTGTCTGCGCCGCTTCTTGCCGAC
GCGGAGACCCTGCGCAAGGTCGAGGAGAACCTGCACTACCTCTTCAGGCACGGGTTCTGCGCCAGGCCTGCAAGATCTCCA
ACGTGGAGCTGACCAACCTGGTCTCTACATGGGCATCCTGCACGAGAACCGCTGGGGCAAAACGTGCTGCACACCACCTG
CGCGGGGAGGCCCCGCGGACTACATCCGCGACTGCGTCTACCTGTACCTTGCCACACCTGGCAGACGGGCATGGGCGTGT
GGCAGCAGTGCCTGGAGGAGCAGAACCTGAAAGAGCTCTGCAAGCTCCTGCAGAAGAACCTCAAGGCCCTGTGGACCGGGTT
CGACGAGCGTACCACCGCTCGGACCTGGCCGACCTCATCTTCCCGAGCGCCTGCGGCTGACGCTGCGCAACGGGTGCCCG
ACTTTATGAGCCAAAGCATGTTGCAAACTTTGCTCTTTCATCTCGAACGCTCCGGGATCCTGCCCGCCACCTGCTCCGCGCT
GCCCTCGGACTTCGTGCCGCTGACCTTCCGCGAGTGCCCCCGCGCTCTGGAGCCACTGCTACTTGCTGCGCCTGGCCAACTA
CCTGGCCTACCACTCGGACGTGATCGAGGACGTGAGCGGGCAGGGTCTGCTGGAGTGCCACTGCCGCTGCAACCTCTGCACG
CCGCAACGCTCCCTGGCCTGCAACCCAGCTGCTGAGCGAGACCCAGATCATCGGCACCTTCGAGTTGCAAGGCCCCGGCGA
CGGCGAGGGCAAGGGGGGTCTGAAACTACCCCGGGGCTGTGGACCTCGGCCTACTTGCGCAAGTTCGTGCCGAGGACTAC
CATCCCTTCGAGATCAGGTTCTACGAGGACCAATCCAGCGGCCAAGGCCGAGCTGTGGCCTGCGTCATCACCCAGGGGGC
CATCTGGCCCAATTGCAAGCCATCCAGAAATCCGCGCAAGAATTCTGCTGAAAAAGGGCCACGGGGTCTACTTGACCCCC
AGACCGGAGAGGAGCTCAACCCAGCTTCCCCAGGATGCCCGAGGAAGCAGCAAGAAGCTGAAAGTGAGCTGCCGCCG
CCGGAGGATTTGGAGGAAGACTGGGAGAGCAGTCAGGCAGAGGAGGAGGAGATGGAAGACTGGGACAGCACTCAGGCAG
AGGAGGACAGCCTGCAAGACAGTCTGGAGGAGGAAGACGAGGTGGAGGAGGCAGAGGAAGAAGCAGCCGCCCGCAGACC
GTCGTCTCGGCGGAGAAAGCAAGCAGCACGGATACCATCTCCGCTCCGGGTCCGGGTGCGGGCGCCGGGCCACAGTAG
GTGGGACGAGACCGGGCGCTTCCCGAACCCACCCAGACCGGTAAGAAGGAGCGGCAGGGATACAAGTCTGGCGGGG
GCACAAAAACGCCATCGTCTCTGCTTGAAGCTGCGGGGGCAACATCTCTTACCCGCGCTACCTGCTCTTCCACCGCGG
GGTGAACCTCCCCGCAACATCTTGCACTACTACCGTCACTCCACAGCCCTACTACTGTTTCCAAGAAGAGGCAGAAACCCA
GCAGCAGCAGAAAAACAGCGGCAGCAGCAGCTAGAAAATCCACAGCGCGGCAGGTGGACTGAGGATCGCGGCGAACGAG
CCGGCGCAGACCCGGGAGCTGAGGAACCGGATCTTCCACCCCTCTATGCCATCTTCCAGCAGAGTCGGGGGCAGGAGCAGG
AACTGAAAGTCAAGAACCCTTCTGCGCTCGCTACCCGCGATTGTCTGTATCACAAGAGCGAAGACCAACTTCAGCGCACTC
TCGAGGACGCCGAGGCTCTCTTCAACAAGTACTGCGCGTCACTCTTAAAGAGTAGCCCGCGCCCGCCACACACGGAAAAAG
GCGGGAATTACGTACCACTGCGCCCTTCCCGGACCATCATGAGCAAGAGATTCCACGCTTACATGTGGAGCTACCAG
CCCCAGATGGGCTGGCCCGCGCGCCGAGGACTACTCCACCCGATGAAGTGGCTCAGTGCCGGGGCCCGCATGATCTC
ACGGGTGAATGACATCCGCGCCACCGAAACAGATACTCTAGAACAGTCAGCGATCACCGCCACGCCCCGCCATCACCTTA
ATCCGCGTAATTGGCCCGCGCCCTGGTGTACCAGGAAATTCAGGCCACGACCGTACTACTTCCGCGAGACGCCAGGCC
GAAGTCCAGCTGACTAACTCAGGTGTCCAGCTGGCCGGCGGCGCCGCCCTGTGTGTCACCGCCCCGCTCAGGGTATAAAGCG
GCTGGTGATCCGAGGCAGAGGCACACAGCTCAACGACGAGGTGGTGAGCTCTTCCGCTGGGTCTGCGACCTGACGGAGTCTTC
CAACTCGCCGATCGGGGAGATCTTCTTACGCTCTGTCAGGCCGCTCTGACTTTGGAGAGTTCGTCTCGACGCCCGCTCG
GGCGGCATCGGCACTCTCAGTTCTGTGGAGGAGTTCACCTCCCTCGGTCTACTTCAACCCCTTCTCCGGCTCCCCGGCCACTAC
CCGGACGAGTTCATCCGAACCTCGACGCCATCAGCGAGTCGGTGGACGGCTACGATTGAATGTCCATGGTGGCGCAGCTG
ACCTAGCTCGGCTTCGACACCTGGACCACTGCCGCCGCTTCCGCTGCTTCGCTCGGGATCTCGCCGAGTTTGCCTACTTTGAGC
TGCCCCGAGGAGCACCTCAGGGCCAGCCACGGAGTGCGGATCATCGTCGAAGGGGGCCTCGACTCCACCTGCTTCGGAT
CTTCAGCCAGCGACCGATCCTGGTCGAGCGCGAACAAGGACAGACCCTTCTACTTTGTACTGCATCTGCAACCACCCCGGCT
GCATGAAAGTCTTTGTTGTCTGCTGTACTGAGTATAATAAAGCTGAGATCAGCGACTACTCCGACTCGATTGTGGTGTTC
CTGCTATCAACCGGTCCCTGTTCTTACCGGGAACGAGACCGAGCTCCAGCTCCAGTGAAGCCCCACAAGAAGTACCTCACCT
GGCTGTTCCAGGGTCCCCGATCGCGTTGTCAACCACTGCGACAACGACGGAGTCTGTGAGCGGCCCTGCCAACCTTACTT
TTTCCACCCGAGAAGCAAGCTCCAGCTCTTCAACCCCTTCTCCCGGGACCTATCAGTGCGTCTCAGGACCTGCCATCACAC
CTTCCACCTGATCCGAATACCACAGCGCCGCTCCCCGCTACTAACAACCAAACTACCCACCAACGCCACCGTCGCGACCTTTCC
TCTGAATCTAATAACCACTACCGGAGGTGGCTTCTGCTGTTAGTGCTCCCCGTCCCGTCCGACCCCGGTCCCCACTCAGTCCCC
CGAGGAGGTTGCAAAATGCAAAATCCAAGAACCTGGAATTCCTCAAATGCTACCGCAAAAAATCAGACATGCATCCAGCT
GGATCATGATCATTGGGATCGTGAACATTCTGGCCTGCACCTCATCTCTTTGTGATTACCCCTGCTTTGACTTTGGTTGGAA
CTCGCCAGAGGCGCTCTATCTCCCGCTGAACCTGACACACCACACAGCAGCAACCTCAGGCACACGCACTACCAACCACCA

Fig. 20H

GCCTAGGCCACAATACATGCCATATTAGACTATGAGGCCGAGCCACAGCGACCCATGCTCCCCGCTATTAGTTACTTCAATCT
AACCGGCGGAGATGACTGACCCACTGGCCAATAACAACGTCAACGACCTTCTCCTGGACATGGACGCCGCGCCTCGGAGCA
GCGACTCGCCAACTTCGATTCGTGAGCAGCAGGAGAGAGCCGTCAAGGAGCTGCAGGACGGCAGATGCCATCCACCAAGTGC
AAGAGAGGCATCTTCTGCCTGGTGAACAGGCCAAGATCTCTACGAGGTACCCAGACCGACCATCGCCTCTCTACGAGCT
CCTGCAGCAGCGCCAGAAGTTCACCTGCCTGGTGGGAGTCAACCCCATCGTCATCACCAGCAGTGGGGGATACCAAGGGGT
GCATCCACTGCTCCTGCGACTCCCCGACTGCGTCCACACTCTGATCAAGACCTCTGCGGCCTCCGCGACCTCTCCCATGAA
CTAATCACCCCTTATCCAGTGAAATAAAGATCATATTGATGATGATTTAAATAAAAAAATAATCATTTGATTTGAAATAAAGA
TACAATCATATTGATGATTTGAGTTTAAACAAAAATAAAGAATCACTTACTTGAAATCTGATACCAGGTCTCTGTCCATGTTTTCT
GCCAACACCACCTCACTCCCTCTTCCAGCTCTGGTACTGACGGCCCCGGGGCTGCAAACTTCTCCACACGCTGAAGGGG
ATGTCAAATTCCTCTGTCCCTCAATCTTCATTTATCTTCTATCAGATGTCCAAAAAGCGCGTCCGGGTGGATGATGACTTCGA
CCCCGTCTACCCCTACGATGCAGACAACGCACCGACCGTGCCTTCATCAACCCCCCTTCGTCTCTTCAGATGGATTCGAAGAG
AAGCCCTGGGGTGTGTCCCTGCGACTGGCTGACCCCGTCAACCAAGAACGGGGAAATCACCTCAAGCTGGGAGAGG
GGGTGGACCTCGACTCGTGGGAAAACTCATCTCAACACGGCCACCAAGGCCGCCGCCCTCTCAGTATTTCAAACAACACC
ATTTCCCTTAAACTGCTGCCCTTTCTACAACAACATGGAATTTAAGCCTCAATGTCTCCACACCATTAGCAGTATTTCCAC
ATTTAACACTTTAGGCATAAGTCTTGAAACGGTCTTCAGACTTCAAATAAGTTGTTGACTGTACAATAACTCATCTCTTACA
TTCAGCTCAAATAGCATCACAGTAAAAACAGACAAAGGGCTATATTAATCCAGTGGAACAGAGGACTTGAGGCTAATAT
AAGCTAAAAAGAGGACTAGTTTTGACGGTAATGCTATTGCAACATATATTGAAATGGCTTAGACTATGGATCTTATGATAG
TGATGGAAAAACAGACCGTAATTACCAAAATGGAGCAGGATTAATTTTGATGCTAACAAAGCAATAGCTGTCAAACATG
GCACAGGTTTTAAGTTTTGACTCGCTGGTGCCTTGACAGCTGGAACAAACAGGATGACAAGCTAACACTTTGGACTACCCCT
GACCCAAGCCCTAATTGTCAATTACTTTAGACAGAGATGCCAAATTTACTCTCTGTCTTACAAAATGCGGTAGTCAAATACTAG
GCACTGTGGCAGTGGCGGTGTTACTGTAGGATCAGCACTAAATCCAATTAATGACACAGTCAAAAGCGCCATAGTTTTCTTA
GATTTGATTCGATGGTGTACTCATGTCAAACCTCATCAATGGTAGGTGATTACTGGAATTTAGGGAGGGACAGACCACTCAA
AGTGTAGCCTATACAAATGCTGTGGGATTCATGCCAAATATAGGTGCATATCCAAAAACCAAGTAAACACCTAAAAATAG
CATAGTCAGTCAGGTATATTTAACTGGAGAACTACTATGCCAATGACACTAACCATAACTTTCAATGGCACTGATGAAAAAGA
CACAACCCCAAGTTAGCACCTACTCTATGACTTTTACATGGCAGTGGACTGGAGACTATAAGGACAAAAATATTACCTTTGCTAC
CAACTCATTTCTTTTTCTACATCGCCAGGAATAATCCCACCCAGCAAGCCAACCCCTTTTCCACACCTTTGTCTATATGGA
AACTCTGAACAGAAAAATAAAGTTCAAGTGTGTTTATGAATCAACAGTTTTACAGGACTCGAGCAGTTATTTTCTCCACCT
CCCAGGACATGGAATACACCAACCTCTCCCCCGCAGCGCTTGAACTGAACTGCAATGCCATTGGTGTCTTTTGGTCT
CCACGTTCCACACAGTTTCAGAGCGAGCCAGTCTCGGATCGGTGAGGAGATGAAACCTCCGGGCACTCCCGCATCTGCACC
TCACAGCTCAACAGCTGAGGATTGCTCCTCGGTGGTGGGATCACGGTTATCTGGAAGAAGCAGAAGAGCGGCGGTGGGAATC
ATAGTCCGCGAACGGGATCGGCCGGTGGTGTGCATCAGGCCCGCAGCAGTCTGCTGCCGCCGCCGCTCCGTCAAGCTGCTG
CTCAGGGGGTTCGGGTCCAGGACTCCCTCAGCATGATGCCACGGCCCTCAGCATCAGTCGTCTGGTGGCGGGCGCAGC
AGCGCATGCGAATCTCGCTCAGGTCACTGCAGTACGTGCAACACAGGACCACAGGTTGTTCAACAGTCCATAGTTCAACACG
CTCCAGCCGAACTCATCGCGGAAGGATGTACCCACGTGGCCGTCGTACCAGATCCTCAGGTAAATCAAGTGGCGCTCCCT
CCAGAAGACGCTGCCATGTACATGATCTCCTGGGCATGTGGCGGTTACCACTCCCGGTACCACATCACCTCTGGTTGAA
CATGCAAGCCCGGATGATCTCGGGAACCAAGGCCAGCGCCCGCCCGCATGCAAGCAGAAGAGACCCCGATCCCGG
CAATGACAATGGAGGACCCACCGCTCGTACCCGTGGATCATCTGGGAGCTGAACAAGTCTATGTTGGCACAGCAGGCAATAT
GCTCATGATCTCTCAGCACTCTCAGTCTCCTCGGGGTCAAAACCATATCCAGGGCACGGGGAATCTTGACAGGACAGCGA
ACCCCGCAGAACAGGGCAATCCTCGACATAACTTACATTGTGCATGGACAGGGTATCGCAATCAGGCAGCACCGGGTATCC
TCCACAGAGAAGCGCGGGTCTCGGTCTCTCAGCGTGGTAAGGGGGCCGGCGGATACGGGTGATGGCGGGACGCGGCT
GATCGTGTCTCGACCGTGTCTGATGCAAGTGTCTTCGGACATTTCTGTAATGCTGTAGCAGAACCTGGTCCGGGCGCTGCA
CACCGATCGCGGGCGGGTCTCGGCGCTTGGAACGCTCGGTGTTAAAGTTGTAACACAGCCACTCTCTCAGACCGTGCAGCA
GATCTAGGGCCTCAGGAGTATGAAGATCCCATCATCCTGATAGCTCTGATCACATCGACCACCGTGGATGGGCCAGGCCC
AGCCAGATGATGCAATTTTGGTGGTTTGGTGACGGCGGGGAGGGAAGAACAGGAAGAACCTGATTAATCTTAATCCA
AACGGTCTCGGAGCACTTCAAATGAAGGTCAAGGATGAGGACCTCGACCTCTCGCCCCGCTGTGTTGGTGAATAACCAAG
GTCAAAGGTGATACGGTCTCGAGATGTTCCACGGTGGCTTCAGCAAAGCCTCCACGCGCACATCCAGAAACAAGACAATAG
CGAAAGCGGGAGGGTCTCTAATCTCAACCATCATGTTACACTCTGCACCATCCCCAGATAATTTTCATTTTCCAGCCTTG
AATGATTGCAACTAGTTCTGAGGTAAATCCAAGCCAGCCATGATAAAAAGCTCGCGCAGAGCACCTCCACCGGCATTCTAA
GCACACCTCATAATTCCAAGATATTCTGCTCCTGGTTACCTGCAGCAGATTGACAAGCGGAATATCAAAATCTCTGCCGCGA
TCCCTGAGCTCCTCCCTCAGCAATAACTGTAAGTACTTTTATATCGTCTCCGAAATTTTAGCCATAGGACCCCCAGGAATAA
GAGAAGGGCAAGCCACATTACAGATAAACCGAAGTCCCCCAGTGAGCATTGCCAAATGTAAGATTGAAATAAGCATGCTG
GCTAGACCCGGTGATATCTCCAGATAACTGGACAGAAAAATCGGGTAAGCAATTTTAAGAAAAACAACAAAAAGAAAAATCTT
CCAGGTGCAGTTTAGGGCTCGGGAACAACGATGGAGTAAGTGCAAGGGTGGTTCAGCATGTTAGTTAGCTGATCTG
TAAAAAACAACAAAAATAAACATTAACCATGCTAGCCTGGCAACAGGTGGGTAATCTGTTCTCCAGCACCAAGCAGGCC
ACGGGGTCTCCGGCGCGACCTCGTAAAAATGTGCTATGATTGAAAACCATCACAGAGAGACGTTCCGGTGGCCGGCGT
GAATGATTGAGAAGAAGCATAACCCCCGAACATTGGAGTCCGTGAGTGAAAAAAGCGGCCGAGGAAGCAATGAGGCA
CTACAACGCTCACTCTCAAGTCCAGCAAAGCGATGCCATGCGGATGAAGCACAAAAATTTTCAAGTGCCTAAAAATGTAATTA
CTCCCTCTGCAAGGACGGAAGCTCCGATCCCTCAGATACACATACAAAGCCTCAGCGTCCATAGCTTACCAGCGGCA
GCAGCAGCGGCACACAACAGGCGCAAGAGTCAGAGAAAAGACTGAGCTCTAACCTGTCCGCCCGCTCTCTGCTCAATATATAG
CCCCAGATCTACACTGACGTAAAGGCCAAAGTCTAAAAATACCCGCCAAATAATCACACACGCCCAGCACAGCCAGAAACC
GGTGACACACTCAGAAAAATACGCGCACTTCTCAACGGCCAACTGCCGTATTTCCGGGTCCACGCTACGTATCAAAA
CACGACTTTCAAATTCGTCGACCGTTAAAAACATCACCGCCCCGCTAACGGTCGCGCTCCCGCAGCCAATCACCTTCT
CCCTCCCCAAATTCAAACAGCTCATTTGCATATTAACGCGCACCAAAAGTTTGAGGTATATTATTGATGATG

Fig. 20I

AdC6 020-HIVgp140(E1572) Amino acids – SEQ ID NO: 9**The symbol “ * ” refers herein to stop codons in the non coding regions**

HHQ*YTSNFWCALICK*AV*IWGGRKVICGSGDR*GRGG*RFDDVAMRRSRFASSRGKSDVKRGVV*TRKYSIFPRSLTGNEVFL
GGCK*KRAIFARKLNEEVKI*VISRLWQGGVFAEGRVDFDRLRGGFYRIFHLNFRVRCQSPVFLRTISFPRKCHLTVTITVLR*RKLR
PDPLWCTLSTICSDAA*LSQYLLPACVLEVAE*CASKI*ATTRQGLTDNCMKNLRRVRRFALLRDVRARYTR*H*LLTSMPTSPIDVN
DGKWPAWHYAQYMTLWDFPTWQYIYVLVIAITMVMRWFQYINGRG*RFDSRGFPSLHPIDVNGSLFWHQNRDFPKCRNNSA
PLTQMGGRRVRWEVYISRARLVNRQITRSFIYVYHS*IANAVSASDTTVSNLRLEFDATMRVRGIPRNWPQWWIWGILGFWMI
CRVVGNDLWVTVYVGVVWKEAKTTLFCASDAKAYDKEVHNWATHACVPTDNPQEIENVTFENFMWKNDMVDQMHE
DIISLWDQSLKPCVKLTPLCVTLNCKNVNISANANATATLNSSMNGEIKNCSFNTTTELRLDKKQKVYALFYKPDVPLNGGEHNETGE
YILINCNSSTITQACPKVSFDPPIHYCAPAGYAILKCNKTFNGTGPCNNVSTVQCTHGIKPVVSTQLLNGSLAEIEIIVRSENLTNNIK
TIIVHLNKSVEIKCTRPNNNTRKSVRIGPGQTFYATGEIIGDIREAHCNISRETWNSTLIQVKEKLREHYNKTIKFEPSSGGDLEVTTHSF
NCRGEFFYCDTTKLFNETKLFNESEYVDNKTIILPCRIKQIINMWQEVGRAMYAPPIEGNITCKSNITGLLTWDGGENSTEGVFRPG
GGNMKDNWRSELYKYKVVEIKPLGVAPTSKLTQARQLLSGIVQQSNLLRAIEAQHLLQLTVWGKQLQTRVLAIERYLKQQQL
LGLWGCSGLKICATAVPWNSSWSNLSLGDWDNMTWMQWDREISNYTNTIFRLLEDSDQNQQEKNEKDLLALDSWKNLWNWF
DITNLW*GTSRVDPGGQTADQPRCLLVASHLLFAPPPCLP*PWKVPLPSFPNKMRLHRIV*VGVILFWGVGWGRTARGRIG
KTIAGMLGMRWALWLLRRKEPADLQI*IHLRCVRRKR**NGIMGIMGLH**IGQISTYAGHRACGLAPPQDMARVRAQRHDPLQ
CAPGLPPRHVHALPVQHAICEGAAGARCHVQSEPDDGV*HECGAVENSEI**IQDQVPGLRMRRQARQASARVCGGDDGGPATRS
FGVVLQRDGVRLQRGR*LE*VVFAGCEPA*GAE*LKSVFVCLQQHERKRL*GRGIQPLSDGASPLLGCSASECDGIHGGPAR
AARELFNPDRLDPPELLVRGRSCRRSCFRQRARRNGPGRRLQLSGGQLEFHQ*SRQPERGEAAAADGPARGPDPAPGRADPAG
GSAAGGDAGRGCHGENQIKNESINKRRRLILTQSLESLEDFSRVAGPGPPVSIIEHPVDLFQDPVEVGLDVEVHGHEPVPGEVAPL
QGLVLGDGVVNHPIVAGAAGVVLHDVLEEEDGHGQPLGVGVDEPVELGGMHAGGDEMHLGLDLEIGDVPAPQIPGVHVVDQ
HQHGVSGALGEFVMQLGREGVKEFGDALVTAQVFHALIHDDGDGPVGGGLGKDVSGVGHIVVVVLGELVIGHFNEFGAEGARLG
DEGALDPGGVVALADLHPLGLELGGGDHVLRGDEKNGFRGGGDELGRKQVPEQLGLAATGGAVDDPDDRLQVVVEGETAAVL
AEEGGHLVHHLAHMHVLAHEFRQEALAPQREELLQRGEVFQRLESVGHGHFGEGLLQEFQTVPELGDVL*GISIQQTSSFRGLGRL
RE*GTRRWASSEARVRSFQGRVRVSVSVTVKGCAPGWALARVRFRILRLVENRSRSPACASAR*QLSMSS*LSASAAWPLARSL
PLEVCPQTGQRDLRA*SLGARKTDSGA*ASAPQLAQTVSHSTSQVRSRGLSKTRFPFCFLMRFLPLVSMSSCPRWVTKRLSVSP*
TDFMGRSSSGVPRSS*RNPAHSETKARVQASTKEATWEG*RSLSSTSGTSRVCCKHMSPSSTSRKVI*V*AT*PGVPAGGV*KG
AGPCSSSLSSGSLRSASCWGRYLSKAGMTSALRLSVSRNEEDLITVPLETFMSPSSIWSEKIFLLSSLVAKEP*RALESSLAMER
MVWFFLSARSLAAMLSCYSRATHFHSKGTIVSSSGTILTRQPRLCRVMRSTLVATSPRRGSLVQQRPPLEQKGGSGSSMSSSG
GSASTVKMPGRSSGSK*LMQVRLSSAACQSRASARS*GLRGVPQGMGCVSAEAYMPQMS*T*RGSSRTPM*VG*QRPPRML
ART*SYSSCEGARSPVRLERCFSAR*TIWRKMAWELEEMVGLWKMLKWAWGRPTESLMKWA*ESCLATSSAVTRTSRAQ*S
RVSWMMSYLSWPFCHSSRLRRNSSRSFYSSRGNPS*SAR*EPTM*NWLTAL*AQQPFSTGRA*ACAALRREVWVRKVSRTM
TLRNWCLKSRSSQPPCSQSWKSVRFL*AGLGKAKVTSKRLILPARGMKLRVMRKGWGT SARLLMTWAARTISSKPLMLCPTM*SS
TNRGRPLTWGSFLSS*VSSAGSLSPCCSRAQSATWGLALRKEVQRSTARAVCKRSRY*RNCWPTAIFSGVTQ*KVRGSPCQRSHLS
WRARSWASSTSGGSPESFMTSMKGTSCLPKDIQV*VSTS*VRKSLSVRGCEPMGKNWISCHQLEEWLLM*WK*KCRRRAEHSC
LCLYKRQCQRCTGCTCTCTWVPLARNFSGQWSAGGCISCCTTSWPSAWPSSASMVMLTSPRGRQVQTSARTGRRARTRA
RRPELSRVLRRCGVRVSGGARLTCSRFSRARGRSRWYLISTAPLVATSTACRVPCPWGATTVPFRFLGAASMSVRSGGEDARRA
AGAARGPEAGAAGARRRRARAGSGTAPGEDWRERRRDG*RPGSDASG*RPDP*V*T*KVRQNRQSR*RRPAAGSLARRPSC
PGRRSRS*TARSPPEGLRGRARRWPRGRWRCGP*AARRRSCRPRRGRCPRLRRGRARA*PPGRG*ARRGA*RRPSRCGAG
RGS*AWWRCAR*RRST*SSGGAASR*RRPGLSPVPWPRRSPRS*KTGSCAPRRSTPPPEDG*ARRWWRAPRARRPRGAPLPSP
PLPPPLTSLPPQEA VAGEGPCVAGGARADGR*SARWSPRAGDAWSR*RRARPRGAAA*RRRRASPGGRRGLRWAGRGR*R
CILSIDP*GLRART*ASRDPRDPKTAERRLRASRSRKVG*ARFLVLRVFGREAGGCCW**S*SRRS*DGGWWRGAPGPWARLAG
CADGRPCPRRGPDTRWGPCSSPA*AAPRAPPPRPRGRACA*ARTRAAAGRAPGRRRRAR*GWPAGSG*GWSGSRRSRRSGGRL
RC*WCRSSWP*RTS*RSRGRVARARGT*GASRRACRRCSRARRARGTGIRRGSAAGGAAIARWRGRARRARGPRA*GGGSRRC
TWTSR*CCCCRRRAGTRGRGSRCCAAAGSSSWWPRSGP*GARSRGCSRHTGKNESGQRLDSVAWRLSERVGLRVYPGSNLES
GWSRS*RGTGTPVSTQAC*RNLDQTEAGRFLALVAGHEKLVS AESGRPRWLA AVVWRKNRQGC VAVCPGSSLSARRRPDSAA NV
GVAAPSFPRPLSQPTSPVTERAPLFFSCVFARCIPIYCGRCAPT LHHNRPYRSSNSRRFCPRPSSSQPLPRPP*AEPAFSMTWPWKR
ARGWRGWGRRRRSGTRACR*KGT LARPTCPSTCSETGAARSPRRCAPASTRGSGCGAAWTESGC*GTRISRRTS*RGAPRAR
TWPRPTWSRRTSRP*RRRATSKNPSTTTCAR*SRARR*PWA*CTCGTCWRPSCRTPRASR*RRSCFWWCSTVGTTRRSGRRC*ISP

Fig. 20J

SPRAAGSWTW*TFCRASWCERSAGCRCPSRWPSTSRC*VWASTTLGRSTRPRTCP*TRR*STGFTCA*P*KC*P*ATIWGCTATT
 GCTAR*APAAGAS*ATRS*CTACSGP*PGPGPRGRATLTWARTCAGSPAAGPWKLPAPVPTWRRWTMRRRRRASTWKTGDATVF
 LLDAATATAAAS*SRDAGGAAEPAVRH*LLGRDPGHATHHGADDPQSRSL*TAASGQPALGHPGGRGALALEPHAREGAGHRE
 RAGGEQGHPR*RGRAGVQRAAGARGPLQQHQRADDEPGPHGDRRARGGVAARAVPPRVEPGLHGGAERLPEHAARQRAPGPG
 GLHQLHQRAAADGGRGAPERGVVAGALLPDQSPGLADREPEPGFQELAGTVGRAGPGRGPRDGVEPADAELAPAAAAGGAL
 HGQRQREPRLVPLPA*PVPRGHRTGARGRADLPGDHPREPRAGPGGPGQPGGHPPELADQPVAEDPAPVRAEHRGGAHPALR
 AAERGAVPDAGGGHAQRGARHDAQHGAQHVRPQPPVHQ*ADGLLASGGRHELGLLYQRHLEPALAPAARVLHGRVRHARPQ
 RRVVPGRRGQQRVLAASRNQCRVEERGRGPAAVLGAVRSRGCCRGARGRQPLPEPALFAEQRAQQRAGSADATAPAGRGV
 ERLLEAREAREELPQ*RDREPGGQDEPLEDVARAQGRAPS*QRRHP*TPAARQAAGTGVGR*GFRRRQQRVGLGWEWW*PV
 RSPAPPYRAPDVRI*KNRRYSRPPWRPACVLLCCL**YDEARVPGSSSLVRERDAAGGGGGDAAPAGGALRAPVPGAYGGAE
 QHSLLAGATLVRYHPVPGGQVGRHRLAELPERPQQLPDHRGAEQRFPHGGQHPDHQL*RALAVGRPAENHHAHQHAQRE
 RVHVQQVQVQAGDGLAQDPQRGG**L*W*SGRADLRVGGV*AARGQLLDHHRSDQRHHRQLGGGAAERGAGERHRE
 VRHAQLPAGLGRDRAGDAGRVHQRLPPRHRPAARLRRGLHREPPQQPAGHPQAAALPGGLPDVVRGPGGGQHPRALGCRSL
 REKQGG*HRRGDRSRGHRLYRGAGR*FC*RCGSGRG*NRK*DSHPAGGEGQQGQELQRRARGQEKHRLPQLVPLQLRRPREG
 RALLDAHHHLGRHLRRGASLLVAARHDARPHLPHASS*QLPGGGRRAPARLLQELLQRRAGRLAAAARLHLAARLQPLPREPD
 PRPPARAHYHRQ*KRSCSHSRDPAQAQYQPGSPARDH*RQTPHLPLRLQGPRGSRAPLEPHLLKNVHSHLAQ**HRLGPA
 RAQQDVRRRSPTLHATPRARARALPRSLGRPQGPRAAHRRRRDRPGGGRRALHARRRRLHRRRRHRQRRGRRAPVRPHQ
 EPAAAHRAPEHPRHARGASLAAQQAAGTQGHAGGGQTRGLRQQQRRQDPQTRGHGGGGGHRQHVPAAARQVVGARR
 RHRCARARAHPPPSHLKMLTSLRC*CVPAARRMSKRKYKEEMLQVIAPEIYGPAAAVKEERKPRKLKRVKDKKEEEDDGLVEFVREF
 APRRRVQWRGRKVKPVLPRGTTVVFTPGERSGSASKRSYDEVYGEDILEQAVRLGEFAYGKRSRPAPLKEEAVSIPLDHGNPTPSL
 KPVTLLQVLPSAAPRRGFKREGGEDLYPTMQLMVPKRQKLEDVLEHMKVDPEVQPEVKVRPIKQVAPGLGVQTVDIKIPTMET
 QTEPVKPSTSTMEVQTDPMWPAPASTSTRRRRKYGAASLLMPNYALHPSIIPTPGYRGTRFYRGYTSSRRRKTTRRRRRSRRSSTAT
 SALVRRVYRSGREPLTLPRARYHPSIAI*LPPPTCRYGPHMPPRPHYGLPRKKAAP*KADGERAASPSPAAARHQQAVGGRLPAR
 ADPHHRRGDRGDRHRSFRGGAGLSAPLRHKKAWICNKKKNGTLTLLVL*CVFLDGRHQFFVPGTATRAAVYGHLEHRHQPTERG
 RLQLEQSLERA*EFRVHAQNLWQQGVEQQRHAGAEGKAERTELPAGG*WPGLRHQRGG*PGQPGRATDQPPGRGPARGV
 RGDAPGGGGGAASPGQARRQATASRRGGDAADAHGRAAPVRGGGETGPAHHAARGASGHRSAETQQQPARDPGLASASPLHSG
 *APAAGGRRVARPPPPGELAHESEQHRGSGSAECEAPLLKDTVALNLLVCVYMYVRRPEGGV*RGASPSCKMATPSMLPQW
 AYMHIAGQDASEYLSPLVQFARATDTYFSLGNKFRNPTVAPTHDVTDRSQRLLTRFVPVDREDNTYSYKVRYTLAVGDNRVLDM
 ASTYFDIRGVLDRGPSFKPSGTAYNSLAPKGAPNSSQWEQAKTGNGGTMETHTYGVAPMGGENITDKGLQIGTDVTANQNKPIY
 ADKTFQPEPQVGEENWQETENFYGGALKKDTNMKPCYGSYARPTNEKGGQAKLVGDDGVPTKEFDIDLAFDTPGGTVNGQD
 EYKADIVMYTENTYLETPDTHVYKPGKDDASSEINLVQSQMPNRPNYIGFRDNFIGLMYYNSTGNMGMVLGAGQASQLNAVVDLQD
 RNTELSYQLLLDSLDRTRYFSMWNQAVDSYDPDVRIENHGVDELPNYCFPLDGSNTAAAYQGVKVKDQDGDVESEWENDD
 TVAARNQLCKGNIFAMEINLQANLWRSFLYSNVALYLPDSYKYTPTNTVLTPTNTNTYDYMNGRVTTPPSLVDAYLNIGARWSLDPM
 DNVNPFNHHRNAGLRYRSMILLGNRGYVPFHIQVPQKFFAIKSLLLPGSYTYEWNFRKDVNMILQSSLGNDLRTDGASIAFTSINLY
 ATFFPMAHNTASTLEAMLRNDTNDQSFNDYLSAANMLYPIANATNPISIPSRNWAARFGRWSFTRKLTRETPSLGSGFDPYFVYS
 GSIPLYDGTFFLNHTFKKVSITFDSSVSWPGNDRLLTPNEFEIKRTVDGEGYNVAQCNMTKDWFLVQMLAHYNIGYQGFYVPEGYK
 DRMYSFERNFQPMRQVVDENVYKDYQAVTLAYQHNSGFGVGLAPTMRQGGQYPANYPYPLIGKSAVASVTQKFLCDRVMW
 RIPFSSNFMSMGALDGLQNMLYANSAHALDMNEVDPMDESTLLYVFEVFDVVRVHQPHRGVIEAVYLRTPFSAAGNATT*AAL
 ASCKMTAGSGEQELRAILRDLGCGPCFLGTDFDKRPFPMAPHKLACAIVNTAGRETGGEHWLAFAWNPRSHTCYLFDPFGFSDERL
 KQIQFEYEGLLRRSALATEDRCVTLEKSTQTVQGPRAACGLFCCMFLHAFVHWPDRPMDKNPTMNLTLGVPNGMLQSPQVEP
 TLRRNQEALYRFLNAHSAYFRSHRARIKATAFDRMNQDM*KTGVCM*MLYS**TAHVYATFSEALTFRNRRGSAGSRHGPRAGI
 RCGTGTWAAT*TRGSAAWARGGRGTSRSTACA*VAGRPAGRARRS*NRWDPRSARESCGTRGCGSTGTPSGPGASRLPAPSRR*
 CPPRPDPRRWPSRRGSSCRSAAPCWARSACGCNRSAGGSASSGPARSSCPGTWPS*KPPAGGRPAAPCRPR*RRPRRTC*RTG
 WWRSRRRARSSARRCWPAAPRCAPSGSG*SWPGWGPSARAARSRSRPHSR*CAPSGSSRSRAGTAACPRLRCSRAATARSCT
 PSSCGRSGSASARSPAGSGPSSRSGSCCW*RSAGCRGAPRSHTGGRCGGTTPPARASAGRRTSGRSPRGTPSAASSLPCSPRPK
 RSAGSGGSSPLSS*SPPPSGGRSRPGSQTACRPSR*CARGES*SPRPPAPRPAFRPRCPG*CLAKAHAWSCGVSWAAEAAA
 MCWESASSRSPRLFLLLGRRPRPRGGRHASSGAEEATGSRGSAGGWQSPFRVRCAPGGAALDFLRGRPLCSPREQQQAWRL
 SHRRQHRHLPPLPPPTTRSSRMKA*PPRRPAPPPTPRPQTCKRWRNPSRLTAT*RPSTRRSWQRAFPKRTTKSSQSRKQRT
 SRTLGLTSMATT*AGQRTCSSIWPAANASSRTRCSTAPRCPSAWRSSAAPTATSSRRACPPSASPTAPVSPTRASTSTRSSRCPRP
 WPPTTSFRTKGSPSPAAPTAPAPTPCSTWAPAPAYLISPWWKFRPSSRVWAATRLGPRTLCKEAERSMSTTAPWWSWKATTRA

Fig. 20K

WRSSSARSS*PTSPTRRSTCPPRS*APSWTRCSSAPRPSRRRCRTPRVRTRASPWSATSSWRAGWERVAPPRAWKSGASS*WP
 WSW*PWSWSVCAASLPTRRPCARSRRCTTSSGTGSCARPARSPTWS*PTWSPTWASCTRTAWGKTCTPPCAGRPAATTSATA
 STCTSATPGRRRAWACGSSAWRSRT*KSSASSCRRTSRPCGPGSTSVPPPRTWPTSSSPSACG*RCATGCPTL*AKACCKTFALSSSN
 APGSCPPAPRCPRTSCR*PSASAPRRSGATATCCAWPTTWPTTRT*SRTSAARVCWSATAAATSARRTAPWPATPSC*ARPRSSA
 PSSCKAPATARARGV*NSPRGCGPRPTCASSCPRTTIPSRSGSTRTNPSRPRPSCRPPASSPRGPSWPNCCKPSRNPKNFC*KRATGST
 WTPRPERSSTPASPRMPRGSSKKLVLPPEDEEDWESSQAEEEEMEDWDSTQAEEDSLQDSLEEEDEVEEAEEEEAAARPSSS
 AEKASSTDISAPGRGRGGRAHSRWDETGFRPNPTTQTGKKERQGYKSWRGHKNIVSCLQACGGNISFTRRYLLFHRGVNFPNRNI
 LHYRHLHSPYYCFQEEAETQQQKTSGSSS*KIHSGGRWTEDEGERAGADPGAEEPDLSHPLCHLPAESGAGAGTESQEPFSALA
 HPQLSVSQERRPTSASHSRGRGSLQQLVLAHS*RVARARPHTEKGGNYVTTCALRPTIMSKEIPTYMWSYQPMGLAAGAAQD
 YSTRMNWLSAGPAMISRVNDIRAHNRNILLEQSAITATPRHHLNPRNWPAALVYQEIPOPTTVLLPRDAQAEVQLTNSGVQLAGG
 AALCRHRPAQGIKRLVIRGRGTQLNDEVVSSSLGLRDPGVFQLAGSGRSSFTPRQAVLTLESSSSQPRSGGIGTLQFVEEFTPSVYFNP
 FSGSPGHYPDEFIPNFDaisesVDGYD*MSHGGAADLARLRHLHDHCRFRFCFARDLAEFAYFELPEEHPQGAHVRIIVEGGLDSSL
 LRIFSQRPIVEREQGQTLTLYCICNHPGLHESLCCLLCTEYNKS*DQRLRLRLWCSCYQVPVLRHRERDRAPAPV*APQEVPHLAV
 PGLPDRRCQPLRQRRSPAERPCCQPYFFHPQKQAPALPTLPPRDLVRLRTLPSHLPPDEYHSAAPRY*QPNYPPTPPSRPFL*I*YHY
 RRWLLLLVLPRPVDPRSPTQSPEEVRKCKFQEPWFKLCYRQKSDMHPSWIMIIGIVNILACTLISFVIYPCDFGWNSEALYLPPEP
 DTPPQQQQAHALPPPQPRQYMPILDYEAEPQRPMLPAISYFNLTGGDD*PTGQ*QRQRPSPGHGRPRLGAATRPTSHSSAAGE
 SRQGAAGRSHSPVQERHLLPGETGQDLLRGHPDRPSLLRAPAAPEVHLPGRSQPHRHHPAVGRYQGVHPLLLRLRPLRPHSD
 QDPLRPPRPPHELITPLSEIKIILMMI*IKKIII*FEIKIQSY**FEFNKNKESLT*NLIPGLCPCFLPTPPHSLPSSGTAGPGGLQTSSTR
 *RGCQIPVPQSSFYLLSDVQKARPGG**LRPLPLRCRQRTDRALHQPLRLFRWIPREAPGGVVPATG*PRHHQERGNHPQAGR
 GGGPRLVGKTHLQHGHHQRRPSQYFKQHHP*NCPCFLQQQWNFKPQCLHTISSISHI*HFRHKSWKRSSDFK*VVDCTTNSSSYI
 QLK*HHSKNRQRAIY*LQWKQRT*G*YKPKKRTSF*R*CYCNIYWKWLRLWL***WKNKTRNYQNWSRIFK*C*QSNQCQTRHR
 FKF*LRWCLDSWKQTG*QANTLDYP*PKP*LSITFRQRCQIYSLSYKMR*SNTRHCGSGGCYCRISTKSN**HSQKRHSFP*I*FRWC
 THVKLINGR*LLEL*GGTDSKCSLYKCCGIHAKYRCISKNPK*NT*K*HSQSGIFNWRNYYANDTNHNFQWH**KRHNPS*HLLYD
 FYMAVDWRL*GQKYLYCQLILFLLHRPGIIPPSKPTPFPTTFVYMETLKQKNKVQVFY*INSFTGLEQLFLLHPPRTWNTPPSPPAQ
 *TSECHW*WTCFWSPRSTQFQSEPVSDRSGR*NPPGTPASAPHSSAEDCPRWWSGSRSLSGRSRRRAAVGIIVRERDRPVVSHQAPQ
 QSLPPPLRQAAAQGVVRVQGLPQHDAHGPHQHSSGAAGAAHANLAQVTAVRATQDHQVQVQSSIVQHAPAETHRGKDATHVA
 VVPDPQVNQVALPPEDAHHVHDLLGHVAVHHLVPVPHHPLVEHAAPDDPAEPQGQHRPARHAARKPRIPAMTMEDPPLVPVDHL
 GAEQVYVGTAAQAYAHASLQHSQLLGGQNHIPGHGELLQDSEPRRTGQSSHITYIVHGQGIARQHRVILHQRSAGLGLLTAW*GGR
 PIRVMAGRG*SCSRPCHDAVAFGHFRTCCSRTWSGRCTPIAGGGLGAWNARC*SCKTATLSDRAADLGPQE**RSHHA**L*SHR
 PPWNGPGPAR*CNFVGFR*RRGREEQEEP*LTFNPNGLGALQNEGHGDGTSRPRCVGGK*QPGQR*YGSRDVPRWLPAKPPRA
 HPETRQ*RKREGSLIPQSCYTPAPSPDNFHFSSLE*FELVPEVNPSQP**KARAEHPPPAFLSTPS*FQDILLVHLQQIDKRNKISAA
 IPELLPQQ*L*VLFHIVSEIFSHRTPRNKRRASHITDKPKSPVSIACKIEISMLARPGDIFQITGQKIG*AIFKKINKRKIFQVHV*GLGN
 NDGVSARGAFQHG*LADL*KNKK*NIKPC*PGEQVGKSFSPAPGRPRGLRRDPRKNCRYD*KPSQRDVPGGRR*FEKKHTPPEH
 WSP*VKKSGRGSNEALQRLSSPAKRCHADEAQNFQVRKKCNYSPPAQAAKLPIPPDTHTKPQRP*LTERQQQRHTTGARVREKTE
 L*PVRPLSAQYIAPDLH*RGQSLKIPAK*SHTPSTRPETGDTLRKIRALPQTAKLPSPGSHATSSKHDFQIPSTVKNITRPAPNGRRS
 RSQSPSSLPKFKQLICILTRTKSLRYIID

Fig. 21A

AdC6 010-HIVgag (E1026) Nucleic Acids – SEQ ID NO: 2

CATCATCAATAATATACCTCAAACCTTTTGGTGCGCGTTAATATGCAAATGAGCTGTTTGAATTTGGGGAGGGAGGAAGGTGAT
TGGCTGCGGGAGCGGCGACCGTTAGGGGCGGGCGGGTGACGTTTTGATGACGTGGCTATGAGGCGGAGCCGGTTTGCAAG
TTCTCGTGGGAAAAGTGACGTCAAACGAGGTGTGGTTTGAACACGGAAATACTCAATTTCCCGCGCTCTCTGACAGGAAATG
AGGTGTTTCTGGGCGGATGCAAGTGAAAACGGGCCATTTTCGCGCGAAAACCTGAATGAGGAAGTGAAAATCTGAGTAATTTTC
GCGTTTATGGCAGGGAGGAGTATTTGCCGAGGGCCGAGTAGACTTTGACCGATTACGTGGGGGTTTCGATTACCGTATTTTTC
ACCTAAATTTCCGCGTACGGTGTCAAAGTCCGGTGTTTTTACGTACGATATCATTTCCCGAAAAGTGCCACCTGACCGTAACTAT
AACGGTCTTAAGGTAGCGAAAGCTCAGATCTCCCGATCCCTATGGTGCACCTCTCAGTACAATCTGCTCTGATGCCGCATAGTT
AAGCCAGTATCTGCTCCCTGCTTGTGTGTTGGAGGTCGCTGAGTAGTGCGCGAGCAAAATTTAAGCTACAACAAGGCAAGGCT
TGACCGACAATTGCATGAAGAATCTGCTTAGGGTTAGGCGTTTTGCGCTGCTTCGCGATGTACGGGCCAGATATACGCGTTGA
CATTGATTATTGACTAGTTATTAATAGTAATCAATTACGGGGTCATTAGTTTCATAGCCCATATATGGAGTTCCGCGTTACATAAC
TTACGGTAAATGGCCCCGCTGGCTGACCGCCCAACGACCCCCGCCATTGACGTCAATAATGACGTATGTTCCCATAGTAACGC
CAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTTACGGTAACTGCCCACTTGGCAGTACATCAAGTGTATCATATGC
CAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCCGCTGGCATTATGCCCACTACATGACCTTATGGGACTTTCCTA
CTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCGGTTTTGGCAGTACATCAATGGGCGTGGATAGCGGT
TTGACTCACGGGGATTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGTTGGCACCAAAATCAACGGGACTTTCCTAA
AATGTCGTAACAACTCCGCCCATTTGACGCAATGGGCGGTAGGCGTGTACGGTGGGAGGTCTATATAAGCAGAGCTCGTTTA
GTGAACCGTCAGATCACTAGAAGCTTTATTGCGGTAGTTTATCACAGTTAAATTGCTAACGCAGTCAGTGCTTCTGACACAACA
GTCTCGAACTTAAGCTGCAGAAGTTGGTCGTGAGGCACTGGGCAGGTAAGTATCAAGGTTACAAGACAGGTTTAAGGAGACC
AATAGAAAAGTGGGCTTGTGAGACAGAGAAGACTCTTGCGTTTCTGATAGGCACCTATTGGTCTTACTGACATCCACTTTGCCT
TTCTCTCCACAGGTGTCCACTCCAGTTCAATTACAGCTCTTAAGGCTAGAGTACTTAATACGACTCACTATAGGCTAGCGCCAC
CATGGGCGCCAGAGCCAGCGTGTGAGCGGGGAGAGCTGGATCGCTGGGAAAAGATTAGACTGAGGCCCGGAGGGAAGA
AAAAGTACAAGCTGAAACACATCGTGTGGGCCAGCAGGGAGCTGGAGCGCTTCGCCGTGAACCCCGACTGCTGGAGACCTC
CGAAGGTGTGCGCAGATCTGGGGCAGCTGCAGCCTTCCCTGCAGACAGGCTCCGAGGAGCTGCGGTCTCTGTATAATACA
GTGGCCCACTGTACTGTGTGCACCAAGCGGATTGAGGTGAAGGATACAAAAGAGGGCCCTGGAGAAGATTGAGGAGGAGCAG
AACAAGAGCAAGAAGAAAGCCAGCAGGCGCCGCCGACACCGGCAATAGCTCCAGGTGAGCCAGAACTATCCAATTGTGC
AGAATCTGCAGGGCCAGATGGTGCACCAAGGCCATTTCCCCACGGACACTGAACGCCTGGGTGAAGGTGGTGGAGGAGAAGG
CCTTCAGCCCCGAAGTGATCCCTATGTTTTCCGCCCTGTCCGAAGGCGCCACCCCTCAGGACCTGAACACCATGCTGAACACAG
TGGGGGGACACCAGGCCGCCATGCAGATGCTGAAGGAAACCATCAACGAGGAGGCGCCGAGTGGGATCGGCTGCACCCCG
TGCACGCCGGGCCAATCGCCCTGGCCAGATGAGGGAGCCCAGAGGCTCTGACATCGCCGGCACCATCTACCTGCAGGA
ACAGATCGGGTGGATGACCAATAACCCACCAATCCAGTGGGCGAGATCTACAAGAGGTGGATTATTCTGGGACTGAACAAA
ATTGTGCGCATGTATTTCCCTACATCCATCCTGGACATCAGGCAGGGCCCTAAGGAACCTTTCCGCGACTACGTGGATCGGTTT
TACAAAACCTGCGCGCCGAGCAGGCCAGCCAGGAAGTGAAGAATTGGATGACAGAGACCCTGCTGGTGCAGAACGCCAATC
CTGACTGTAAAACCATCCTGAAGGCCCTGGGCCCTGCCGCCACACTGGAGGAAATGATGACCGCTGCCAGGGCGTGGGCGG
CCCTGGCCACAAAGCCAGGGTGCTGGCCGAGGCCATGTCTCAGGTGACCAACTCTGCCACAATTATGATGCAGCGGGGGAAC
TTTCGGAACCAGAGGAAGACCGTGAAGTGCTTCAACTGTGGCAAGGAGGGACACATCGCCAAGAATTGCCGCGCCCCACGGA
AGAAGGGGTGTTGGAAATGCGGGAAGGAGGGCCACCAGATGAAAGACTGCACAGAGCGGCAGGCCAACTTTCTGGGCAAG
ATTTGGCCAGCCACAAGGGCCGCCCGGAACTTTCTGCAGTCCAGGCCTGAGCCTACCGCCCCCTGAGGAATCCTTCGG
GTTCCGGCAGGAGACAACACCCCAAGCCAGAAGCAGGAACCCATCGACAAAAGAGCTGTACCCCTGGCCAGCCTGAGATCC
CTGTTCCGGAATGACCCAGCTCTCAGTGATGATCTAGCGTTTAAACGGGCCCTCTAGAGTCGACCCGGGCGGCCAAACCGCT
GATCAGCCTCGACTGTGCCTTCTAGTTGCCAGCCATCTGTTGTTTGGCCCTCCCCGTGCCTTCCTTGACCTGGAAGGTGCCAC
TCCCACTGTCCTTTCTAATAAAATGAGGAAATTGCATCGCATTGTCTGAGTAGGTGTCATTCTATTCTGGGGGGTGGGGTGGG
GCAGGACAGCAAGGGGGAGGATTGGGAAGACAATAGCAGGCATGCTGGGGATGCGGTGGGCTCTATGGCTTCTGAGGCGG
AAAGAACCAGCAGATCTGCAGATCTGAATTCATCTATGTGCGGTGCGGAGAAAGAGGTAATGAAATGGTATTATGGGTATTAT
GGGTCTGCATTAATGAATCGGTGAGATATCGACATATGCTGGCCACCGTGCATGTGGCCTCGCACCCCCGCAAGACATGGCCC
GAGTTCGAGCACAACGTCATGACCCGCTGCAATGTGCACCTGGGCTCCCGCCGAGGCATGTTATGCCCTACCACTGCAACAT
GCAATTTGTGAAGGTGCTGCTGGAGCCCGATGCCATGTCCAGAGTGAGCCTGACGGGGGTGTTTGACATGAATGTGGAGCTG
TGGAAAATTCTGAGATATGATGAATCCAAGACCAGGTGCCGGCCTGCGAATGCGGAGGCAAGCACGCCAGGCTTCAGCCCG
TGTGTGTGGAGGTGACGGAGGACCTGCGACCCGATCATTTGGTGTGCTGCAACGGGACGGAGTTCGGCTCCAGCGGGGA

Fig. 21B

AGAATCTGACTAGAGTGAGTAGTGTGGGGCTGGGTGTGAGCCTGCATGAGGGGCAGAATGACTAAAAATCTGTGGTTTTCT
GTGTGTTGCAGCAGCATGAGCGGAAGCGCCTCTTTGAGGGAGGGGTATTAGCCCTTATCTGACGGGGCGTCTCCCTCCTG
GGCGGGAGTGCGTCAGAATGTGATGGGATCCACGGTGGACGGCCGGCCCGTGCAGCCCGGAACCTCTCAACCTGACCTAC
GCGACCTGAGCTCCTCGTCCGTGGACGCAGCTGCCGCCGACGTGCTGCTCCGCCGCCAGCGCCGTGCGCGGAATGGCCCT
GGGCGCCGGCTACTACAGCTCTCTGGTGGCAACTCGAGTTCACCAATAATCCGCCAGCCTGAACGAGGAGAAGCTGCTGC
TGCTGATGGCCAGCTCGAGGCCCTGACCCAGCGCCTGGGCGAGCTGACCCAGCAGGTGGCTCAGCTGCAGGCGGAGACGC
GGGCGCGGTTGCCACGGTGAAAACCAATAAAAAATGAATCAATAAAATAAACGGAGACGGTTGTTGATTTAACACAGAGT
CTTGAATCTTTATTTGATTTTTCGCGCGCGGTAGGCCCTGGACCACCGGTCTCGATCATTGAGCACCCGGTGGATCTTTCCAG
GACCCGGTAGAGGTGGGCTTGATGTTGAGGTACATGGGCATGAGCCGTCGCCGGGGTGGAGGTAGCTCCATTGCAGGGC
CTCGTGCTCGGGGATGGTGTGTAATCACCCAGTCATAGCAGGGGCGCAGGGCGTGGTGTGCACGATGTCCTTGAGGAGG
AGACTGATGGCCACGGGCAGCCCTTGGTGTAGGTGTTGACGAACCTGTTGAGCTGGGAGGGATGCATGCGGGGGGAGATG
AGATGCATCTTGGCCTGGATCTTGAGATTGGCGATGTTCCCGCCAGATCCCGCCGGGGTTCATGTTGTGCAGGACCACAG
CACGGTGTATCCGGTGCACTTGGGGAATTTGTATGCAACTTGGAAGGGAAGGCGTGAAAGAATTTGGAGACGCCCTTGTGA
CCGCCAGGTTTTCCATGCACTCATCATGATGATGGCGATGGGCCCGTGGGCGGCGGCCTGGGCAAAGACGTTTCGGGGGT
CGGACACATCGTAGTTGTGGTCTGGGTGAGCTCGTCATAGGCCATTTAATGAATTTGGGGCGGAGGGTGCCCGACTGGGG
GACGAAGGTGCCCTCGATCCCGGGGGCGTAGTTGCCCTCGCAGATCTGCATCTCCAGGCCCTGAGCTCGGAGGGGGGGATC
ATGTCCACCTGCGGGGCGATGAAAAAACGGTTTCGGGGGCGGGGGAGATGAGCTGGGCCGAAAGCAGGTTCCGGAGCAGC
TGGGACTTGCCGAACCGGTGGGGCCGTAGATGACCCCGATGACCGGCTGCAGGTGGTAGTTGAGGGAGAGACAGCTGCCG
TCCTCGCGGAGGAGGGGGGCCACCTCGTTCATCATCTCGCGCACATGCATGTTCTCGCGCACGAGTTCGCCAGGAGGCGCTC
GCCCCCAGCGAGAGGAGCTCTGCAGCGAGGCGAAGTTTTTACAGCGGCTTGTAGTCCGTGCGCCATGGGCATTTTGGAGAGG
GTCTGTTGCAAGAGTTCCAGACGGTCCAGAGCTCGGTGATGTGCTCTAGGGCATCTCGATCCAGCAGACCTCCTCGTTTCGC
GGGTTGGGGCGACTGCGGGAGTAGGGCACAGGCGATGGGCGTCCAGCGAGGCCAGGGTCCGGTCTTCCAGGGCCGCAG
GGTCCGCGTCAGCGTGGTCTCCGTACCGTGAAGGGGTGCGCGCCGGGCTGGGCGCTTGCGAGGGTGCGCTTCAGGCTCATC
CGGCTGGTCGAGAACCGTCCCGGTGGGCGCCCTGCGCGTCGGCCAGGTAGCAATTGAGCATGAGTTCGTAGTTGAGCGCCT
CGGCCGCGTGGCCCTTGGCGCGGAGCTTACCTTTGGAAGTGTGTCCGCAGACGGGACAGAGGAGGACTTGAGGGCGTAGA
GCTTGGGGGCGAGGAAGACGGAAGTCCGGGGCGTAGGCGTCCGCGCCGACGTGGCGCAGACGGTCTCGCACTCCACGAGCC
AGGTGAGGTGCGGGCGGTTGGGGTCAAAACGAGGTTTCTCCGTGCTTTTGTATGCGTTTCTACCTCTGGTCTCCATGAGCT
CGTGTCGCCGCTGGGTGACAAAGAGGCTGTCCGTGTCCCGTAGACCGACTTATGGGCCGGTCTCGAGCGGGGTGCCGCG
GTCTCGTCGTAGAGGAACCCCGCCACTCCGAGACGAAGGCCCGGGTCCAGGCCAGCACGAAGGAGGCCACGTGGGAGGG
GTAGCGGTGCTGTCCACCAGCGGGTCCACCTTCTCCAGGGTATGCAAGCACATGTCCCCTCGTCCACATCCAGGAAGGTGA
TTGGCTTGTAAGTGTAGGCCACGTGACCGGGGTCCCGGCCGGGGGGTATAAAAGGGGGCGGGCCCTGCTCGTCTCACT
GTCTCCGGATCGTGTCCAGGAGCGCCAGCTGTTGGGGTAGGTATTCCCTCTGAAGGCGGGCATGACCTCGGCACTCAGGT
TGTCAGTTTCTAGAAACGAGGAGGATTGATATTGACGGTGCCGTTGGAGACGCTTTCATGAGCCCTCGTCCATTTGGTCAG
AAAAGACGATCTTTTTGTTGTGCGAGCTTGGTGGCGAAGGAGCCGTAGAGGGCGTTGGAGAGCAGCTTGGCGATGGAGCGCAT
GGTCTGGTTCTTTCTTGTGCGCGCGCTCCTTGGCGGCGATGTTGAGCTGCACGTAAGTTCGCGCGCCACGCACTTCCATTGGG
GAAGACGGTGGTGAGCTCGTGGGACGATTCTGACCCGCCAGCCGCGGTTGTGCAGGGTGATGAGGTCCACGCTGGTGGC
CACCTCGCCGCGCAGGGGCTCGTTGGTCCAGCAGAGGCGCCCGCCCTTGCGCGAGCAGAAGGGGGGCGAGCGGGTCCAGCAT
GAGCTCGTGGGGGGGTGCGGTCCACGGTGAAGATGCCGGGCAGGAGCTCGGGGTGAAGTAGCTGATGCAGGTGCCCCA
GATTGTCCAGCGCCGCTTGCCAGTCGCGCACGGCCAGCGCGCTCGTAGGGGCTGAGGGGCGTGCCCCAGGGCATGGGGT
GCGTGAGCGCGGAGGCGTACATGCCGAGATGTGCTAGACGTAGAGGGGCTCCTCGAGGACGCCGATGTAGGTGGGGTAGC
AGCGCCCCCGCGGATGTGGCGCGCACGTAGTCGTACAGCTCGTGCGAGGGCGCGAGGAGCCCCGTGCCGAGGTTGGAGC
GTTGCGGCTTTTCGGCGCGGTAGACGATCTGGCGGAAGATGGCGTGGGAGTTGGAGGAGATGGTGGGCCTTTGGAAGATGT
TGAAGTGGGCGTGGGGCAGGCCGACCGAGTCCCTGATGAAGTGGGCGTAGGAGTCTGACGCTTGGCGACGAGCTCGGCGG
TGACGAGGACGTCCAGGGCGCAGTAGTCGAGGGTCTCTGGATGATGTCATACTGAGCTGGCCCTTCTGCTTCCACAGCTCG
CGGTTGAGAAGGAACCTTTCGCGGTCTTCCAGTACTTTCGAGGGGGAACCCGTCTGATCGGCACGGTAAGAGCCCACCAT
GTAGAAGTGGTTGACGGCCTTGTAGGCGCAGCAGCCCTTCTCCAGGGGAGGGCGTAAGCTTGCAGCGCCTTGCAGGGGAG
GTGTGGGTGAGGGCGAAGGTGTGCGCACCATGACCTGAGGAACTGGTGCTTGAAGTCGAGGTGTCGAGCCGCCCTGCT
CCCAGAGTTGGAAGTCCGTGCGCTTCTGTAGGCGGGGTAGGCAAAGCGAAAGTAACATCGTTGAAGAGGATCTTCCCCGC
GCGGGGCATGAAGTTGCGAGTGATGCGGAAAGGCTGGGGCACCTCGGCCCGGTTGTTGATGACCTGGGCGGCGAGGACGAT
CTCGTCGAAGCCGTTGATGTTGTGCCGACGATGTAGAGTTCCACGAATCGCGGGCGGCCCTTGACGTGGGGCAGCTTCTTGA

Fig. 21C

[illegible]

Fig. 21C

GGGCTGCCGCTGTCCGAGAAGCTGGCGGCCATCAACTTCTCGGTGCTGAGTCTGGGCAAGTACTACGCTAGGAAGATCTACA
AGACCCCGTACGTGCCCATAGACAAGGAGGTGAAGATCGACGGGTTTTACATGCGCATGACCCTGAAAGTGCTGACCCTGAG
CGACGATCTGGGGGTGTACCGCAACGACAGGATGCACCGCGCGGTGAGCGCCAGCCCGCGCGGAGCTGAGCGACCAGGA
GCTGATGCACAGCCTGCAGCGGGCCCTGACCGGGGCCGGACCGAGGGGGAGAGCTACTTTGACATGGGCGCGGACCTGCG
CTGGCAGCCCAGCCCGCGGGCCTTGAAGCTGCCGGCGGTTCCCCCTACGTGGAGGAGGTGGACGATGAGGAGGAGGAGG
GCGAGTACCTGGAAGACTGATGGCGCGACCGTATTTTTGCTAGATGCAGCAACAGCCACCGCGCGCCTCTGATCCGCGA
TGCGGGCGCGCTGCAGAGCCAGCCGTCCGGCATTAACTCTCGGACGATTGGACCCAGGCCATGCAACGCATCATGGCGCT
GACGACCCGCAATCCCGAAGCCTTTAGACAGCAGCCTCAGGCCAACCGGCTCTCGGCCATCTGGAGGCGGTGGTGCCTCGC
GCTCGAACCCACGCACGAGAAGGTGCTGGCCATCGTGAACGCGTGGTGAGAAACAAGGCCATCCGCGGTGACGAGGCCG
GGCTGGTGTAACGCGCTGCTGGAGCGCTGGCCGCTACAACAGCACCAACGTGCAGACGAACCTGGACCGCATGGTGAC
CGACGTGCGCGAGGCGGTGTCGACGCGGAGCGGTTCCACCGCGAGTGAACCTGGGCTCCATGGTGGCGCTGAACGCCTTC
CTGAGCACGACGCCCGCAACGTGCCCCGGGGCCAGGAGGACTACACCAACTTCATCAGCGCGCTGCGGCTGATGGTGGCCG
AGGTGCCCGAGAGCGAGGTGTACAGTCGGGGCCGACTACTTCTCCAGACCAGTCGCCAGGGCTTGACAGCCGTGAACCT
GAGCCAGGCTTTCAAGAACTTGACGGGACTGTGGGGCGTGACGGCCCCGTGCGGGGACCGCGCGACGGTGTGAGCCTGCT
GACGCCGAACCTCGCGCTGCTGCTGCTGCTGGTGGCGCCCTTACGACAGCGGCAGCGTGAGCCGCGACTCGTACCTGGGC
TACCTGCTTAACCTGTACCGCGAGGCCATCGGACAGGCGCACGTGGACGAGCAGACCTACCAGGAGATACCCACGTGAGCC
GCGCGCTGGGCCAGGAGGACCCGGGCAACCTGGAGGCCACCTGAACTTCTGCTGACCAACCGGTGCGAGAAGATCCCGCC
CCAGTACGCGCTGAGCACCGAGGAGGAGCGCATCTGCGCTACGTGCAGCAGAGCGTGGGGCTGTTCTGATGCAGGAGGG
GGCCACGCCAGCGCGGCGCTCGACATGACCGCGCGCAACATGGAGCCCAGCATGTACGCCGCAACCGCCCGTTCATCAAT
AAGCTGATGGAATACTTGATCGGGCGGCCCATGAACTCGGACTACTTTACCAACGCCATCTGAACCCGCACTGGCTCCCG
CCGCCCCGGTCTACACGGGCGAGTACGACATGCCGACCCCAACGACGGGTTCTGTGGGACGACGTGGACAGCAGCGTGT
TCTCGCCGCTCCAGGAACCAATGCCGTGTGAAGAAAGAGGGCGGGGACCGGGCGGCGTCTCGGGCGTGTCCGGTGC
CGGGTGTGCGCGGCGGTGCCGAGGCCGCCAGCCCTTCCGAGCCTGCCCTTTCTGCTGAACAGCGTGCAGCAGCAGCA
GCTGGGTGCGCTGACCGACCGCGCTGCTGGGCGAGGAGGAGTACCTGAACGACTCCTTGTGAGGCCGAGCGCGAGAA
GAACTTCCCAATAACGGGATAGAGAGCCTGGTGGACAAGATGAGCCGCTGGAAGACGTACGCGCAGCAGCAGGGACGA
GCCCCGAGTAGCAGCGCAGGCACCCGTAGACGCCAGCGGCACGACAGGCAGCGGGGACTGGTGTGGGACGATGAGGATTC
CGCCGACGACAGCAGCGTGTGGACTTGGGTGGGAGTGGTGGTAACCCGTTGCTCACCTGCGCCCCGTATCGGGCGCTG
ATGTAAGAATCTGAAAAATAAAGACGGTACTACCAAGGCCATGGCGACACGCGTGCCTTCTCTGTTGTTGTAGTAG
TATGATGAGGCGCGTGTACCCGAGGGTCTCTCCCTCGTACGAGAGCGTGATGCAGCAGGCGGTGGCGGGCGGCGATGCA
GCCCCGCTGGAGGCGCCTTACGTGCCCCGCGGTACCTGGCGCTACGGAGGGGCGGAACAGCATTGTTACTCGGAGCTG
GCACCTTGTACGATAACACCGGTTGTACCTGGTGGACAACAAGTCGGCAGACATCGCCTCGCTGAACTACCAGAACGACCA
CAGCAACTTCTGACACCGTGGTGCAGAACACGATTTACCCCCAGGAGGCCAGCACCAGACCATCAACTTTGACGAGC
GCTCGCGGTGGGGCGGCCAGCTGAAAACCATCATGCACACCAACATGCCAACGTGAACGAGTTTCATGTACGCAACAAGTTC
AAGGCGCGGGTGTGGTCTCGCGCAAGACCCCCAACGGGGTGGATGATGATTATGATGGTAGTCAGGACGAGCTGACCTAC
GAGTGGGTGGAGTTTGTAGCTGCCCCAGGGCAACTTCTCGGTGACCATGACCATCGATCTGATGAACAACGCCATCATCGACAA
CTACTTGGCGGTGGGGCGGCGAAGCGGGTGTGGAGAGCGACATCGGCGTGAAGTTCGACACGCGCAACTTCCGGCTGGG
CTGGGACCCCGTGACCGAGCTGGTGTGTCGGGGCGTGTACACCAACGAGGCTTCCACCCGACATCGTCTGCTGCCCCGCT
GCGGCGTGGACTTCACCGAGAGCCGCTCAGCAACCTGCTGGGCATCCGCAAGCGGCAGCCCTTCCAGGAGGGCTTCCAGAT
CCTGTACGAGGACCTGGAGGGGGGCAACATCCCCGCGCTCTGGATGTCGAAGCCTACGAGAAAAGCAAGGAGGATAGCAC
CGCCGCGGCGACCGCAGCCGTGGCCACCGCCTTACCGAGGTGCGGGGCGATAATTTTGCTAGCGCTGCGGCAGCGGCCGAG
GCGGCTGAAACCGAAAGTAAGATAGTCATCCAGCCGTGGAGAAGGACAGCAAGGACAGGAGCTACAACGTGCTCGCGGAC
AAGAAAAACACCGCTACCGCAGCTGGTACCTGGCCTACAACCTACGGCGACCCCGAGAAGGGCGTGCGCTCTGGACGCTGC
TACCACCTCGGACGTCACTGCGGCTGGAGCAAGTCTACTGGTGCCTGCCCCGACATGATGCAAGACCCGGTCACTTCCGC
TCCACGCGTCAAGTTAGCAACTACCGGTGGTGGGCGCCGAGTCTGCCCCGCTACTCCAAGAGCTTCTTCAACGAGCAGGC
CGTCTACTCGCAGCAGCTGCGCGCTTCACTCGCTCACGCAGTCTTCAACCGCTTCCCCGAGAACCAGATCCTCGTCCGCCC
GCCCGCGCCACCATTACCACCGTCAGTGAACCGTTCCTGCTCTCACAGATCACGGGACCCTGCCGTGCGCAGCAGTATCCG
GGGAGTCCAGCGCGTGACCGTCACTGACGCCAGACGCCGACCTGCCCTACGCTACAAGGCCCTGGGCGTAGTCGCGCCG
CGCGTCTCTCGAGCCGACCTTCTAAAAATGTCCATTCTCATCTCGCCAGTAATAACACCGGTTGGGGCTGCGCGCGCCC
AGCAAGATGTACGGAGGCGCTCGCCAACGCTCCACGCAACACCCCGTGCAGCGTGCAGGGGCACTTCCGCGCTCCCTGGGGCG
CCCTCAAGGGCCGCTGCGCTGCGCACCAACCGTCGACGACGTGATCGACAGGTGGTGCCGACGCGCGCAACTACACGCC

Fig. 21D

CGCCGCCGCGCCCGTCTCCACCGTGGACGCCGTATCGACAGCGTGGTGGCCGACGCGCGCCGGTACGCCCGCACCAAGAGC
CGGCGGCGGCGCATCGCCCGGCGGCACCGGAGCACCCCGCCATGCGCGCGGCGGAGCCTTGCTGCGCAGGGGCCAGGCGC
ACGGGACGCGAGGGCCATGCTCAGGGCGGCCAGACGCGCGGCCCTCCGGCAGCAGCAGCGCCGGCAGGACCCGACAGCGCG
GGCCACGGCGGCGGCGGCGGCCATCGCCAGCATGTCCCGCCCGCGGCGCGGCAACGTGTACTGGGTGCGCGACGCCGCCAC
CGGTGTGCGCGTGCCCGTGCACCCGCCCCCTCGCACTTGAAGATGCTGACTTCGCGATGTTGATGTGTCCAGCGGCGAG
GAGGATGTCCAAGCGCAAATACAAGGAAGAGATGCTCAGGTTCATCGCGCCTGAGATCTACGCCCCGCGGCGGCGGTGAA
GGAGGAAAGAAAGCCCCGAAACTGAAGCGGGTCAAAAAGGACAAAAAGGAGGAGGAAGATGACGGAAGTGGTGGAGTTTG
TGCGCGAGTTGCCCCCGGCGGCGCGTGCAGTGGCGCGGCGGAAAGTGAACCGGTGCTGCGGCCGGCACCACGGTGG
TCTTACGCCCGGCGAGCGTTCCGGCTCCGCTCCAAGCGCTCTACGACGAGGTGTACGGGGACGAGGACATCCTCGAGCA
GGCGGTGAGCGTCTGGGCGAGTTTTCGTACGGCAAGCGCAGCCGCCCGCGCCCTTGAAGAGGAGGCGGTGTCCATCCC
GCTGGACCACGGCAACCCACGCCGAGCCTGAAGCCGGTGACCCTGCAGCAGGTGCTACCGAGCGCGGCGCGCGCCGGGG
CTTCAAGCGCGAGGGCGGCGAGGATCTGTACCCGACCATGCAGCTGATGGTGCCCAAGCGCCAGAAAGCTGGAGGACGTGCT
GGAGCACATGAAGGTGACCCCGAGGTGCAGCCCGAGGTCAAGGTGCGGCCCATCAAGCAGGTGGCCCCGGGCCTGGGCGT
GCAGACCGTGGACATCAAGATCCCCACGGAGCCCATGAAACGCAGACCGAGCCCGTGAAGCCAGCACCAGCACCATGGAG
GTGCAGACGGATCCCTGGATGCCAGCACCAGCTTCCACCAGCACTCGCCGAAGACGCAAGTACGGCGCGGCCAGCCTGTGA
TGCCCAACTACGCGCTGCATCCTTCATCATCCCCACGCCGGGCTACCGCGGCACGCGCTTCTACCGCGGTACACCAGCAGCC
GCCCGCGCAAGACCACACCCCGCGCCGTCGTGCGAGCCGCCGAGCAGCACCAGCGACTTCCGCTTGGTGGGAGAGTGTA
TCGCAAGCGGCGCGAGCCTCTGACCCTGCCGCGCGCGCTACCACCCGAGCATCGCCATTTAACTACCGCCTCTACTTGCA
ATATGGCCCTCACATGCCGCTCCGCGTCCCCATTACGGGCTACCGAGGAAGAAAGCCGCGCCGTAGAAGGCTGACGGGGAA
CGGGTGCCTGCGCATCACACCGGCGGCGGCGCGCCATCAGCAAGCGGTTGGGGGAGGCTTCTGCCGCGCTGATCCCC
ATCATGCGCGGCGATCGGGGCGATCCCCGGCATAGCTTCCGTGGCGGTGCAGGCCTCTCAGCGCCACTGAGACACAAAA
AGCATGGATTTGTAATAAAAAAAAAAATGGACTGACGCTCCTGGTCTGTGATGTGTGTTTTAGATGGAAGACATCAATTTT
CGTCCCTGGCACCGCGACACGGCACGCGGCCGTTTATGGGCACCTGGAGCGACATCGGCAACAGCCAAGTGAACGGGGGCGC
CTTCAATTGGAGCAGTCTCTGGAGCGGGCTTAAGAATTTCCGGTCCACGCTCAAAACCTATGGCAACAAGGCGTGGAACAGCA
GCACAGGGCAGGCGCTGAGGGAAAAGCTGAAAGAACAGAACTTCCAGCAGAAGGTGGTTGATGGCCTGGCCTCAGGCATCA
ACGGGGTGGTTGACCTGGCCAACAGGCCGTGCAGAAACAGATCAACAGCCGCTGGACGCGGTCCCGCCCGCGGGGTCCGT
GGAGATGCCCCAGGTGGAGGAGGAGTGCCTCCCCTGGACAAGCGCGGCGACAAGCGACCGCGTCCCGACGCGGAGGAGA
CGTGCTGACGCACACGGACGAGCCGCCCGCTACGAGGAGGCGGTGAAACTGGGCCTGCCACCACGCGGCCCGTGGGCG
CTCTGGCCACCGGAGTGCTGAAACCCAGCAGCAGCCAGCCCGCGACCTGGACTTGCCTCCGCTCGCCCCCTCCACAGTGGCT
AAGCCCTGCCGCCGTGGCCGTGCGCTGCGCGCCCCCGAGGCCGCCCGCAGGCGAACTGGCAGAGCACTCTGAACAGCA
TCGTGGGTCTGGGAGTGCAAGTGTGAAGCGCGCGCGTCTATTAAAAGCACTGTAGCGCTTAACTTGCTGTCTGTGT
ATATGTATGTCCGCCGACCAGAAGGAGGAGTGTGAAGAGGCGCGTCCCGAGTTGCAAGATGGCCACCCCATCGATGCTGCC
CCAGTGGGCGTACATGCACATCGCCGGACAGGACGCTTCCGAGTACCTGAGTCCGGGTCTGGTGCAGTTCGCCCCGCCACA
GACACCTACTTCAGTCTGGGGAACAAGTTTAGGAACCCACGGTGGCGCCACGCACGATGTGACCACCGACCGCAGCCAGC
GGCTGACGCTGCGCTTCTGCCCCGTGGACCGCAGGACAACACCTACTCGTACAAAGTGCCTACACGCTGGCCGTGGGCGA
CAACCGCGTGCTGGACATGGCCAGCACCTACTTTGACATCCGCGGCGTGCTGGACCGGGGCCCTAGCTTCAAACCTACTCTG
GCACCGCCTACAACAGCCTAGCTCCCAAGGGAGCTCCCAATTCAGCCAGTGGGAGCAAGCAAAAACAGGCAATGGGGGAAC
TATGGAAACACACATATGGTGTGGCCCAATGGGCGGAGAGAATATTACAAAAGATGGTCTTCAAATTGGAAGTACGTTA
CAGCGAATCAGAATAAACCAATTTATGCCGACAAAACATTTCAACCAGAACCGCAAGTAGGAGAAGAAAATTGGCAAGAAAC
TGAAAACCTTTATGGCGGTAGAGCTCTAAAAAAGACACAAACATGAAACCTTGCTATGGCTCCTATGCTAGACCCACCAATGA
AAAAGGAGGTCAAGCTAACTTAAAGTTGGAGATGATGGAGTTCAACCAAGAATTCGACATAGACCTGGCTTTCTTTGATA
CTCCCGGTGGCACCGTGAACGGTCAAGACGAGTATAAAGCAGACATTGTGATGTATACCGAAAACACGTATTTGGAACTCCA
GACACGCATGTGGTATACAAACCAGGCAAGGATGATGCAAGTTCTGAAATTAACCTGGTTCAGCAGTCTATGCCAACAGACC
CAACTACATTGGGTTACGGGACAATTTATCGGTCTTATGTACTACAACAGCACTGGCAATATGGGTGTGCTTGTGTCAGGC
CTCCAGCTGAATGCTGTGGTTGATTGCAAGACAGAAACACCGAGCTGTCTACCAGCTTGTCTTACTCTTTGGGTGACAG
AACCCGGTATTTAGTATGTGGAACAGGCGGTGGACAGTTATGACCCGATGTGCGCATCATCGAAAACCATGGTGTGGAG
GATGAATTGCCAACTATTGCTTCCCTTGGACGGCTCTGGCACTAACGCCGCATACCAAGGTGTGAAAGTAAAGATGGTCA
AGATGGTGATGTTGAGAGTGAATGGGAAAATGACGATACTGTTGCAGCTCGAAATCAATTATGTAAAGGTAAATTTTCGCCA
TGGAGATTAATCTCAGGCTAACCTGTGGAGAAGTTTCTCTACTCGAACGTGGCCCTGTACCTGCCCGACTCCTACAAGTACA
CGCCGACCAACGTACGCTGCCGACCAACACCAACCTACGATTACATGAATGGCAGAGTGACACCTCCCTCGCTGGTAGAC

Fig. 21E

GCTACCTCAACATCGGGGCGCGCTGGTCGTGGACCCCATGGACAACAGTCAACCCCTTCAACCAACCAACGCAACCGGGGCTCGCTACCGCTCCATGCTCCTGGGCAACGGGCGCTACGTGCCCTTCCACATCCAGGTGCCCAAAAGTTTTTCGCCATCAAGAGCCTCTGCTCCTGCCCGGTCTACACCTACGAGTGGAACCTCCGCAAGGACGTCAACATGATCCTGCAGAGCTCCCTAGGCACGACCTGCGCACGGACGGGGCCTCCATCGCCTTACCAGCATCAACCTCTACGCCACCTTCTTCCCATGGCGCACAAACACCGCTCCACGCTCGAGGCCATGCTGCGCAACGACACCAACGACCAAGTCTTCAACGACTACCTCTCGGCGGCCAACATGCTCTACCCATCCCGGCCAACGCCACCAACGTGCCATCTCCATCCCCTCGCGCAACTGGGCCGCTTCCGCGGATGGTCTTACGCGCCTGAAGACCCGCGAGACGCCCTCGCTCGGCTCCGGTTGACCCCTACTTCGTCTACTCGGGCTCCATCCCCTACCTAGACGGCACCTTCTACCTCAACCACACCTTCAAGAAGGTCTCCATCACCTTCGACTCCTCCGTCAAGTGGCCCCGCAACGACCGCTCTGACGCCAACGAGTTCGAAATCAAGCGCACCGTCGACGGAGAGGGATACAACGTGGCCAGTGCAACATGACCAAGGACTGGTTCTGGTCCAGATGCTGGCCACTACAACATCGGCTACCAGGGCTTCTACGTGCCGAGGGGTACAAGGACCGCATGTACTCCTTCTCCGCAACTTCCAGCCCATGAGCCGCCAGGTCGTGGACGAGGTCAACTACAAGGACTACCAGGCCGTACCTTGGCCTACCAGCACAACTCGGGCTTCTGTCGGCTACCTCGCGCCACCATGCGCCAGGGCCAGCCCTACCCCGCAACTACCCCTACCCGCTCATCGGCAAGAGCGCCGTGCGCAGCGTCAACAGAAAAAGTTCCTCTGCGACCGGGTCATGTGGCGCATCCCCTTCTCCAGCAACTTCATGTCCATGGGCGCGCTACCGACCTCGGCCAGAACATGCTCTACGCCAACTCCGCCACGCGCTAGACATGAATTTGAGTCGACCCCATGGATGAGTCCACCCTTCTCTATGTTGTCTTGAAGTCTTCGACGTCGTCCGAGTGACCCAGCCCCACCGCGCGTCATCGAAGCCGTCTACCTGCGCACGCCCTTCTCGGCCGCAACGCCACCACCTAAGCCGCTCTTGCTTCTTGAAGATGACGGCGGGCTCCGGCGAGCAGGAGCTCAGGGCCATCTCCGCGACCTGGGCTGCGGGCCCTGCTTCTGGGCACCTTCGACAAGCGTTCCCTGGATTATGCCCCGCGACAAGCTGGCCTGCGCCATCGTGAACACGGCCGCGCGAGACCGGGGCGAGCACTGGCTGGCCTTGCCTGGAACCCGCGCTCCACACATGTACTCTTGCACCCCTTGGGTTCTCGGACGAGCGCCTCAAGCAGATCTACCAGTTGAGTACGAGGGCCTGCTGCGTCGACGCGCCTGGCCACCGAGGACCGCTGCGTCACCTTGAAAAAGTCCACCAGACCGTGCAGGGTCCGCGCTCGGCCGCTGCGGGCTTCTGCTGTCATGTTCTGTCACGCTTCTGTCACCTGGCCCCACCGCCCCATGGACAAGAACCCACCATGAACCTTACTGACGGGGGTGCCAACGGCATGCTCCAGTCGCCCCAGGTGGAACCCACCGTGCGCCGAACCGGAAGCGCTTACCGCTTCTCAATGCCACTCCGCTACTTTCGCTCCACCGCGCGCATCGAGAAGCCACCGCTTGCACCGCATGAATCAAGACATGTAAAAAACCGGTGTGTGTATGTGAATGCTTTATTATAATAAACAGCACATGTTATGCCACCTTCTGAGGCTCTGACTTTATTTAGAAATCGAAGGGTTTCTGCCGGTCTCGGCATGGCCCGCGGGCAGGGATACGTTGCGGAACCTGGTACTTGGGCAGCCACTTGAACCTCGGGGATCAGCAGCTTGGGCACGGGGAGGTGCGGGGAACGAGTCGCTCCACAGCTTGCAGGTGAGTTGCAGGGCGCCAGCAGGTGGGCGCGGAGATCTTGAATCGCAGTTGGGACCGCGGTTCTGCGCGCGAGAGTTGCGGTACACGGGGTTGCAGCACTGGAACACCATCAGGGCCGGGTGCTTACGCTTGCCAGCACCGTCGCTCGGTGATGCCCTCCACGTCCAGATCCTCGGCGTTGGCCATCCCGAAGGGGGTTCATCTTGAGGTCTGCCGCCCATGCTGGGCACGACCGGGCTTGTTGTTGCAATCGCAGTGACGGGGGATCAGCATCATCTGGGCTGCTCGGAGCTCATGCCCGGTACATGGCCTTCATGAAAGCCTCAGCTGGCGGAAGGCCTGCTGCGCCTTGCCGCCCTCGGTGAAGAAGACCCCGCAGGACTTGCTAGAGAACTGGTTGGTGCGCAGCCGGCGTCTGTCACGCAGCAGCGCGCTGTTGTTGGCAGCTGCACCAGCTGCGCCCCAGCGTTCTGGGTGATCTTGCCCGGTTGGGTTCTCCTTCAGCGCGCGCTGCCGTTCTGCTGCCACATCCATCTGATAGTGTGCTCCTTCTGGATCATCACGGTCCCGTGCAGGCACCGCAGCTTGCCTCGGCTTGGTGACGCCGTGCAGCCAGCGCGCAGCCGGTGCACTCCAGTTCTTGTTGGGCGATCTGGGAGTGCGAGTGACGAAGCCCTGCAGGAAGCGGCCCATCATCGCGTCAGGGTCTTGTGCTGTGAAGGTACGCGGATGCCCGGTGCTCCTCGTTACATACAGGTGGCAGATGCGGCGGTACACCTCGCCCTGCTCGGCATCAGCTGGAAGCGGACTTCAGGTGCTCTCCACGCGGTACCGGTCCATCAGCAGCTCATCTTCCATGCCCTTCTCCAGGCCGAAACGATCGGCAGGCTCAGGGGGTCTTACCAGCCATTGTCATCTTAGTCGCCGCCCGCAGGTACAGGGGGTCTTCTCGTCCAGGGTCTCAAACTCGCTTCCGCTCCTTCTCGATGATGCGCACGGGGGGAAGCTGAGCCACGGCCGACGCTCTCCTCGGCTGCCTTTCGCTCTGCTGTCTGGTGATGTCTTGCAAAGGCACATGCTTGGTCTTGGGGGTTTCTTTTGGGCGGCAGAGGCGGCGCGCATGTGCTGGGAGAGCGCGAGTTCTCGTTACACGACTATTTCTTCTTGGCCGTCGTCCGAGACCACGCGGCGGTAGGCATGCCTCTTCTGGGGCAGAGGCGGAGGCGACGGGCTCTCGCGGTTGCGGGCGGCTGGCAGAGCCCTTCCGCGTTCCGGGGGTGCGCTCCTGGCGGCGCTGCTCTGACTGACTTCTCCGCGGCCGGCCATTGTGTTCTCTAGGGAGCAACAACAAGCATGGAGACTCAGCCATCGTCGCCAACATCGCCATCTGCCCCGCCGCCACCGCGACGAGAACCAGCAGCAGAATGAAAGCTTAACCGCCCCGCGGCCAGCCCCACCTCCGACGCCGCGGCCCCAGACATGCAAGAGATGGAGGAATCCATCGAGATTGACCTGGGCTACGTGACGCCCGCGGAGCACGAGGAGGAGCTGGCAGCGCGCTTTTCAGCCCGGAAGAGAACCACCAAGAGCAGCCAGAGCAGGAAGCAGAGAACGAGCAGAACCAGGCTGGGCACGAGCATGGCGCTACCTGAGCGGGGCAGAGGACGTGCTCATCAAGCATCTGGCCCGCAATGCATCATCGTCAAGGACGCGCTGCTCGACCGCGCGGAGGTGCCCTCAGCGTGCGGGAGCTACGAGCGCAACCTCTTCTCGCCGCGCGTGCCCCCAAGCGCCAACCCACGGCACCTGTGAGCCCAACCCGCGCTCAACTTCTACCCGGTCTTCCGGTGCGCGAGGCCCTGGCCACCTACCCT

Fig. 21F

CTTTTTCAAGAACCAAGGATCCCCGTCTCTGCCGCGCCAACCGCACCCGCGCCGACGCCCTGCTCAACCTGGGCCCCGGCGC
CCGCCTACCTGATATCACCTCCTTGGGAAGAGGTTCCCAAGATCTTCGAGGGTCTGGGCAGCGACGAGACTCGGGCCGCGAACG
CTCTGCAAGGAAGCGGAGAGGAGCATGAGCACCACAGCGCCTGTTGGAGTTGGAAGGCGACAACGCGCGCCTGGCGGTCC
TCAAGCGCACGGTCGAGCTGACCCACTTCGCCTACCCGCGCTCAACCTGCCCCCAAGGTCATGAGCGCCGTCATGGACCAG
GTGCTCATCAAGCGCGCCTCGCCCCTCTCGGAGGAGGAGATGCAGGACCCCGAGAGTTCGGACGAGGGCAAGCCCGTGGTCA
GCGACGAGCAGCTGGCGCGCTGGCTGGGAGCGAGTAGCACCCCCAGAGCCTGGAAGAGCGGCGCAAGCTCATGATGGCCG
TGGTCTGTTGACCGTGGAGCTGGAGTGTCTGCGCCGCTTCTTTGCCGACGCGGAGACCCTGCGCAAGGTCGAGGAGAACCT
GCACTACCTCTTCAGGCACGGGTTCTGCGCCAGGCTGCAAGATCTCCAACGTGGAGCTGACCAACCTGGTCTCCTACATGG
GCATCCTGCACGAGAACCCTGGGGCAAACGTGCTGCACACCACCTGCGCGGGGAGGCCCGCCGCGACTACATCCGCGA
CTGCGTCTACCTGTACCTCTGCCACACCTGGCAGACGGGCATGGGCGTGTGGCAGCAGTGCCTGGAGGAGCAGAACCTGAAA
GAGCTCTGCAAGCTCCTGCAGAAGAACCTCAAGGCCCTGTGGACCGGTTTCGACGAGCGTACCACCGCCTCGGACCTGGCCG
ACCTCATCTTCCCCGAGCGCCTGCGGCTGACGCTGCGCAACGGGCTGCCGACTTTATGAGCCAAAGCATGTTGCAAACTTTC
GCTCTTTCATCCTCGAACGCTCCGGGATCTGCCCGCACCTGCTCCGCGCTGCCCTCGGACTTCGTGCCGTGACCTTCCGCGA
GTGCCCCCGCGCTCTGGAGCCACTGCTACTTGTGCGCCTGGCCAACTACCTGGCTACCACTCGGACGTGATCGAGGACG
TCAGCGGCGAGGGTCTGCTGGAGTGCCAACCTGCAACCTGTCACGCCGACCGCTCCCTGGCTGCAACCCCAAGCTG
CTGAGCGAGACCCAGATCATCGGCACCTTCGAGTTGCAAGGCCCGGCGACGCGGAGGGCAAGGGGGGTCTGAAACTCACC
CCGGGGTGTGGACCTCGGCCTACTTGCAGTTCGTGCCGAGGACTACCATCCCTTCGAGATCAGGTTCTACGAGGACCA
ATCCAGCCGCCCAAGGCCGAGCTGTGCGCTGCGTCATACCCAGGGGGCCATCCTGGCCCAATTGCAAGCCATCCAGAAAT
CCCGCCAAGAATTTCTGCTGAAAAAGGGCCACGGGGTCTACTTGGACCCCCAGACCGGAGAGGAGCTCAACCCAGCTTCCCC
CAGGATGCCCGAGGAAGCAGCAAGAAGCTGAAAGTGGAGTCCGCGCGCGGAGGATTTGGAGGAAGACTGGGAGAGCA
GTCAGGCAGAGGAGGAGGAGATGGAAGACTGGGACAGCACTCAGGCAGAGGAGGACAGCCTGCAAGACAGTCTGGAGGAG
GAAGACGAGGTGGAGGAGGCGAGGAAGAAGCAGCCGCCCGCCAGACCGTCTGCTCCTCGGCGGAGAAAGCAAGCAGCACGGA
TACCATCTCCGCTCCGGGTCGGGGTCGCGGCGGCCGGGCCACAGTAGGTGGGACGAGACCGGGCGCTTCCCGAACCCACC
ACCCAGACCGGTAAGAAGGAGCGGCAGGGATACAAGTCTGGCGGGGGCACAAAAACGCCATCGTCTCCTGCTTGAAGCCT
GCGGGGGCAACATCTCCTTACCCGGCGCTACCTGCTTCCACCGCGGGGTGAATTTCCCCGCAACATCTTGCACTACTACC
GTCACCTCCACAGCCCCCTACTACTGTTTCAAGAAGAGGCAGAAACCCAGCAGCAGCAGAAAACCGCGGCAGCAGCAGCTA
GAAAAATCCACAGCGGCGGCAGGTGGACTGAGGATCGCGGCGAACGAGCCGCGCAGACCCGGGAGCTGAGGAACCGGATC
TTTCCACCTCTATGCCATCTTCCAGCAGAGTCCGGGGCAGGAGCAGGAAGTCAAGAACCGTTCTCTGCGCTCGCT
CACCCGAGTTGTCTGTATCACAAGAGCGAAGACCAACTTCAGCGCACTCTCGAGGACGCCGAGGCTCTCTTCAACAAGTACT
GCGCGCTCACTCTAAAGAGTAGCCCGCGCCCGCCACACAGGAAAAAGGCGGGAATTACGTACCACCTGCGCCCTTCGCC
CGACCATCATGAGCAAAGAGATTCCACGCTTACATGTGGAGCTACCAGCCCAGATGGGCTGGCCGCGCGCGCGCCCA
GGACTACTCCACCCGATGAAGTGGCTCAGTGCCGGGCCCGCGATGATCTCACGGGTGAATGACATCCGCGCCACCGAAACC
AGATACTCCTAGAACAGTCAGCGATACCCGCCACGCCCCGCCATCACCTTAATCCGCGTAATTGGCCCGCGCCCTGGTGTACC
AGGAAATTTCCAGCCACGACCGTACTACTTCCGCGAGACGCCAGGCCGAAGTCCAGCTGACTAACTCAGGTGTCCAGCTG
GCCGGCGGCGCGCCCTGTGTCGTACCGCCCCGCTCAGGGTATAAAGCGGCTGGTGATCCGAGGCAGAGGCACACAGCTCA
ACGACGAGGTGGTGAGCTCTTCGCTGGGTCTGCGACCTGACGGAGTCTTCCAACCTCGCCGATCGGGGAGATCTTCTTCACG
CCTCGTCAGGCGCTCCTGACTTTGGAGAGTTCGTCTCGACGCCCGCTCGGGCGGCATCGGCACTCTCCAGTTCTGTGGAGGA
GTTCACTCCCTCGGTCTACTTCAACCCCTTCTCCGGCTCCCCGGCCACTACCCGGACGAGTTCATCCGAACTTCGACGCCATC
AGCGAGTCGGTGGACGGCTACGATTGAATGTCCATGGTGGCGCAGCTGACCTAGCTCGGCTTCGACACCTGGACCACTGCC
GCCGCTTCCGCTGCTTCGCTCGGGATCTCGCCGAGTTTGCCTACTTTGAGCTGCCCCGAGGAGCACCTCAGGGCCAGCCAC
GGAGTGGGATCATCGTCAAGGGGGCTCGACTCCACCTGCTTCGGATCTTCAGCCAGCGACCGATCCTGGTTCGAGCGCG
AACAAGGACAGACCTTCTTACTTTGACTGCATCTGCAACACCCCGGCTGCATGAAAGTCTTTGTTGTCTGCTGTGACTGA
GTATAATAAAAGCTGAGATCAGCGACTACTCCGACTCGATTGTGGTGTCTCTGCTATCAACCGGTCCCTGTTCTTACCGGGA
ACGAGACCGAGCTCCAGTCCAGTGTAAGCCCCACAAGAAGTACCTCACCTGGCTGTTCCAGGGTCCCCGATCGCGTTGTC
AACCCTGCGACAACGACGGAGTCTGCTGAGCGGCCCTGCCAACCTTACTTTTTCCACCCGAGAAAGCAAGCTCCAGCTCTTC
CAACCTTCTCCCCGGGACCTATCAGTGCGTCTCAGGACCTGCCATCACACCTTCCACCTGATCCGAAATACCACAGCGCCGC
TCCCCGCTACTAACAACCAAACTACCCACCAACGCCACCGTCGCGACCTTCTCTGAATCTAATACCACTACCGGAGGTGAGC
TCCGAGGTGACCAACCTCTGGGATTTACTACGGCCCTGGGAGGTGGTGGGGTTAATAGCAAATAAAAAAATAATCATTTG
ATTTGAAATAAAGATACAATCATATTGATGATTTGAGTTTAAACAAAATAAAGAATCACTTACTTGAAATCTGATACCAGGTCTC
TGTCATGTTTTCTGCCAACACCACCTCACTCCCTCTTCCAGCTCTGGTACTGCAGGCCCGCGGGCTGCAAACTTCTCCA

Fig. 21G

CACGCTGAAGGGGATGTCAAATTCCTCTGTCCCTCAATCTTCATTTTATCTTCTATCAGATGTCCAAAAAGCGCGTCCGGGTGG
ATGATGACTTCGACCCCGTCTACCCCTACGATGCAGACAACGCACCGACCGTGCCCTTCATCAACCCCCCTTCGTCTCTTCAGA
TGGATTCCAAGAGAAGCCCTGGGGGTGTTGTCCTGCGACTGGCTGACCCCGTCACCACCAAGAACGGGGAAATCACCCTCA
AGCTGGGAGAGGGGGTGGACCTCGACTCGTCGGGAAAACTCATCTCCAACACGGCCACCAAGGCCGCCCTCTCAGTAT
TTCAAACAACACCATTTCCTTAAAACTGCTGCCCTTTCTACAACAACATGGAACCTTAAGCCTCAATGTCTCCACACCATTAG
CAGTATTTCCACATTTAACACTTTAGGCATAAGTCTTGAAAACGGTCTTCAGACTTCAAATAAGTTGTTGACTGTACAACTAAC
TCATCCTCTTACATTAGCTCAAATAGCATCACAGTAAAAACAGACAAAGGGCTATATATTAAGTCCAGTGGAACAGAGGACT
TGAGGCTAATATAAGCCTAAAAAGAGGACTAGTTTTTGACGGTAATGCTATTGCAACATATATTGAAATGGCTTAGACTATG
GATCTTATGATAGTGATGGAACAAAGACCCGTAATTACCAAAATTGGAGCAGGATTAAATTTTGATGCTAACAAAGCAATA
GCTGTCAAAGTACAGGTTAAGTTTGAAGTCCGCTGGTGCCTTGACAGCTGGAACAAACAGGATGACAAGCTAACACT
TTGGACTACCCCTGACCAAGCCCTAATTGTCAATTACTTTAGACAGAGATGCCAAATTTACTCTGTCTTACAAATGCGGT
AGTCAAATACTAGGCACTGTGGCAGTGGCGGTGTTACTGTAGGATCAGCACTAAATCCAATTAATGACACAGTCAAAAGCGC
CATAGTTTTCCTTAGATTTGATTCCGATGGTGTACTCATGTCAAATCATCAATGGTAGGTGATTACTGGAACCTTAGGGAGGG
ACAGACCACTCAAAGTGTAGCCTATACAAATGCTGTGGGATTGATGCCAAATATAGGTGCATATCCAAAAACCAAGTAAAA
CACCTAAAAATAGCATAGTCAGTCAGGTATATTTAACTGGAGAACTACTATGCCAATGACACTAACCATAACTTTCAATGGCA
CTGATGAAAAAGACACAACCCAGTTAGCACCTACTCTATGACTTTTACATGGCAGTGGACTGGAGACTATAAGGACAAAAAT
ATTACCTTTGCTACCAACTCATTCTTTTTCTACATCGCCAGGAATAATCCACCCAGCAAGCCAACCCCTTTTCCACCACC
TTTGTCTATATGAAACTCTGAAACAGAAAAATAAAGTTCAAGTGTTTTATTGAATCAACAGTTTTACAGGACTCGAGCAGTTA
TTTTCTCCACCCTCCAGGACATGGAATACACCACCTCTCCCCCGCACAGCCTGAACATCTGAATGCCATTGGTGATGGA
CATGCTTTTGGTCTCCAGTTCCACACAGTTTCAGAGCGAGCCAGTCTCGGATCGGTGAGGAGATGAAACCTCCGGGCACT
CCCGCATCTGCACCTCACAGCTCAACAGCTGAGGATTGTCTCGTGGTGGTGGGATCACGTTATCTGGAAGAAGCAGAAGAGC
GGCGGTGGGAATCATAGTCCGGAACGGGATCGGCCGGTGGTGTGCGATCAGGCCCCGAGCAGTCTGCGCCGCCGCTC
CGTCAAGCTGCTGCTCAGGGGGTTCGGGTCCAGGACTCCCTCAGCATGATGCCACGGCCCTCAGCATCAGTCGTCTGGTGC
GGCGGGCGCAGCAGCGCATGCGAATCTCGCTCAGGTCACTGCAGTACGTGCAACACAGGACCACAGGTTGTTCAACAGTCC
ATAGTTCAACACGCTCCAGCCGAAACTCATCGCGGGAAGGATGCTACCCACGTGGCCGCTGACAGATCCTCAGGTAAATCA
AGTGGCGCTCCCTCCAGAAGACGCTGCCATGTACATGATCTCCTTGGGCATGTGGCGGTTACCCACCTCCCGGTACCACATCA
CCCTCTGGTTGAACATGCAGCCCCGGATGATCCTGCGGAACACAGGGCCAGCACCGCCCCGCCGCCATGCAGCGAAGAGA
CCCCGGATCCCGGCAATGACAATGGAGGACCCACCGCTCGTACCCGTGGATCATCTGGGAGCTGAACAAGTCTATGTTGGCAC
AGCACAGGCATATGCTCATGATCTCTCAGCACTCTCAGCTCCTCGGGGGTCAAAACCATATCCAGGGCAGCGGGAACCTCTT
GCAGGACAGCGAACCCCGCAGAACAGGGCAATCCTCGACATAACTTACATTGTGCATGGACAGGGTATCGCAATCAGGCAG
CACCGGGTGATCCTCCACCAGAGAAGCGCGGGTCTCGGTCTCCTCAGCGTGTTAAGGGGGCCGGCCGATACGGGTGATGG
CGGGACGCGGTGATCGTGTCTCGACCGTGTATGATGCAGTTGCTTTCGGACATTTTCGACTTGCTGTAGCAGAACCTGGT
CCGGGCGCTGCACACCGATCGCCGGCGGGCGGTCTCGGCGCTTGAACGCTCGGTGTTAAAGTTGTAACAGCCACTCTCTCA
GACCGTGACGAGATCTAGGGCCTCAGGAGTGATGAAGATCCCATCATGCCTGATAGCTCTGATCAGTACGACACCGTGGAA
TGGGCCAGGCCCAGCCAGATGATGCAATTTTGTGGGTTTCGGTGACGGCGGGGGAGGGAAGAAGCAGGAAGAACCATGATT
AACTTTTAAATCCAAACGGTCTCGGAGCACTTCAAATGAAGGTACGGAGATGGCACCTCTCGCCCCGCTGTGTTGGTGGAA
AATAACAGCCAGGTCAAAGGTGATACGGTCTCGAGATGTTCCACGGTGGCTCCAGCAAAGCCTCCACGCGCACATCCAGAA
ACAAGACAATAGCGAAAGCGGGAGGGTCTCTAATTCCTCAACCATCATGTTACACTCCTGCACCATCCCAAGATAATTTTCATT
TTTCCAGCCTTGAATGATTGAACTAGTTCTGAGGTAAATCCAAGCCAGCCATGATAAAAAGCTCGCGCAGAGCACCTCCAC
CGGCATTCTTAAGCACACCCTCATAATTCCAAGATATTCTGCTCCTGGTTCACCTGCAGCAGATTGACAAGCGGAATATCAAAA
TCTCTGCCGCGATCCCTGAGCTCCTCCCTCAGCAATAACTGTAAGTACTTTTCATATCGTCTCCGAAATTTTAGCCATAGGACC
CCAGGAATAAGAGAAGGGCAAGCCACATTACAGATAAACCGAAGTCCCCCAGTGAGCATTGCCAAATGTAAGATTGAAA
TAAGCATGCTGGCTAGACCCGGTGATATCTCCAGATAAAGTGGACAGAAAAATCGGGTAAGCAATTTTAAAGAAAATCAACAAA
AGAAAAATCTTCCAGGTGCACGTTTAGGGCCTCGGGAACAACGATGGAGTAAGTGCAAGGGGTGCGTTCAGCATGGTTAGT
TAGCTGATCTGTAAAAAACAACAAATAAAAACATTAACCATGCTAGCCTGGCGAACAGGTGGGTAATCGTTCTCTCCAGCA
CCAGGCAGGCCACGGGTCTCCGGCGCGACCCTCGTAAAAATTGTCGCTATGATTGAAAACCATCACAGAGAGACGTTCCCG
GTGGCCGGCGTGAATGATTCGAGAAGAAGCATACCCCCGGAACATTGGAGTCCGTGAGTGAACAAAAAGCGGCCGAGGAA
GCAATGAGGCACTACAACGCTCACTCTCAAGTCCAGCAAAGCGATGCCATGCGGATGAAGCACAAAATTTTCAAGTGCGTAAA
AAATGTAATTACTCCCCTCTGCACAGGCAGCGAAGCTCCCGATCCCTCCAGATACACATACAAAGCCTCAGCGTCCATAGCTT
ACCGAGCGGCAGCAGCAGCGGCACACAACAGGCGCAAGAGTCAGAGAAAAAGTCTAGCTCTAACCTGTCCGCCGCTCTCTG
CTCAATATATAGCCCAGATCTACACTGACGTAAAGGCCAAAGTCTAAAAATACCCGCCAAATAATCACACACGCCAGCACAC
GCCAGAAACCGGTGACACACTCAGAAAAATACGCGCACTTCTCAAACGGCCAAACTGCCGTCAATTCGGGTTTCCACGCTA
CGTCATCAAAACACGACTTTCAAATTCCGTCGACCGTTAAAAACATACCCGCCCGCCCTAACGGTCGCGCTCCCGCAGCC
AATCACCTTCTCCTCCCAAAATCAAACAGCTCATTGTCATATTAACGCGCACCAAAAGTTGAGGTATATTATGATGATG

Fig. 21H

AdC6 010-HIVgag (E1026) Amino acids – SEQ ID NO: 10**The symbol “ * ” refers herein to stop codons in the non coding regions**

HHQ*YTSNFWCALICK*AV*IWGGRKVICGSGDR*GRGG*RFDDVAMRRSRFASSRGKSDVKRGVV*TRKYSIFPRSLTGNEVFL
GGCK*KRAIFARKLNEEVKI*VISRLWQGGVFAEGRVDFDLRGGFYRIFHLNFRVRCQSPVFLRTISFPRKCHLTVTITVLR*RLRS
PDPLWCTLSTICSDAA*LSQYLLPACVLEVAE*CASKI*ATTRQGLTDNCMKNLRRVRRFALLRDVRARYTR*H*LLTSY***SITGSLV
HSPYMEFRVT*LTVNGPPG*PPNDPRPLTSIMTYPIVTPIGTFH*RQWVEYLR*TAHLAVHQVYHMPSTPPIDVNDGKWPAAWHY
AQYMTLWDFPTWQYIYVLVIAITMVMRFWQYINGRG*RFDSRGFSLHPIDVNGSLFWHQNRDFFPKCRNNSAPLTQMGGRRV
RWEVYISRARLVNRQITRSFIADVYHS*IANAVSASDSTVSNLSCRWS*GTGQVSIKVTRQV*GDQ*KLGLSRQRRLLRF**APIGLT
DIHFALSTGVHSQFNYSS*G*ST*YDSL*ASATMGARASVLSGGELDRWEKIRLPGGKKKYKLKHIVWASRELERFAVNPGLET
EGCRQILGQLQPSLQGTSEELRSLYNTVATLYCVHQRIEVKDTKEALEKIEEEQNKSKKKAQAAAADTGNSSQVSQNYPIVQNLQGG
MVHQAIPTLNNAWVKVVEEKAFSPEVPMFSALSEGATPQDLNMTLNTVGGHQAAMQMLKETINEEAAEWDRLHPVHAGPIA
PGQMREPRGSDIAGTTSTLQEQIGWMTNPPPIVGEIYKRWIILGNKIVRMYSPSILDIRQGPKEPFRDYVDRFYKTLRAEQASQE
VKNWMTETLLVQANPDCKTILKALGPAATLEEMMTACQGVGGPGHKARVLAEMSQVTNSATIMMQRGFNFRNQRKTVKCFN
CGKEGHIAKNCRAPRKGCWKCGKEGHQMKDCTERQANFLGKIWPSHKGRPGNLFQSRPEPTAPPEESFRFGEETTPSQKQEP
DKELYPLASRLSFGNDPSSQ**SSV*TGPLESTRAAKPLISLDCAF*LPAICCLPLPRAFLDPGRCHSHCPFLIK*GNICALSE*VSFYSG
GWGGAGQQGGGLGRQ*QACWGCGLGYGF*GGKNQICRSEFIYVGCGERGNEMVLWVLWVCINESVRYRHMLATVHVASHP
RKTWPEFEHNMVTRCNVHLGSRRGFMFMPYQCNMQFVKVLEPDAMSRVSLTGVDNMNVELWKILRYDESKTRCRACECGGKH
ARLQPVCEVEDLDPDHLVLSNGTEFGSSGEESD*SE*CLGLGVSLHEGQND*NWFSVCCSSMSGASFEAGGVSPYLTGRLPS
WAGVRQNVMGSTVDGRPVQANSTLTATLSSSSVDAASAAAAASAASAVRGMALGAGYSSLVANSSSTNNPASLNEEKL
MAQLEALTQRLGELTQQVAQLQAETRAAVATVTK*KMNQ*INGDGC*F*HRVLNLYLIFRAR*ALDHRSRSLSTRWIFSRTR*RW
AWMLRYMGMSPSRGWR*LHCRASCSCGMVL*ITQS*QGRRAWCCTMSLRRLMATGSPLV*VLTNLLSWEGCMRGEMRCILA
WILRLAMFPFRRRGFMLCRTSTVYPVHLGNLSCNLEGKA*KNLETPL*PPRFSMHSSMMMAMGPWAAAWAKTFRGSDTS*L
WSWVSSS*AILMNLGRRVPDWGTVKPSIPGA*LPSQICISQALSSEGGIMSTCGAMKKTVSGAGEMSWAESRFRSSWDLPQVGP
*MTPTMTGCRW*LRRQLPSSRRRGATSFIIISRTCMFSRTSSARRRSPSERSSCEAKFFSGLSPSAMGILERVCCSSRRSSQSSVMCS
RASRRSPPRFAGWDCGSRAPGDGRPARPGSGPSRAAGSASAWSPSR*RGARRAGRLRGCSGSSGWSRTAPGRRPARRPGS
N*A*VRS*APRPRGPWRGAYLWKVRRDRGGT*GRRAWGRGRRTGRRRPRRSWRRSRTPRAR*GRGGWGQKRGFLRAF*
CVSYLWSP*ARVPAG*QRCPCPRRPTLWAGPRAGCRGPRRRGTPTPRRRPGSRPARRRPRGRSGRCPPAGPPSPGYASTCPP
RPHPGR*LACKCRPRDRGSRPGGYKRGAPARPHCLPDRCPGAPAVGVGIPSRRA*PRHSGCQFLETRI*Y*RCRWRRLS*APR
PFGQKRRSFCCRAWWRRSRGRWRRAAWRWSAWSGSFPCRRAPWRR*AAARTRAPRTSIRGRW*ARRARF*PASRGAC**G
PRWWPPRRAGARWSSRGARPCASRRGAAGPA*ARRGRRPR*RCRAGARGRSS*CRCPDCPAPLASRARPARARRG*GACPR
WGA*ARRRTRCRRRRGAPRGRRCRWGSSAPRGWCWRARSRTARARARGAPCRGWSVAAFRRGRRSGGRWRGSRWWRAF
GRC*SGRGAGRPS*SGRRSPAARRARR*RGPRGRSSRGLG*CHT*AGPSASTARG*EGTLRGPSTLRGGTRPDRHGKSPPC
RTG*RPCRRSSPSRGRKLARPCAGRCG*GRRCRAP*P*GTGA*SRGRRSRPAPRVGSPCASCRRG*AKRK*HR*RGSCPRGA*S
CE*CGKAGAPRPGC*PGRGRSRRSR*CCARRCRVPRIAGGP*RGAA*ARRR*ARRGR*ARAARGPSRRRGGR*GRKSRDPR
PGRSASGPGTDGTGPRPFRG*RSRRCGRRRASGPT*AGGRGRGRARRAAGPRRV*PA*RGRAACRRTPSRCRFPHRR*GRAF
RCEDASRWGRTGSPATSWRNGC*CDGSRNADGAPSTRACVYTSVRSARNAARDARAARAVPGFLWRGISVSGGALAAASRAVL
LGHRRGHRLPRWWSC*RARAGGRSRPRLGRVGERGRGRAGRSCPGS*DAESGQWAAAARG*LAGAFPRAGGPDGT*SPRR
RWWLRPRLAGCRAPGAPPCPVSSWALLPCRSEAAARTRAGRQGRGARRQGRQGHVGAARGQVLVLRPEKTGVSDATVDV
DLTPLGEGHGTREFEPERFDRLNLGIVDGLPQDLHVARVVLVGLDGLHELDLLLLKVSAGALDGGREVVGDAAHELREGVHAG
LVPDAVDHGSVGVARAHDHLGEVELDVAREDRVVAEALVEVVERGGDVLGDEEVHDPAAERHLADVAQGFQAFHGLVEVHGE
VEKLGVARRDGQLLLQKTDELGDGGAHLAELGPGGLLHLLHLLH*HLFYLLRRRWRGRGPASPAAHGQTVDEALDGLPAPATH
GLGDGAPVLAPQHEDAAHLQVAAGGVSVGGEGGADDASYQLTRRDSAQGPRLHIGIRKPLNEGFEPAVAR*AEPGLFFG
YLVGRRAGDAAGDEVEVGGPETADGGEEHQVLGPGLLDAQTVGHAPGVVLTPEVLVVLHEPLHGHLLARAABHAREPEPALR
LDERQVGDDALGEDGLLDLGEGLLEVVEDEAVVGSVDGAVGHDPVDGLVAGSHELVLVLEARVGARVEDVVVAGAHEVL
VSDEEVRRLAVERPSLGGGGAGREVLEHEAVVAVDPVGHGPDAGGGGGGARELADAVPDVAQRQEVVHGGRLAREARAVD
ALDIRAKTAVSGSTPWPGG*ANGLGCACTPVRISSQAGAAANVVALPSRPKANETSRIIRRVVFWPWSLVMKN**ARKAAAR
DGLP*SGERARVALRCAPVRASALGAGRIPRLTAWLPRRFQDPLASRLQLRSEPLFFFLVFLPDASRTAADAPPPSTTTAPTAAA
ATAGASAPAPAAASHYRGRRRERSRRSV*PGLGRGRGAGAAGGVVAGAAPARADEKGRSRLRAQAEPVQRQERRGARGDARL
PLPRGAGAAARPGPKAGAEGRGFRGGRADGDQPRARARGRGQPGHGVRADEGGEQLPKILQQPRAHLDRARGGDPGPDAPV
GPAGGHRAEPHEQAADGAASVGGAAQSGQRDVQGGAAEYHRARGPLAPGPGEHFAEHRGAGARAAAVREAGGHQLGAESG

Fig. 211

QVLR*EDLQDPVRAHRQGGEDRRVLHAHDPESADPERRSSGGVPQRQDAPRGERQPPARAERPGADAQPAAGPDRGRDRGGELL
 *HGRGPALAAQPPGLGSCRRFPLRGGGGGR*GGGGRVPGRLMARPYFC*MQQQPPPPPPDPAMRAALQSQPSGINSSDDWTQA
 MQRIMALTTRNPEAFRQQPQANRLSAILEAVVPSRSNPHEKVLAINNALVENKAIRGDEAGLVYNALLERVARYNSTNVQTNLDR
 MVTDVREAVSQRRERFHRESNLGSMVALNAFLSTQPANVPRGQEDYTNFISALRLMVAEVPQSEVYQSGPDYFFQTSRQGLQTVNL
 SQAFKNLQGLWGVQAPVGDRA TVSSLLTPNSRLLLLLVAPFTDSGSVSRDYLGYLLNLYREAIGQAHVDEQTYQEITHVSRALGQE
 DPGNLEATLNFLLTNRSQKIPQYALSTEEERILRYVQSVGLFLMQEGATPSAALDMTARNMEPSMYARNRPFINKLMDYLHRAA
 AMNSDYFTNAILNPHWLPPPGFYTGEYDMPDPNDGFLWDDVDSSVFSRPGTNAVWKKEGGDRRPSALSGRAGAAA VPEAA
 SPFSLPFSLSNRSSELGRLTRPRLLGEEYLNDSLLRPEREKNFPNNGIESLVDKMSRWKTYAHEHRDEPRASSAGTRRRQRHHRQ
 RGLVWDDSDADDSSVLDLGGSGGNPFALRPRIGRLM*ESEKIKDGTHQGHGDQRAFFSVVCSMMRRVYPEGPPPSYESVMQ
 QAVAAAMQPPLEAPYVPPRYLAPTEGRNSIRYSELAPLYDTRLYLVNKSADIASLNYQNDHSNFLTTVVQNNDFTPTEASTQTINF
 DERSRWGGQLKTIMHTNMPNVNEFMYSNKFARVMVSRKTPNGVDDDYDGSQDELTYEWVEFELPEGNFVSMTIDLMMNNAI
 DNYLAVGRQNGVLES DIGVKFDTRNFRLGWDPTVELVMPGVYTNEAFHPDIVLLPGCGVDFTESRLSNLLGIRKRPQFQEGFQILYE
 DLEGGNIPALLDVEAYEKSKEDSTAAATAAVATASTEVRGDNFASAAAAEAAETESKIVIQPEKDSKDRSYNVLADKNTAYRSW
 YLAYNYGDPEKGVRSWTLTSDVTCGVEQVYWSLPDMMQDPVTFRSTRQVS NYPVVGAE LLPVYSKFFNEQAVYSQQLRAFTS
 LTHVFNRFENQILVRPPAPTITTVSENVPALTDHGTLPLRSSIRGVQRTVTDARRRTCPVYKALGVVAPRVLSSRTF*KMSILISPS
 NNTGWGLRAPSKMYGGARQSTQHPVRVRGHFRAPWGALKGRVRSRTTVDDVIDQVADARNYTPAAAPVSTVDAVIDSVVAD
 ARRYARTKSRRRIARRHRSTPAMRAARALLRRARRTGRRAMLRAARRAASGSSSAGTRRRRAATAAAAAIASMSRPRRGNVYVW
 RDAATGVRVPVTRPRPT*RC*LRD VDSQRRGGCPSANTRKRCSSRLRSTAPRRR*RRKESPAN*SGSKRTKRRRKMTDWWWS
 LCASSPPGGACSGAGGK*NRCCGPAPRWSSRPASVPAPPPSAPTTRCTGTRTSSSRSSVWASLRTASAAAPR*KRRRCPSRWTT
 ATPRRA*SR*PCSRCYRARRRAGASSARAARICTRPCS*WCPSARSWRTCWST*RWTPRCSPRSRCGPSSRWPRAWACRPWTSRS
 PRSPWKRRPSP*SPAPAPWRCRRIPGCQHQLPPALAEASTARPAC*CPTTRCILPSSPRRATAARASTAATPAAAAARPPPAVVA
 AAAAAAPRLPPWCGECIAAGASL*PCRARATTRASPFNYRLLADMALTCRLRVPTGYRGRKPRRRRLTGNGLRHHHRRRRRAISKR
 LGGGFLPALIPIIAAIGAIPGIASVAVQASQRH*DTKKHGFVIKKMD*RSWSCDVC*MEDINFSSLAPRHGTRPFMGTWSDIGN
 SQLNGGAFNWSSLWSGLKNFGSTLKYGNKAWNSSTGQALREKLEQNFQKQVVDGLASGINGVVDLANQAVQKQINSRLDAV
 PPAGSVEMPQVEEELPLDKRGDKRPRDAEETLLHTDEPPPYEAVKGLPTTRPVAPLATGVLPKSSSQPATLDLPPPRPSTVAK
 PLPPVAVASRAPRGRPQANWQSTLNSIVGLGVQSVKRRRCY*KTL*RLTCLSVICMSADQKEECEARRRVARWPPHRCPPSGRT
 CTSPDRTLST*VRVWCSSPAPQTPTSVWGTS LGTPRWRPRTM*PPTAASG*RCASCPWTARTTPTRTKCATRWPWATTACWT
 WPAPLTSAACWTGALASNP TLAPPTA*LPRELPIPASGSKQKQAMGELWKHTHMVWPQWAERILQKMFVKLELTQIRINQF
 MPTKHFNQNRK*EKKIGKCLKTFMAVELLKKQT*NLAMAPMLDPPMKKEVKLNKLEMMEFQPKNST*TWLSLIPVAP*TVKTS
 IKQTLSCIPKTRIWKLQTRMWTYNQARMMQVLKLTWFSSLCPTDPTTLGSGTTLVLCTTTALAIWVCLLVPPS*MLWLICKTETP
 SCPTSSCLTLWVTEPGISVCGTRRWVTMPMCASSKTMVWRMNCQTIASPW TALALTPHTKV*K*KMVKMVMLRVNGKMTILL
 QLEINYVKVTFSPWRLISRLTCGEVSSTRTWPCPTPTSTRRPTSRCRPTPTIT*MAE*HLPRW*TPTSTSGRAGRWTWPWTSTP
 STTTATRACATAPCSWATGATCPSTSRCPKSFSPSRASCSCPGPTPTSGTSARTST*SCRAP*ATTCARTGPPSPSPASTSTPPSPWR
 TTPPPSRPCCATPTTSPSTTSRRPTCSTPSRPTPPTCPSPSRATGPPSADGPSRA*RPARRPRSAPGSTPTSSTRAPSPT*TAPSTS
 TTPSRSPSPSTPPSAGPATTAS*RPTSSKSSAPSTERDTTWPSAT*PRTGSWSRCWPTTTSATRASTCPRATRTACTPSSATSSP*AA
 RSWTRSTTRTPSPWPTSTTTASSATSRRPCARASPTPTTPTRSSARAPSPASPRKSSSATGSCGASPPATSCPWARSPTSARTC
 STPTPPTR*T*ISKSTPWSMPPFMSLSSKSTSECTSPTAASSKPSTCARPSRPATPPPKPLLLAR*RRAPASRSSGPSSATWAAGPA
 SWAPSTSASLDSWPRTSWPAPS*TRPAARPGASTGWSPGTRAPTHATSSTPSGSRTSASSRSTSSSTRACCAAPWPPRTAASP
 WKSPPRPCRVRARPPAGSSAACSTPCTGPTAPWTRTPP*TY*RGCTACSSRPWNPPCAATRKRSTASSMPTPTFAPTARAS
 RRPPPSTA*IKTCKKPVCECFIHNKQHMFMPPSRL*LYLEIEGVLPALGMARGQGYVAELVLGQPLELGDQQLGHGEVGERVAP
 QLARELQGAQQVGRGDLEIAVGTRVLRARVAVHGVAALEHHQGRVLHACQHRRVGDALHVQILGVGHPEGGHLAGLPPHAGHA
 AGLVVAIAVQGDQHHLGLGAHARVHGLHESLQAEGLRLAALGEEDPAGLARELVGGAAGVVHAAARVVVGQLHHAAPPAVL
 GDLGPVGVLQRALPVLARHIHLDVLLDHHGPVQAPQALGFGAAVQPQRAAGALPVLVGD LGVRVHEALQEAHHRGQGLV
 AGEQQRDAAVLLVHIQVADA AVHLALLGHQLEGLQVALHAVPVHQQRHFFHALLPGRNDRQAQGV LHRHCHLSRRRRGQGVV
 LVQGLKHS LAVLLDDAHGGKAEAHGRQLLLGLPFVLAVLADVLQRHMLGLAGFLGRQRRRRRCAGRARVLVHHDYFFFLAVVRDH
 AAVGMPLLGQRRRRRALAVRRAAGRAPSAFGGALLAALL*LTSSAAGHCVLLGSNNKHGDSAIVANIAICPRRHRRREPAAE*KLNR
 PAAQPHLRRRGPRHARDGGIHRD*PGLRDARGARGGAGSALFSPGREPPRAARAGSRERAEPGWARAWRLPERGRGRAHQASG
 PPMHHRQGRAARPRRGAPQRGGAQPLRAQPLLAARAPQAPAQRHL*APQAPQLPLGRGARGPHLPFLQEPKDPRLLPQRP
 HPRRRPAQPGPRRPPT*YHLLGRGSQDLRSGGQRRDSGRERSARKRGA*APQRPGGVGRRQRAPGGPQAHGRADPLRLPGAQ
 PAPQGHERRHGPAGAHQARLAPLGGGDAGPREFGRGQARGQRRRAAGALAGSE*HPPEPGRAAQAHDRGPGDRGAGVSAPLLC
 RRGDPAQGRGEPALPLQARVRAPGLQDLQRGADQPGLLHGHAPAREPPGAKRAAHPARGGPPRLHPRLPLVPLPHLADGHGRV

Fig. 21J

AAVPGGAEPERALQAPAEPPQGPVDRVRRAYHRLGPRPHLPRAAADAQAARLYEPKHVAKLSLFHPRTLDRPARHLLRAALG
 LRAADLPRVPPAALEPLLLAAPGQLPGLPLGRDRGRQRRGSAGVPLPLQLHAAPLPLQPPAAERDPDRHRLRVARPRRRRGQG
 GSETHPGAVDLGLLAQVRARGPLSLRDQVLRGPIAAQGRAVGLRHHPGGHPGPIASHPEIPPRISAEKGPRGLLGPPDRRGAQPQ
 LPPGCPEEAARS*KWSCRRRIWRKTGRAVRQRRRWKTGTALRQRTACKTVWRRKTRWRRQRKKQPPDRRPRRRKQAARIP
 SPLRVGVAAAGPTVGGTRPGASRTPPRPVRRSGRDTSPGGGKTTPSSPACKPAGATSPSPGATCSSTAG*TSPATSCITTVTSTAPT
 TVSKKRQKPSSSRKPAAAAARKSTAAAGGLRIAANEPAQTRELRNRIFFTLYAIFQQSRGQEQELKVKNRSLRSLTRSCLYHKSEDLQ
 RTLEDAEALFNKYCALTLKE*PAPAHTRKAGITSPAPFARPS*AKRFRLTCGATSPRWAWPPAPPRTTPPA*TGSPVGPGR*SHG*
 MTSAPTETRY*NSQRSPRPAILIRVIGPPPWCTRKFSPRPYFRETPRPKSS*LTQVSSWPAAPPCVVTAPLRV*SGW*SEAE
 HSSTTRW*ALRWVCDLTESSNSPDRGDLPSRLVRPS*LWRVRPRSPARAASALSSSWRSSLPSTSTPSPAPPATTRTSSRTSTPSAS
 RWTATIECPMVAQLT*LGFDTWTTAAASAASLGISPLTLSCPRSTLRAQPTCEGSSSKGASTPTCFGSSASDRSWSSANKDRPFL
 CTASATTPACMKVFFVCCVLSIIKAEISDYSGLDCGVPAINRSLFFGTNETELQLQCKPHKKYLTWLFQGSPIAVVNHCDNDGVLLSGP
 ANLTFSTRSKLQLFQPFPGTYQCVSGPCHHTFHLPNTTAPLPATNNQTTQRHRRDLSSSENNTTGGELRGRPTSGIYYPWEVV
 GLIANKNNHLLI*NKDTIILMI*V*QK*RITYLKSDTRSLMFSANTTSLPSSQLWYCRPRAANFLHTLKGMSSNSCPSIFILSSIRCPKS
 ASGWMMTSTPSTPTMQTTHRPCSSTPPSSLQMDSKRSPWGCCPCDWLTPSPRTGKSPSSWERGWTSTRRENSSPTRPPRPP
 LSVFQTTFPFLKLLPLSTTTMEL*ASMSPHH*QYFPHLT*A*VLETVFRQLQISC*LYN*LILLHSAQIASQ*KQTKGYILTPVETEDLRLI*
 A*KED*FLTVMLLQHILEMA*TMDLMIVMEKQDP*LPKLEQD*ILMLTKQ*LSN*AQV*VLTPLPV*QLETNRMTS*HFGPLTQA
 LIVNYFQTEMPNLLSVLQNAVVKY*ALWQWRLL*DKH*QLMTQSKAP*FSLDIPMVYSCQTHQW*VITGTGRDRPLKV*PIQ
 MLWDSCQI*VHIQKPKVKHLKIA*SVRYI*LEKLLCQ*H*P*LSMALMCKKTQPQLAPTL*LLHGSGLTIRTILPLPTHSLFPTSPRN
 NPTQQANPFSHHLCYGNSETEK*SSSVLLNQFYRTRAVIFPPPSQDMEYTTLSPTALNI*MPLVMDMLLVSTFHTVSEASLGS
 VREMKPSGHSRICTSQLNS*GLSSVVGITVIWKKQKSGGGNHSPTGSAGGVASGPAAVAAAAAPSSCCSGGSGPGTPSA*CPRPS
 ASVWVCGGRSSACESRSGHCSTCNTGPPGCSTVHSSTRSSRNSSREGCYPRGRTRSSGKSSGAPSRRCPCPCT*SPWACGGSPPPG
 TTSPSG*TCSPG*SCGTTGPAPPRPPCSEETPDGNDNGGPTARTRGSSGS*TSLCWHSTGICSCISSALSAPRGSKPYPRARGTLA
 QRTPQNRILAHNLHCAWTGYRNQAAPGDPPPEKGRSRSRPHSVVRGPADTGDGGTRLIVFSTVS*CSCFRFTSYLL*QNLVRLHT
 DRRRRSRRLERSVLKL*NSHSLRPCSRASGVMKIPSCIALITSTTVEWARPSQMMQFCWVSVTAGEGRTGRMTINF*SKRSRST
 SK*RSRRWHLSPPLCWWKITARSKVIRFSRCSTVASSKASTRTSRNKTIKAGGFSNSSTIMLHSCITIP*FSFFQP*MIRTSS*GKSKP
 AMIKSSRRAPSTGILKHTLIIPRYSAPGSPAAD*QAEYQNLCDP*APPSAITVSTLSYRLRN*P*DPQE*EKGKPHYR*TEVPPSEHC
 QM*D*NKHAG*TR*YLPDNWTEENRVSNF*ENQQKKNLPGARLGPREQRWSKCKGCVPAWLVS*SVKKQKIKH*TMLAWRTGG
 *IVLSSTRQATGSPARPS*KLSL*LKTITERRSRWP*A*MIREAYTPGTLESVSEKKRPRKQ*GTTTLTKSSKAMPCG*STKFSGA*KM
 *LLPSCTGSEAPDPSRYTYKASASIAAAAAAHNRKRSQRKD*ALTCPPALCSIYSPRSTLT*RPKSKNTRQIITHAQHTPRNR*HTQ
 KNTRTSSNGQTAVISGFPRYVIKTRLSNSVDR*KHHPPRP*RSPLQPITFLPPQIQTALHINAHQKFEVYY**

Fig. 22A

AdC7 010-HIVgp140(E1469) Nucleic Acids – SEQ ID NO: 3

CATCATCAATAATATACCTCAAACCTTTGGTGCGGTTAATATGCAAATGAGCTGTTTGAATTTGGGGAGGGAGGAAGGTGAT
TGGCCGAGAGACGGGGCGACCGTTAGGGGCGGGGCGGGTGACGTTTTGATGACGTGGCCGTGAGGCGGAGCCGGTTTGCAA
GTTCTCGTGGGAAAAGTGACGTCAAACGAGGTGTGGTTTGAACACGGAAATACTCAATTTCCCGCGCTCTGACAGGAAAT
GAGGTGTTTCTGGGCGGATGCAAGTGAAAACGGGCCATTTTCGCGCGAAAACCTGAATGAGGAAGTGAAAATCTGAGTAATTT
CGCGTTTATGGCAGGGAGGAGTATTTGCCGAGGGCCGAGTAGACTTTGACCGATTACGTGGGGGTTTCGATTACCGTATTTTT
CACCTAAATTTCCGCGTACGGTGTCAAAGTCCGGTGTTTTACGTACGATATCATTTCCCCGAAAGTGCCACCTGACCGTAACTA
TAACGGTCTAAGGTAGCGAAAGCTCAGATCTCCCGATCCCCTATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGT
TAAGCCAGTATCTGCTCCCTGCTTGTGTGTTGGAGGTGCGTGAGTAGTGCGCGAGCAAATTTAAGCTACAACAAGGCAAGGC
TTGACCGACAATTGCATGAAGAATCTGCTTAGGGTTAGGCGTTTTGCGCTGCTTCGCGATGTACGGGCCAGATATACGCGTTG
ACATTGATTATTGACTAGTATGCCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCCCTGGCATTATGCCAGTA
CATGACCTTATGGGACTTTCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGTATGCGGTTTTGGCAGTAC
ATCAATGGGCGTGGATAGCGTTTTGACTCACGGGGATTTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGTTGGCA
CCAAAATCAACGGGACTTTCCAAAATGTCGTAACAACCTCCGCCCATTGACGCAAATGGGCGGTAGGCGTGTACGGTGGGAG
GTCTATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCACTAGAAGCTTTATTGCGGTAGTTTATCACAGTTAAATTGCTAAC
GCAGTCAGTGCTTCTGACACAACAGTCTCGAACTTAAGGCTAGAGTACTTAATACGACTCACTATAGGCTAGTTAAGGCTAGA
GTTTCGACGCCACCATGCGCGTGATGGGCATCCTGCGCTCTACCAGCAGTGGTGGATCTGGGGCATCCTGGGCTTCTGGATGC
TGATGATCTGCAACGTGTGGGGCAACCTGTGGGTGACCGTGTAACGCGTGCCCGTGTGGAAGGAGGCCAAGACCACCT
GTTCTGCGCTCCGACGCCAAGGCCACAAGGAGGAGGTGCACAACATCTGGGCCACCCACGCCTGCGTGCCACCGACCCCA
ACCCCCAGGAGATCGTGCTGAAGAACGTGACCGAGAACTTCAACATGTGGAAGAACGACATGGTGGAACAGATGCACGAGG
ACATCATCTCCCTGTGGGACCAGTCCCTGAAGCCCTGCGTGAAGCTGACCCCCCTGTGCGTGACCTGAACTGCTCCGACGTGA
AGATCAAGGGCACCAACGCCACCTACAACAACGCCACCTACAACAACAACAACACCATCTCCGACATGAAGAAGTCTCCTTCA
ACACCACCACCGAGATCACCGACAAGAAGAAGAGGAGTACGCCCTGTTCTACAAGCTGGACGTGGTGGCCCTGGACGGCAA
GGAGACCAACTCCACCAACTCCTCCGAGTACCGCCTGATCAACTGCAACACCTCCGCCGTGACCCAGGCCTGCCCAAGGTGTC
CTTCGACCCCATCCCATCCACTACTGCGCCCCCGCCGGCTACGCCATCTGAAGTGCAACAACAAGACCTTCAACGGCACCGG
CCCCTGCAACAACGTGTCCACCGTGCAGTGCACCCACGGCATCAAGCCCGTGGTGTCCACCCAGCTGCTGTGAACGGCTCCCT
GGCCGAGGAGGAGGTGGTGATCCGCTTCGAGAACCTGACCAACAACGCCAAGATCATCATCGTGACCTGAACGAGTCCGTG
GAGATCAACTGCACCCGCCCCCTCCAACAACACCCGCAAGTCCGTGCGCATCGGCCCGGCCAGACCTTCTTCGCCACCGGCGA
CATCATCGGCGACATCCGCCAGGCCCACTGCAACATCTCCGCAAGAAGTGGAACACCACCCTGCAGCGGTGAAGGAGAAG
CTGAAGGAGAAGTTCCCAACAAGACCATCCAGTTCGCCCCCTCCTCCGGCGGCGACCTGGAGATCACCAACCACTCCTTCAAC
TGCCGCGGCGAGTTCTTACTGCTACACCTCCGACCTGTTCAACTCCACCTACATGTCCAACAACACCGGCGGCGCCAACATC
ACCTGCAGTGCCGCATCAAGCAGATCATCCGCATGTGGCAGGGCGTGGGCCAGGCCATGTACGCCCCCCCCATCGCCGGCA
ACATCACCTGCAAGTCCAACATCACCGGCCTGCTGCTGACCCGCGACGGCGGCAAGGAGAAGAACGACACCGAGACCTTCCG
CCCCGGCGGCGGCGACATGCGCGACAACCTGGCGCTCCGAGCTGTACAAGTACAAGGTGGTGGAGATCAAGCCCCCTGGGCATC
GCCCCGACAAGGCCAAGCTGACCGTGCAGGCCCGCCAGCTGCTGTCCGGCATCGTGACGACGAGTCCAACCTGCTGCGCG
CCATCGAGGCCCAGCAGCATGCTGCAGCTGACCGTGTGGGGCATCAAGCAGCTGCAGACCCGCGTGTGGCCATCGAGCG
CTACCTGAAGGACCAGCAGCTGCTGGGCATCTGGGGCTGCTCCGGCAAGCTGATCTGCACCACCGCCGTGCCCTGGAACGCCT
CCTGGTCCAACAAGTCTACGAGGAGATCTGGGGCAACATGACCTGGATGCAGTGGGACCGCGAGATCAACAACACCAAA
CACCATCTACTCCCTGCTGGAGGAGTCCAGAACAGCAGGAGAAGAACGAGAAGGACCTGCTGGCCCTGGACTCCTGGGAG
TCCCTGTGGTCTGTTCAACATCACCAACTGGCTGTGGTAAGGTACCTCTAGAGTCGACCCGGGCGGCCAAACCGCTGATCA
GCCTCGACTGTGCCTTCTAGTTGCCAGCCATCTGTTGTTTGGCCCTCCCCCGTGCCTTCTTGACCCTGGAAGGTGCCACTCCCA
CTGTCTTTCCTAATAAAATGAGGAAATTGCATCGCATTGTCTGAGTAGGTGTCATTCTATTCTGGGGGGTGGGGTGGGGCAG
GACAGCAAGGGGGAGGATTGGGAAGACAATAGCAGGCATGCTGGGGATGCGGTGGGCTCTATGGCTTCTGAGGCGGAAAG
AACCAGCAGATCTGCAGATCTGAATTCATCTATGTGCGGTGCGGAGAAAGAGGTAATGAAATGGCATTATGGGTATTATGGG
TCTGCATTAATGAATCGGCCAGATATCGATATGTGGCCACCGTGCATGTGACCTCGACCCCCCGCAAGACATGGCCCGAGTTC
GAGCACAACGTCATGACCCGATGCAATGTGCACCTGGGGTCCGCCGAGGCATGTTTCATGCCCTACCAAGTGAACATGCAATT
TGTGAAGGTGCTGCTGGAGCCCGATGCCATGTCCAGAGTGAGCCTGACGGGGGTGTTTGACATGAATGTGGAGCTGTGAAAA
ATTCTGAGATATGATGAATCCAAGACCAGGTGCCGGGCTGCGAATGCGGAGGCAAGCACGCCAGGCTTCAGCCCGTGTGTG
TGGAGGTGACGGAGGACCTGCGACCCGATCATTTGGTGTGCTCTGCAACGGGACGGAGTTCGGCTCCAGCGGGGAAGAATC

Fig. 22B

TGACTAGAGTGAGTAGTGTTTGGGGGAGGTGGAGGGCTGTATGAGGGGCAGAATGACTAAAATCTGTGTTTTCTGTGTGT
TGCAGCAGCATGAGCGGAAGCGCCTCCTTTGAGGGAGGGGTATTACGCCCTTATCTGACGGGGCGTCTCCCTCCTGGGCGG
GAGTGCCTCAGAATGTGATGGGATCCACGGTGGACGGCCGCCGTGCAGCCCGCAACTCTCAACCCTGACCTACGCGAC
CCTGAGCTCCTCGTCCGTGGACGCAGCTGCCGCCGAGCTGCTGCTCCGCCGCCAGCGCCGTGCGCGGAATGGCCCTGGG
GCCGGCTACTACAGCTCTCTGGTGGCCAACTCGACTTCCACCAATAATCCCGCCAGCCTGAACGAGGAGAAGCTGCTGCTGCT
GATGGCCAGCTCGAGGCCCTGACCCAGCGCCTGGGCGAGCTGACCCAGCAGGTGGCTCAGCTGCAGGCGGAGACGCGGGC
CGCGTTTGCCACGGTGAAAAACCAATAAAAAATGAATCAATAATAAACGAGACGGTTGTTGATTTTAACACAGAGTCTTGA
ATCTTTATTTGATTTTTCGCGCGCGGTAGGCCCTGGACCACCGGTCTCGATCATTGAGCACCCGGTGGATTTTTTCAGGACCC
GGTAGAGGTGGGCTTGGATGTTGAGGTACATGGGCATGAGCCCGTCCCGGGGTGGAGGTAGCTCCATTGCAGGGCCTCGT
GCTCGGGGTGGTGTGTAATCACCCAGTCATAGCAGGGGCGCAGGGCGTGGTGTGTCACGATGTCTTGAGGAGGAGAC
TGATGGCCACGGGCGAGCCCTTGGTGTAGGTGTTGACGAACCTGTTGAGCTGGGAGGGATGCATGCGGGGGGAGATGAGAT
GCATCTTGGCCTGGATCTTGAGATTGGCGATGTTCCCGCCAGATCCCGCCGGGGTTCATGTTGTGCAGGACCACAGCAG
GTGTATCCGGCGCACTTGGGGAATTTGTATGCAACTTGAAGGGAAGGCGTGAAAGAATTTGGAGACGCCCTTGTGACCGC
CCAGGTTTTCCATGCACTCATCCATGATGATGGCGATGGGCCCGTGGGCGGCGGCTGGGCAAAGACGTTTCGGGGGTCCGA
CACATCGTAGTTGTGGTCTGGGTGAGCTCGTCATAGGCCATTTAATGAATTTGGGGCGGAGGGTGCCCGACTGGGGGACG
AAGGTGCCCTCGATCCCGGGGGCGTAGTTGCCCTCGCAGATCTGCATCTCCAGGCCCTTGAGCTCGGAGGGGGGGATCATGT
CCACCTGCGGGGCGATGAAAAAACGGTTTCCGGGGCGGGGGAGATGAGCTGGGCCGAAAGCAGGTTCCGGAGCAGCTGG
GACTTGCCGCAGCCGGTGGGGCCGTAGATGACCCGATGACCGGCTGCAGGTGGTAGTTGAGGGAGAGACAGCTGCCGTCC
TCGCGGAGGAGGGGGGCCACCTCGTTCATCATCTCGCGCACATGCATGTTCTCGCGCACGAGTCCGCCAGGAGGCGCTCGCC
CCCCAGCGAGAGGAGCTCTTGACGCGAGGCGAAGTTTTTCAGCGGCTTGAGYCCGTGCGCCATGGGCATTTTGAGAGGGT
TGTTGCAAGAGTTCAGACGGTCCAGAGCTCGGTGATGTGCTAGGGCATCTCGATCCAGCAGACCTCCTCGTTTCGCGGG
TTGGGGCGACTGCGGGAGTAGGGACCAAGCGATGGGCGTCCAGCGAGGCCAGGGTCCGGTCTTCAGGGTCGACGGGTC
CGCGTCAGCGTGGTCTCCGTACGGTGAAGGGGTGCGCGCCGGGCTGGGCGCTTGCGAGGGTGCGCTTCAGGCTCATCCGGC
TGGTCGAGAACCGTCCCGGTGCGCGCCCTGCGCGTGGCCAGGTAGCAATTGAGCATGAGTTCGTAGTTGAGCGCCTCGGC
CGCGTGGCCCTTGGCGCGGAGCTTACCTTTGGAAGTGTGTCCGACAGCGGGACAGAGGAGGGACTTGAGGGCGTAGAGCTT
GGGGGCGAGGAAGACGGACTCGGGGGCGTAGGCGTCCGCGCCGAGCTGGCGCAGACGGTCTCGCACTCCACGAGCCAGG
TGAGGTGCGGGCCGGTTGGGGTCAAAAACGAGGTTTCTCCGTGCTTTTTGATGCGTTTCTTACCTCTGGTCTCCATGAGCTCGT
GTCCCGCTGGGTGACAAAGAGGCTGTCCGTGTCCCGTAGACCGACTTTATGGGCCGGTCTCGAGCGGGGTGCCGCGGTC
CTCGTCGTAGAGGAACCCCGCCACTCCGAGACGAAGGCCGGGTCCAGGCCAGCACGAAGGAGGCCACGTGGGAGGGGTA
GCGGTGTTGTCCACCAGCGGGTCCACCTTCTCCAGGGTATGCAAGCACATGTCCCTCTGTCCACATCCAGGAAGGTGATTG
GCTTGTAAGTGTAGGCCAGTGACCGGGGTCCCGGCCGGGGGGTATAAAGGGGGCGGGCCCTGCTGCTCCTCACTGTC
TTCCGGATCGCTGTCCAGGAGCGCCAGCTGTTGGGGTAGGTATTCCCTCTCAAGGCTGGCATAACCTCGGCACTCAGGTTGT
CAGTTTCTAGAAACGAGGAGGATTTGATATTGACGGTGCCGTGGAGACGCCCTTCATGAGCCCTCGTCCATCTGGTCAGAA
AAGACGATCTTTTTGTTGTCGAGCTTGGTGGCGAAGGAGCCGTAGAGGGCGTTGGAGAGGAGCTTGGCGATGGAGCGCATG
GTCTGTTCTTTTCTTGTGCGCGCGCTCCTTGGCGCGATGTTGAGCTGCACGTACTCGCGCGCCACGCACTTCCATTGGGG
AAGACGGTGGTGAGCTCGTCGGGCACGATTCTGACCCGCCAGCCGCGTTGTGCAGGGTGATGAGGTCCACGCTGGTGCCA
CCTCGCCGCGCAGGGGCTCGTTGGTCCAGCAGAGGCGCCCGCCTTGCGCGAGCAGAAGGGGGGCGAGCGGGTCCAGCATGA
GCTCGTCGGGGGGTGGCGTCCACGGTGAAGATGCCGGGCAGAAGCTCGGGGTCAAGTAGCTGATGCAGGTGTCCAGAT
CGTCCAGCGCCGCTTGCCAGTCCGCGCAGGCCAGCGCGCGCTCGTAGGGGCTGAGGGGCGTGCCCAAGGCATGGGGTGCG
TGAGCGCGGAGGCGTACATGCCGAGATGTCTGATAGCTAGAGGGGCTCCTCGAGGACGCCGATGTAGGTGGGGTAGCAGC
GCCCCCGCGGATGCTGGCGCGCACGTAGTCGTACAGCTCGTGCAGGGGCGCAGGAGCCCCGTGCCAGGTTGGAGCGTT
GCGGCTTTTCGGCGCGGTAGACGATCTGGCGGAAGATGGCGTGGGAGTTGGAGGAGATGGTGGGCCTTGGAAGATGTTGA
AGTGGGCGTGGGGCAGGCCGACGAGTCCCTGATGAAGTGGGCGTAGGAGTCTGCAGCTTGGCGACGAGCTCGGCGGTGA
CGAGGACGTCCAGGGCGCAGTAGTCGAGGGTCTTGGATGATGTCTGTAAGTGGGCTTCTGCTTCCACAGCTCGCGG
TTGAGAAGGAACTTTCGCGTCTTCCAGTACTTTCAGAGGGGGAACCGTCTGATCGGCACGGTAAGAGCCACCATGTA
GAACTGGTTGACGGCCTTGATAGGCGCAGCAGCCCTTCTCCAGGGGAGGGCGTAAGCTTGTGCGGCCCTTGCGCAGGGAGGTG
TGGGTGAGGGCGAAGGTGTGCGCACCATGACCTTGAGGAACTGGTGCTTGAAGTCGAGGTGTCGACGCCGCCCTGCTCCC
AGAGCTGGAAGTCCGTGCGCTTCTTGTAGGCGGGGTGGGCAAAGCGAAAGTAACATCGTTGAAGAGGATCTTGCCCGCGCG
GGGATGAAGTTGCGAGTGATGCGGAAAGGCTGGGGCACCTCGGCCCGGTTGTTGATGACCTGGGCGGCGAGGACGATCTC
GTCGAAGCCGTTGATGTTGTGCCGACGATGTAGAGTTCCACGAATCGCGGGCGGCCCTAACGTGGGGCAGCTTCTGAGCT
CGTCGTAGGTGAGCTCGGCGGGGTGCTGAGCCCGTGTCTGCTGAGGGGCCAGTCGGCGACGTGGGGGTGGCGCTGAGGA

Fig. 22C

AGGAAGTCCAGAGATCCACGGCCAGGGCGGTCTGCAAGCGGTCCCGGTACTGACGGAAGTCTGGCCCCACGGCCATTTTTTC
GGGGGTGACGCAGTAGAAGGTGCGGGGGTCCCGTGCACGCGGTCCCACTTGAGCTGGAGGGCGAGGTCGTGGGCGAGCT
CGACGAGCGCGGGTCCCGGAGAGTTTCATGACCAGCATGAAGGGGACGAGCTGCTTGCCGAAGGACCCCATCCAGGTGT
AGGTTTCCACATCGTAGGTGAGGAAGAGCCTTTCGGTGCGAGGATGCGAGCCGATGGGAAGAAGTGGATCTCCTGCCACCA
GTTGGAGGAATGGCTGTTGATGTGATGGAAGTAGAAATGCCGACGGCGCGCCGAGCACTCGTGCTTGTGTTTATAACAAGCGT
CCGCAGTGCTCGAACGCTGCACGGGATGCACGTGCTGCACGAGCTGTACCTGGGTTCCTTTGACGAGGAATTTCACTGGGCA
GTGGAGCGCTGGCGGCTGCATCTGGTGCTGTAACGTCCTGGCCATCGGCGTGGCCATCGTCTGCCTCGATGGTGCTCATGC
TGACGAGCCCGCGCGGGAGGCAGGTCCAGACTTCGGCTCGGACGGGTGCGAGAGCGAGGACGAGGGCGCGCAGGCCGAG
CTGTCCAGGGTCTGAGACGCTGCGGAGTCAGGTCACTGGGCGAGCGGGCGCGCGGTTGACTTGACGAGCTTTTCCAGG
GCGCGCGGGAGGTCCAGATGGTACTTGATCTCCAGGCGCGGTTGGTGCGACGTCCACGGCTTGACGGGTCCCGTGCCCT
GGGGCGCCACACCGTGCCCGTTTCTTGGGCGCTGCTTCCATGCCGTCAGAAGCGGCGGCGAGGACGCGCGCGGGC
GGCAGGGGCGGCTCGGGACCGGAGGCAGGGGCGGCAGGGGCACGTGCGCGCGCGCGCGGGCAGGTTCTGGTACTGCGC
CCGGAGAAGACTGGCGTGAGCGACGACGCGACGGTTGACGTCTGGATCTGACGCTCTGGGTGAAGGCCACGGGACCCGT
GAGTTTGAACCTGAAAGAGAGTTTCGACAGAATCAATCTCGGTATCGTTGACGGCGGCTGCCGAGGATCTCTGACGTGCG
CCGAGTTGCTCTGGTAGGCGATCTCGGTCACTGCTGATCTCTCTCTGAAGGTCTCCGCGCCGCGCGCTCGACG
GTGGCCGCGAGGTCGTTGGAGATGCGGCCCATGAGCTGCGAGAAGGCGTTTCATGCCGCTCGTTCCAGACGCGGCTGAGA
CCACGGCTCCGTCGGGGTTCGCGCGCGCATGACCACCTGGGCGAGGTTGAGCTCGACGTGGCGCGTGAAGACCGCGTAGTT
GCAGAGGCGCTGGTAGAGGTAGTTGAGCGTGGTGCGATGTGCTCGGTGACGAAGAAGTACATGATCCAGCGCGGAGCG
GCATCTCGTGACGTGCGCCAGGGCTTCAAGCGCTCCATGGCTCGTAGAAGTCCACGGCGAAGTTGAAAACTGGGAGTTG
CGCGCCGAGACGGTCAACTCTCTCCAGAAGACGGATGAGCTCAGCGATGGTGCGCGCACCTCGCGCTCGAAGGCCCGG
GGGGCTCTCTCTTCCATCTCTCTCTCTCCACTAACATCTCTTCTACTTCTCTCAGGAGGCGGCGGGGGAGGGGCCCT
GCGTCGCCGCGCGCGCACGGGCAGACGGTCGATGAAGCGCTCGATGGTCTCCCGCGCGCGGCGACGCATGGTCTCGGTGAC
GGCGCGCCCGTCTCGCGGGGCCGACGCTGAAGACGCGCGCGCATCTCAGGTGGCCGCGGGGGGTTCTCGGTTGGG
CAGGGAGAGGGCGCTGACGATGCATCTTCAATTGGCCGTAGGACTCCGCGCAAGGACCTGAGCGTCTCGAGATCCACG
GGATCCGAAAACCGCTGAACGAAGGCTTCGAGCCAGTCGACGTGCAAGGTAGGCTGAGCCCGGTTTCTGTTCTTCGGGGA
TTTCGGGAGGCGGGCGGGCGATGCTGCTGGTGATGAAGTTGAAGTAGGCGGTCTGAGACGGCGGATGGTGCGGAGGAGC
ACCAGGTCTTGGGCCGGCTTGTGGATGCGCAGACGGTCGGCCATGCCAGGCGTGGTCTGACACCTGGCGAGGTCTCT
TGAGTAGTCTGATGAGCCGCTCCACGGGCACCTCTCTCGCCGCGCGGCGGCGTGCATGCGCGTGAGCCGAACCCGCGC
TGGGGCTGGACGAGCGCCAGGTGCGCGACGACGCGCTCGGCGAGGATGGCTGCTGTATCTGGGTGAGGGTGGTCTGGAAG
TCGTGCAAGTCGACGAAGCGGTGGTAGGCTCCGGTGTGATGGTATAGGAGCAGTTGGCCATGACGGACCAAGTTGACGGTCT
GGTGCGCGGCTGCGACGAGCTCGTGGTACTTGAGGCGCGAGTAGGCGCGGTGTCGAAGATGTAGTCTGAGGTGCGCA
CGAGGTACTGGTATCCGACGAGGAAGTGCAGCGCGGCTGGCGGTAGAGCGGCCATCGCTCGGTGGCGGGGGCGCGGGC
GCGAGGTCTCGAGCATGAGGCGGTGGTAGCCGTAGATGTACCTGGACATCCAGGTGATGCCGCGCGGCTGGTGAGGCG
CGCGGAACTCGCGGACGCGGTTCCAGATGTTGCGCAGCGGCAGGAAGTAGTTCATGGTGCGCGGCTTGCGCCGTGAGG
CGCGCGCAGTCGTGGATGCTCTAGACATACGGGCAAAACGAAAGCGGTGAGCGGCTCGACTCCGTGGCCTGGAGGCTAAGC
GAACGGGTTGGGCTGCGCGTGTACCCCGTTTCAATCTCGAATCAGGCTGGAGCCGAGCTAACGTGGTACTGGCACTCCCG
TCTCGACCAAGCTGCTAACGAAACCTCCAGGATACGGAGGCGGGTGGTTTTTGGCCTTGGTCTGGTCTGATGAAAACTA
GTAAGCGCGGAAAGCGACCGCCCGGATGGCTCGTGCCTAGTCTGGAGAAAGAATCGCCAGGGTTCGCTTGGGTGTGCC
CCGGTTTCAGGCCTCAGCGCTCGGCGCGCGGCGGATTCCGCGGCTAACGTGGGCGTGGCTGCCCCGTCGTTTCAAGACCCCTT
AGCCAGCCGACTTCTCAGTTACGAGCGAGCCCTCTTTTCTGTGTTTTTCCAGATGCATCCCGTACTGCGGCAGATGCG
CCCCACCTCCACCTAACCGCCCCCTACCGCGCAGCAGCAACAGCCGCGCTTCTGCCCCGCCCCAGCAGACGACGAGC
CACTACCGCGCGCGCGCGGTGAGCGGAGCCGCGTTAGTATGACCTGGCCTTGAAGAGGGCGAGGGGCTGGCGCGGCT
GGGGGCGTCTGCGCGGAGCGGCACCCGCGCGTGCAGATGAAAAGGACGCTCGCGAGGCTACGTGCCAAGCAGAACCT
GTTAGAGACAGGAGCGGCGAGGAGCCGAGGAGATGCGCGCTCCCGCTTCCACGCGGGGCGGGAGCTGCGGCGCGGCT
GGACCGAAAGCGGGTGTGAGGGACGAGGATTTTCAGGGCGACGAGCTGACGGGGATCAGCCCCGCGCGCGCACGTGG
CCGCGGCAACCTGGTACGGCGTACGAGCAGACCGTGAAGGAGGAGAGCAACTTCAAAAATCTTCAACAACACGTGCG
CACGTGATCGCGCGGAGGAGGTGACCTGGGCTGATGCACCTGTGGGACCTGCTGGAGGCCATCGTGACAGAACCCACG
AGCAAGCCGCTGACGGCGCAGCTGTTTCTGGTGGTGACGACAGTCGGGACAACGAGACGTTACGGGAGGCGCTGCTGAAT
ATCACCGAGCCGAGGGCGGCTGGCTCTGGACCTGGTGAACATTCTGACAGCATCGTGGTGAGGAGCGCGGGCTGCCGC
TGTCGAGAAAGCTGGCGGCTATCAACTTCTGGTGCTGAGCTGGGCAAGTACTACGCTAGGAAGATCAAGAACCCCGTAC
GTGCCATAGACAAGGAGGTGAAGATCGACGGTTTTACATGCGCATGACCCTGAAAGTGTGACCTGAGCGACGATCTGG

Fig. 22D

GGGTGTACCGCAACGACAGGATGCACCGCGCGGTGAGCGCCAGCCGCCGGCGGAGCTGAGCGACCAGGAGCTGATGCACA
GCCTGCAGCGGGCCCTGACCGGGGCCGGACCGAGGGGGAGAGCTACTTTGACATGGGCGCGACCTGCGCTGGCAGCCCA
GCCGCCGGGCCCTTGGAAGCTGCCGGCGGTTCCCTACGTGGAGGAGGTGGACGATGAGGAGGAGGAGGGCGAGTACCTG
GAAGACTGATGGCGCGACCGTATTTTTGCTAGATGCAGCAACAGCCACCGCCTCTGATCCCGCGATGCGGGCGGCGCTGCA
GAGCCAGCCGTCCGGCATTAACTCCTCGGACGATTGGACCCAGGCCATGCAACGCATCATGGCGCTGACGACCCGCAATCCCG
AAGCCTTTAGACAGCAGCCTCAGGCCAACCGGCTCTCGGCCATCCTGGAGGCCGTGGTGCCTCGCGCTCGAACCCACGCAC
GAGAAGGTGCTGGCCATCGTGAACGCGCTGGTGGAGAACAAGGCCATCCGCGGCGACGAGGCCGGGCTGGTGTACAACGCG
CTGCTGGAGCGCGTGGCCCGCTACAACAGCACCAACGTGCAGACGAACTGGACCGCATGGTGACCGACGTGCGCGAGGCG
GTGTGCGAGCGGAGCGGTTCCACCGCGAGTCGAACCTGGGCTCCATGGTGGCGCTGAACGCCTTCTGAGCACGCAGCCCG
CCAACGTGCCCCGGGGCCAGGAGGACTACACCAACTTCATCAGCGCGCTGCGGCTGATGGTGGCCGAGGTGCCCCAGAGCGA
GGTGTACCACTCGGGGCCGACTACTTCTTCCAGACAGTCGCCAGGGCTTGACAGCCGTGAACCTGAGCCAGGCTTTCAAGA
ACTTGAGGGACTGTGGGGCGTGCAGGCCCGGTGCGGGACCGCGCGACGGTGTGAGCCTGCTGACGCCGAACTCGCGCC
TGCTGCTGCTGCTGGTGGCGCCCTTACGAGACGCGGCAGCGTGAGCCGCGACTCGTACCTGGGCTACCTGCTTAACCTGTAC
CGCGAGGCCATCGGGCAGGCGCACGTGGACGAGCAGACCTACCAGGAGATCACCCACGTGAGCCGCGCGCTGGGCCAGGAG
GACCCGGGCAACCTGGAGGCCACCCTGAACCTTCTGCTGACCAACCGGTGCGAGAAGATCCCGCCCCAGTACGCGCTGAGCAC
CGAGGAGGAGCGCATCTGCGCTACGTGCAGCAGAGCGTGGGGCTGTTCTGATGCAGGAGGGGGCCACGCCAGCGCCGC
GCTCGACATGACCGCGCGCAACATGGAGCCAGCATGTACGCTCGAACCGCCGTTTCATCAATAAGCTGATGGACTACTTGC
ATCGGGCGGCGCCATGAACCTCGGACTACTTTACCAACGCCATCTTGAACCCGCACTGGCTCCCGCGCCCGGGTTCTACACG
GGCGAGTACGACATGCCCGACCCCAACGACGGGTTCTGTGGGACGACGTGGACAGCAGCGTGTCTCGCGCGCCCGCCA
CCACCGTGTGGAAGAAAGAGGGCGGGGACCGCGGCCGTCTCGCGCTGTCCGGTTCGCGCGGGTGCTGCCGCGCGGTGTC
CTGAGGCCGCCAGCCCTTCCGAGCCTGCCCTTTGCTGAACAGCGTGCAGCAGCAGAGCTGGGTGCGCTGACGCGGCC
GCGCCTGCTGGGCGAGGAGGAGTACCTGAACGACTCCTGTTGAGGCCGAGCGCGAGAAGAACTTCCCAATAACGGGATA
GAGAGCCTGGTGGACAAGATGAGCCGCTGGAAGACGTACGCGCAGCAGACAGGGACGAGCCCCGAGCTAGCAGCAGCGC
AGGCAACCGTAGACGCCAGCGACACGACAGGACGCGGGTCTGGTGTGGGACGATGAGGATTCGCGCGACGACAGCAGCGT
GTTGGACTTGGGTGGGAGTGGTGGTGAACCGTTGCTCACTTGCGCCCCGTATCGGGCGCCTGATGTAAGAATCTGAAA
AAATAAAAAACGGTACTACCAAGGCCATGGCGACCAGCGTGCGTCTTCTCTGTTGTTGTAGTAGTATGATGAGGCGCGTG
TACCCGGAGGGTCTCTCCCTCGTACGAGAGCGTGATGCAGCAGGCGGTGGCGGCGGCGATGCAGCCCCGCTGGAGGCG
CCTTACGTGCCCCGCGGTACCTGCGCCTACGGAGGGGGCGGAACAGCATTGTTACTCGGAGCTGGCACCTTGTACGATAC
CACCCGGTTGTACCTGGTGGACAACAAGTCGGCGGACATCGCTCGTGAACCTACCAGAACGACCACAGCAACTTCTGACCA
CCGTGGTGCAGAACAAACGATTTACCCCCACGGAGGCCAGCACCCAGACCATCAACTTTGACGAGCGCTCGCGGTGGGGCGG
CCAGCTGAAAACCATCATGCACACCAACATGCCCAACGTGAACGAGTTCATGTACAGCAACAAGTTCAAGGCGCGGGTGATG
GTCTCGCGAAGACCCCCAATGGGGTTCGCGGTGGATGAGAATTATGATGGTAGTCAGGACGAGCTGACTTACGAGTGGGTGG
AGTTTGAGCTGCCCGAGGGCAACTTCTCGGTGACCATGACCATCGATCTGATGAACAACGCCATCATCGACAACCTACTTGGCG
GTGGGGCGTCAGAACGGGGTGTGGAGAGCGACATCGGCGTGAAGTTCGACACGCGCAACTTCCGGCTGGGCTGGGACCCC
GTGACCGAGCTGGTGTATGCCGGGCGTGTACCAACGAGGCGCTTCCACCCGACATCGTCTGCTGCCCCGCTGCGGCGTGG
ACTTACCGAGAGCCGCTCAGCAACCTGCTGGGCATCCGCAAGCGGCAGCCCTTCCAGGAGGGCTTCCAGATCTGTACGAG
GACCTGGAGGGGGGCAACATCCCCGCGCTCTTGATGTGCAAGCCTATGAGAAAAGCAAGGAGGAGGCCGCGCGAGCGGCG
ACCGCAGCCGTGGCCACCGCCTTACCGAGGTGCGGGGCGATAATTTGCTAGCGCCGCGGCGAGTGGCCGAGGCGGCTGAAA
CCGAAAGTAAGATAGTCATCCAGCCGGTGGAGAAGGACAGCAAGGACAGGAGCTACAACGTGCTCGCGGACAAGAAAAACA
CCGCTACCGCAGCTGGTACCTGGCCTACAACCTACGGCGACCCCGAGAAGGGCGTGCCTCTGGACGCTGCTACCACTCG
GACGTCACTGCGGCTGGAGCAAGTCTACTGGTGCCTGCCGACATGATGAAGACCCGGTCACTTCCGCTCCACGCGTCA
AGTTAGCAACTACCCGGTGGTGGGCGCCGAGTCTGCCCCGCTACTCCAAGAGCTTCTTCAACGAGCAGGCCGTCTACTCGC
AGCAGCTGCGCGCCTTCACTCGCTACGCACGTCTTAAACCGCTTCCCGAGAACAGATCCTCGTCCGCCCGCCGCGCCCA
CCATTACCACCGTCAGTGAACCGTTCTGCTCTACAGATCACGGGACCTGCCGCTGCGCAGCAGTATCCGGGGAGTCCAG
CGCGTGACCGTCACTGACGCCAGACGCCGACCTGCCCTACGTCTACAAGGCCCTGGGCGTAGTTCGCGCGCGCGCTCTCTC
GAGCCGACCTTCTAAAAAATGTCCATTCTCATCTCGCCAGTAATAACACCGGTTGGGGCTGCGCGCGCCAGCAAGATGT
ACGGAGGCGCTCGCAACGCTCCACGCAACACCCCGTGCCTGTCGCGGGCACTTCCGCGCTCCCTGGGGCGCCCTCAAGGG
CCGCGTGCCTGCGCACCAACGTCGACGACGTGATCGACAGGTGGTGGCCGACGCGCGCAACTACACGCCCGCCGCGCG
CCCGCTCCACCGTGGACGCCGTATCGACAGCGTGGTGGCCGATGCGCGCGGTACGCCCGCGCCAAGAGCCGGCGCGGC
GCATCGCCCGCGGCGCACCGGAGCACCCCGCATGCGCGCGGCGCGAGCCTTGTGCGCAGGGCCAGGCGCACGGGACGCA
GGGCCATGCTCAGGGCGGCCAGACGCGCGGCCCTCCGGCAGCAGCAGCGCCGGCAGGACCCGACGACGCGCGGCCACGGCG

Fig. 22E

GCGGCGGCGGCCATCGCCAGCATGTCCCGCCCGCGGCGGCAACGTGTACTGGGTGCGCGACGCCGCCACCGGTGTGCGC
GTGCCGTGCGCACCCGCCCCCTCGCACTTGAAGATGCTGACTTCGCGATGTTGATGTGTCCCAGCGGCGAGGAGGATGTCC
AAGCGCAAATACAAGGAAGAGATGCTCCAGGTCATCGCGCTGAGATCTACGGCCCCGCGGTGAAGGAGGAAAGAAAGCCC
CGCAAACCTGAAGCGGGTCAAAAAGGACAAAAAGGAGGAGGAAGATGTGGACGGACTGGTGGAGTTTGTGCGCGAGTTTCGC
CCCCGGGCGGCGGTGCACTGGCGCGGGCGGAAAGTGAACCGGTGCTGCGGCCGGCACCACGGTGGTCTTCACGCCCGG
CGAGCGTTCCGGCTCCGCCTCAAGCGCTCCTACGACGAGGTGTACGGGACGAGGACATCCTCGAGCAGGCGGTGCGAGCGT
CTGGGCGAGTTTGCTTACGCAAGCGCAGCCGCCCGCGCCCTTGAAGAGGAGGCGGTGTCCATCCCGTGGACCACGGCA
ACCCACGCCGAGCCTGAAGCCGGTGACCCTGCAGCAGGTGCTGCCGAGCGGGCGCGCCGCGGGGCTTCAAGCGCGAGG
GCGGCGAGGATCTGTACCCGACCATGCAGCTGATGGTGCCCAAGCGCCAGAAGCTGGAGGACGTGCTGGAGCACATGAAGG
TGGACCCCGAGGTGCAGCCCGAGGTCAAGGTGCGGCCATCAAGCAGGTGGCCCCGGGCGTGGCGTGCAGACCGTGGACA
TCAAGATCCCCACGGAGCCCATGGAACGCAGACCGAGCCGTGAAGCCAGCACACGACCATGGAGGTGCAGACGGATCC
CTGGATGCCGGCGCGGCTTCCACCACTCGCCGAAGACGCAAGTACGGCGCGGCCAGCTGCTGATGCCAACTACGCGCTG
CATCCTTCCATCATCCCCACGCCGGGTACCGCGGCACGCGCTTCTACCGCGGCTACACCAGCAGCCGCCGCAAGACCACCAC
CGCGCGCGCGTCTGTCGACCCGCCGACGACACCGCGACTTCCGCCCGCGCCTGGTGCGGAGAGTGTACCGCAGCGGGC
GCGAGCCTCTGACCCTGCCGCGCGCGCTACCACCCGAGCATCGCCATTTAACTCTGCCGTGCGCTCTACTTGCAGATATGG
CCCTCACATGCCGCTCCGCTCCCCATTACGGGCTACCGAGGAAGAAAGCCGCGCGTAGAAGGCTACGGGGAACGGGCT
GCGTCGCCATCACACCGGCGGCGGCGGCCATCAGCAAGCGGTTGGGGGAGGCTTCTGCCGCGCTGATCCCCATCATC
GCCGCGCGATCGGGCGATCCCCGGCATAGCTTCGTGGCGGTGCAGGCCTCTCAGCGCCACTGAGACACAGTTGAAAAA
TTTGTAATAAAAAAATGGAAGTACGCTCCTGGTCTGTGATGTGTGTTTTAGATGGAAGACATCAATTTTTCTGCTCCCTGGCAC
CGCGACACGGCACGCGGCCGTTTATGGGCACCTGGAGCGACATCGGCAACAGCCAACTGAACGGGGGCGCCTTCAATTGGAG
CAGTCTCTGGAGCGGGCTTAAGAATTTGGGTCCACGCTCAAAACCTATGGCAACAAGGCGTGGAAACAGCAGCACAGGGCAG
GCGCTGAGGGAAAAAGCTGAAAGAGCAGAACTTCCAGCAGAAGGTGGTCGATGGCCTGGCCTCGGGCATCAACGGGGTGGTG
GACCTGGCCAACAGGCCGTGCAGAAACAGATCAACAGCCGCTGGACGCGGTCCCGCCCGGGGTCCGTGGAGATGCCCC
AGGTGGAGGAGGAGCTGCCTCCCTGGACAAGCGCGGCGACAAGCGACCGCGTCCCAGCGGAGGAGACGCTGCTGACGC
ACACGGACGAGCCGCCCCGTACGAGGAGGCGGTGAACTGGGTCTGCCACCACGCGGCCGTGGCGCCTCTGGCCACCGG
GGTGCTGAAACCCAGCAGCAGCAGCCAGCCGCGACCTGGACTTGCTCCGCTGCTTCCCGCCCCTCCACAGTGGCTAAGC
CCCTGCCGCCGGTGGCGTGCCTGCGCGCGCCCCGAGGCCGCCCCAGGCGAACTGGCAGAGCACTCTGAACAGCATCGT
GGGTCTGGGAGTGCAAGGTGTAAGCGCGCGCTGCTATTAAGACACTGTAGCGCTTAACTTGCTTGTGTGTATAT
GTATGTCCGCCACCAGAAGGAGGAAGAGGCGCGTCCGAGTTGCAAGATGGCCACCCATCGATGCTGCCCACTGGGC
GTACATGCACATCGCCGACAGGACGCTTCGGAGTACCTGAGTCCGGGTCTGGTGCAGTTGCCCCGCGCCACAGACCTACT
TCAGTCTGGGAACAAGTTAGGAACCCACGGTGGCGCCACGCACGATGTGACCACCGACCGCAGCCAGCGCTGACGCT
GCGCTTCTGCCCCGTGGACCGCAGGACAACCTACTCTGTAAGTGCCTACACGCTGGCGTGGGCGACAACCGCGTG
CTGGACATGGCCAGCACCTACTTTGACATCCGCGCGTGTGGATCGGGGGCCAGCTTCAAACCTACTCCGGCACCGCTA
CAACAGCCTGGCTCCCAAGGGAGCGCCCAACACTTGCCAGTGGACATATAAGCTGGTGATACTGATACAGAAAAACCTATA
CATATGGAATGCACCTGTGCAAGGCATTAGCATTACAAAGGATGGTATTCAACTTGGAAGTACAGCGATGGTCAGGCAATC
TATGCAGACGAACTTATCAACCAGAGCCTCAAGTGGGTGATGCTGAATGGCATGACATCACTGGTACTGATGAAAAATATGG
AGGCAGAGCTCTTAAGCTGACACCAAAATGAAGCCTTGCTATGGTTCTTTGCCAAGCCTACCAATAAAGAAGGAGGCCAGG
CAAATGTGAAAACCGAAACAGGCGGTACCAAGAATATGACATTGACATGGCATTCTTCGATAATCGAAGTGCAGCTGCCGCC
GGCCTAGCCCCAGAAATTGTTTTGTATACTGAGAATGTGGATCTGGAACTCCAGATACCCATATTGTATACAAGGCAGGTAC
AGATGACAGTAGCTCTTATCAATTTGGGTGAGCAGTCCATGCCAACAGACCCAACTACATTGGCTTCAGAGACAACCTTAT
CGGTCTGATGTACTACAACAGCACTGGCAATATGGGTGACTGGCTGGACAGGCCTCCAGCTGAATGCTGTGGTGGACTTGC
AGGACAGAAAACCGAACTGTCTACCAGCTCTGCTTACTCTGGGTGACAGAACCAGGTATTTAGTATGTGGAATCAG
GCGGTGGACAGTTATGACCCGATGTGCGCATTATTGAAATCACGGTGTGGAGGATGAACTTCTAACTATTGCTTCCCCCTG
GATGCTGTGGGTAGAAGTACTTACCAGGGAATTAAGGCCAATGGTGATAATCAAACCACTGGACCAAGATGATACTGT
TAATGATGCTAATGAATTGGGCAAGGGCAATCCTTTCGCCATGGAGATCAACATCCAGGCCAACCTGTGGCGGAACTTCTCT
ACGCGAACGTGGCGCTGTACCTGCCGACTCCTACAAGTACACGCCGGCCAAACATCACGCTGCCACCAACACCAACACCTAC
GATTACATGAACGGCCGCTGGTGGCGCCCTCGTGGTGGACGCTACATCAACATCGGGGCGCGTGGTCTGCTGGACCCCA
TGGACAACGTCAACCCCTTCAACCACACCGCAACGCGGGCCTGCGATACCGCTCCATGCTCCTGGGCAACGGGCGCTACGTG
CCCTTCCACATCCAGGTGCCCCAAAAGTTTTTCGCCATCAAGAGCCTCCTGCTCCTGCCGGGTCTACACCTACGAGTGGAACT
TCCGCAAGGACGTCAACATGATCCTGCAGAGCTCCCTCGGCAACGACCTGCGCACGGACGGGGCCTCCATCGCTTACCAGC
ATCAACCTCTACGCCACCTTCTTCCCATGGCGCACAAACACCGCTCCACGCTCGAGGCCATGCTGCGCAACGACCAACGAC

Fig. 22F

CAGTCCTTCAACGACTACCTCTCGGCGGCCAACATGCTCTACCCCATCCCGGCCAACGCCACCAACGTGCCATCTCCATCCCT
CGCGAACTGGGCCGCTTCCGCGGCTGGTCTTACGCGCCTCAAGACCCGCGAGACGCCCTCGCTCGGCTCCGGTTTCGAC
CCCTACTTCTGCTACTCGGGCTCCATCCCTACCTCGACGGCACCTTCTACCTCAACCACACCTTCAAGAAGGTCTCCATCACCTT
CGACTCCTCCGTGAGCTGGCCCGGCAACGACCGCCTCTGACGCCAACGAGTTCGAAATCAAGCGCACCGTCGACGGAGAG
GGGTACAACGTGGCCAGTGCAACATGACCAAGGACTGGTTCCTGGTCCAGATGCTGGCCACTACAACATCGGCTACCAGG
GCTTCTACGTGCCCCGAGGGCTACAAGGACCGCATGTACTCTTCTCCGCAACTTCCAGCCCATGAGCCGCCAGGTCTGGAC
GAGGTCAACTACAAGGACTACCAGGCCGTACCCTGGCTACCAGCACAACAACCTCGGGCTTCTCGGCTACCTCGCGCCAC
CATGCGCCAGGGCCAGCCCTACCCGCCAACTACCCCTACCCGCTCATCGGCAAGAGCGCGCTCGCCAGCGTACCCAGAAAA
AGTTCCTCTGCGACCGGGTCATGTGGCGCATCCCTTCTCCAGCAACTTCATGTCCATGGGCGCGCTCACCGACCTCGGCCAGA
ACATGCTCTACGCCAACTCCGCCACGCGCTAGACATGAATTCGAAGTCGACCCCATGGATGAGTCCACCTTCTCTATGTTGT
CTTCGAAGTCTTCGACGTCTCGAGTGCACAGCCCCACCGCGGCTCATCGAGGCCGTCTACCTGCGCACGCCCTTCTCGGC
CGGCAACGCCACCACCTAAGCCTCTTGCTTCTTGCAAGATGACGGCTGCGCGGGCTCCGGCGAGCAGGAGCTCAGGGCCATC
CTCCGCGACCTGGGCTGCGGGCCCTGCTTCTGGGCACCTTCGACAAGCGCTTCCCGGGATTATGGCCCCGCACAAGCTGGC
CTGCGCCATCGTCAACACGGCCGGCCGCGAGACCGGGGGCGAGCACTGGCTGGCCTTCGCCTGGAACCCGCGCTCCACACC
TGCTACCTCTTCGACCCCTTCGGGTTCTCGGACGAGCGCCTCAAGCAGATCTACCAGTTCGAGTACGAGGGCTGCTGCGTCG
AGCGCCTGGCCACCGAGGACCGCTGCGTACCCTGAAAAAGTCCACCCAGACCGTGCAGGGTCCGCGCTCGGCCGCTGCG
GGCTCTTCTGCTGCATGTTCTGACGCTTCTGTCACCTGGCCGACCGCCCCATGGACAAGAACCCACCATGAACCTGCTGA
CGGGGTGCCAACGGCATGCTCCAGTCGCCCCAGGTGGAACCCACCTGCGCCGCAACCAGGAGGCGCTTACCGCTTCTC
AACGCCCACTCCGCTACTTTCGCTCCACCGCGCGCATCGAGAAGGCCACCGCTTCGACCGCATGAATCAAGACATGTAA
TCCGGTGTGTATGTGAATGCTTTATTCATCATAATAAACAGCACATGTTTATGCCACCTTCTCTGAGGCTCTGACTTTATTA
GAAATCGAAGGGGTTCTGCCGCTCTCGGCATGCCCCGCGGGCAGGGATACGTTGCGGAACCTGGTACTTGGGCAGCCACTTG
AACTCGGGGATCAGCAGCTTCGGCACGGGGAGGTGCGGGAACGAGTCGCTCCACAGCTTGCCTGTGAGTTGCAGGGCGCCC
AGCAGGTGCGGCGCGGAGATCTTGAATCGCAGTTGGGACCCGCGTTCGCGCGGAGAGTTACGGTACACGGGTTGCAG
CACTGGAACACCATCAGGGCCGGGTGCTTCACGCTCGCCAGCACCGTCGCGTCGGTGATGCCCTCCAGTCCAGATCCTCGGC
GTTGGCCATCCCGAAGGGGGTCATCTTGACGGTCTGCGCCCCATGCTGGGCACGCAGCCGGGCTTGTTGTTGCAATCGCAGT
GCAGGGGGATCAGCATCATCTGGGCTGCTCGGAGCTCATGCCCGGTACATGGCCTTCATGAAAGCCTCCAGCTGGCGGAA
GGCCTGCTGCGCTTGCCGCCCTCGGTGAAGAAGACCCGCGAGGACTTGCTAGAGAACTGGTGGTGGCGCAGCCAGCGTCG
TGACGCAGCAGCGCGCGTCTGTTGGCCAGCTGCACACGCTGCGCCCCAGCGGTTCTGGGTGATCTTGGCCCGGTGCG
GGTCTCTCTCAGCGCGCGTGGCCGTTCTGCTCGCCACATCCATCTCGATCGTGTGCTCCTTCTGGATCATACGGTCCCGTG
CAGGCACCGCAGCTTGCCTCGGCTCGGTGCACCCGTGCAGCCACAGCGCGCAGCCGGTCTCTCCAGTTCTTGTGGGCGA
TCTGGGAGTGCGAGTGACGAAGCCCTGCAGGAAGCGGCCATCATCGTGGTCAGGGTCTTGTGCTGGTGAAGGTGACGG
AATGCCGCGGTGCTCTCGTTACATACAGGTGGCAGATACGGCGGTACACCTCGCCCTGCTCGGGCATCAGCTGGAAGGCG
GACTTCAGGTGCTCTCCACGCGGTACCGGTCCATCAGCAGCGTCATCACTTCCATGCCCTTCTCCAGGCCGAAACGATCGGC
AGGCTCAGGGGGTTCTTACCGTTGTCTTAGTCGCGCCGCCGAAAGTCAGGGGGTCTTCTCGTCCAGGGTCTCAAACAC
TCGCTTCCGCTCCTTCTCGGTGATGCGCACGGGGGAAAGCTGAAGCCACGGCCGCCAGCTCCTCCTCGGCTGCTTTTCTGT
CCTCGTGTCTGGCTGATGTCTTCAAAGGCACATGCTTGGTCTTGCGGGGTTTCTTTTGGGCGGCAGAGGCGGCGCGGA
GACGTGCTGGGCGAGCGGAGTTCTCGCTACCACGACTATTTCTTCTCTTGGCCGTCGTCCGAGACCACGCGGCGGTAGGC
ATGCCTCTTCTGGGGCAGAGGCGGAGGCGACGGGCTCTCGCGTTCCGGCGGGCGGTGGCAGAGCCCTTCCGCGTTCGGG
GGTGGCTCTTGGCGGCGCTGCTCTGACTGACTTCTCCGCGGCCGCGCCATTGTGTTCTCCTAGGGAGCAAGCATGGAGACTC
AGCCATCGTCGCCAACATCGCCATCTGCCCCCGCGCCGCGACGAGAACCAGCAGCAGCAGAATGAAAGCTTAACCGCCCCG
CCGCCAGCCCCACCTCCGACGCCGAGCCCCAGACATGCAAGAGATGGAGGAATCCATCGAGATTGACCTGGGCTACGTGA
CGCCCGCGGAGCACGAGGAGGAGCTGGCAGCGCTTTTCAGCCCCGGAAGAGAACCACCAAGAGCAGCCAGAGCAGGAAG
CAGAGAGCGAGCAGAACCAGGCTGGGCTCGAGCATGGCGACTACCTGAGCGGGCAGAGGACGTGCTCATCAAGCATCTGG
CCCGCCAATGCATCATCGTAAAGACGCGCTGCTGACCGCGCCGAGGTGCCCTCAGCGTGGCGGAGCTCAGCCGCGCTAC
GAGCGCAACCTCTTCTCGCCGCGGTGCCCCCCAAGCGCCAGCCAAACGGCACCTGCGAGCCCAACCCGCGCTCAACTTCTAC
CCGGTCTTCCGCGGTGCCCCGAGGCCCTGGCCACCTACCACCTCTTTTCAAGAACCAAGGATCCCGTCTCCTGCGCGCCAAC
CGACCCGCGCCGACGCCCTGCTAACCTGGGCCCCGGCGCCGCTACCTGATATCGCTCCTTGAAGAGGTTCCCAAGAT
CTTCGAGGGTCTGGGCAGCGACGAGACTCGGGCCGGAACGCTCTGCAAGGAAGCGGAGAGGAGCATGAGCACCACAGCGC
CCTGGTGGAGTTGGAAGGCGACAACGCGCGCTGGCGGTCTCAAGCGCACGGTCGAGCTGACCACTTCGCTACCCGGCG
CTAACCTGCCCCCAAGGTGATGAGCGCCGTATGGACCAGGTGCTCATCAAGCGCGCTCGCCCTCTCGGAGGAGGAGAT
GCAGGACCCCGAGAGCTCGGACGAGGGCAAGCCCGTGGTACGCGACGAGCAGCTGGCGCGCTGGCTGGGAGCGAGTAGCA

Fig. 22G

CCCCCAGAGCCTGGAAGAGCGGCGCAAGCTCATGATGGCCGTGGTCTGGTGACCGTGGAGCTGGAGTGTCTGCGCCGCTT
CTTCGCGGACGCGGAGACCTGCGCAAGGTCGAGGAGAACCTGCACTACCTCTTCAGACACGGGTTCTGTGCGCCAGGCCTGC
AAGATCTCCAACGTGGAGCTGACCAACCTGGTCTCCTACATGGGCATCCTGCACGAGAACCCTGGGGCAGAACGTGTGCA
CACCACCCTGCGCGGGGAGGCCCGCCGCGACTACATCCGCGACTGCGTCTACCTGTACCTTGCCACACCTGGCAGACGGGCA
TGGGCGTGTGGCAGCAGTGCCTGGAGGAGCAGAACCTGAAAGAGCTCTGCAAGCTCCTGCAGAAGAACCTCAAGGCCCTGTG
GACCGGGTTTCGACGAGCGCACACCACCGCCGCGGACCTGGCCGACCTCATCTTCCCCGAGCGCCTGCGGCTGACGCTGCGCAAC
GGGCTGCCCCGACTTTATGAGCCAAAGCATGTTGAAAACCTTTCGCTCTTTCATCCTCGAACGCTCCGGGATCCTGCCCCCACC
TGCTCCGCGCTGCCCTCGGACTTCGTGCCGCTGACCTTCGCGAGTGCCCCCGCCGCTCTGGAGCCACTGCTACCTGCTGCGC
CTGGCCAACTACCTGGCCTACCACTCGGACGTGATCGAGGACGTGACGGCGAGGGCCTGCTCGAGTGCCACTGCCGCTGCA
ACCTCTGCACGCCGACCGCTCCCTGGCCTGCAACCCCCAGCTGCTGAGCGAGACCCAGATCATCGGCACCTTCGAGTTGCAA
GGCCCCGGCGAGGGCAAGGGGGGTCTGAACTCACCCCGGGGTGTGGACCTCGGCCTACTTGCGCAAGTTCGTGCCCGAG
GACTACCATCCCTTCGAGATCAGTTTCTACGAGGACCAATCCAGCCGCCAAGGCCGAGCTGTCGGCCTGCGTCATACCCA
GGGGGCCATCCTGGCCCAATTGCAAGCCATCCAGAAATCCCGCCAAGAATTTCTGCTGAAAAAGGGCCACGGGGTCTACTTGG
ACCCCCAGACCGGAGAGGAGCTCAACCCAGCTTCCCCAGGATGCCCCGAGGAAGCAGCAAGAAGCTGAAAGTGGAGCTGC
CGCCGCCGCGGAGGATTTGGAGGAAGACTGGGAGAGCAGTCAGGCAGAGGAGGAGGAGATGGAAGACTGGGACAGCACT
CAGGCAGAGGAGGACAGCCTGCAAGACAGTCTGGAGGAGGAAGACGAGGTGGAGGAGGCAGAGGAAGAAGCAGCCGCCG
CCAGACCGTCTGCTCGGCGGAGGAGGAGAAAGCAAGCAGCAGGATACCATCTCCGCTCCGGGTGCGGGTCTGCGCGGCC
GGGCCACAGTAGATGGGACGAGACCGGGCGCTTCCGAACCCACCACCCAGACCGGTAAGAAGGAGCGGCAGGGATACA
AGTCTGGCGGGGGCACAAAAACGCCATCGTCTCCTGCTTGAAGCCTGCGGGGGCAACATCTCCTTACCCGGCGCTACCTG
CTCTTCCACCGCGGGGTGAACCTCCCCGCAACATCTTGCACTTACTACCGTCACCTCCACAGCCCCCTACTACTGTTTCAAGAAG
AGGCAGAAACCCAGCAGCAGCAGCAGCAGCAGCAAAAACAGCGGCAGCAGCTAGAAAATCCACAGCGGCGGCAGGTGGACT
GAGGATCGCGGCGAACGAGCCGGCGCAGACCCGGGAGCTGAGGAACCGGATCTTCCACCCCTATGCCATCTTCAGCAG
AGTCGGGGGCAAGAGCAGGAACCTGAAAGTCAAGAACCGTTCTGCGCTCGCTACCCGCGAGTTGTCTGTATCACAAGAGCG
AAGACCAACTTCAGCGCACTCTCGAGGACGCCGAGGCTCTCTTCAACAAGTACTGCGCGCTCACTCTTAAAGAGTAGCCGCG
CCCGCCACACACGGAAAAAGGCGGGAATTACGTACCACTGCGCCCTTCGCCCCGACCATCATGAGCAAAGAGATTCCC
ACGCTTACATGTGGAGCTACCAGCCCCAGATGGGCCTGGCCGCCGCGCGCCGCGCCAGGACTACTCCACCCGCATGAAGTGGCT
CAGTGCCGGGCCCCGCGATGATCTACGGGTGAATGACATCCGCGCCACCGAAACAGATACTCCTAGAACAGTCAGCGATCA
CCGCCACGCCCCGCCATCACCTTAATCCGCGTAATTGGCCGCCGCCCTGGTGTACCAGGAAATCCCCAGCCACGACCGTAC
TACTTCCGCGAGACGCCCAGGCCGAAGTCCAGCTGACTAACTCAGGTGTCCAGCTGGCCGGCGGCGCCGCCCTGTGTCTCAC
CGCCCCGCTCAGGGTATAAGCGGCTGGTGTATCCGAGGCAGAGGCACACAGCTCAACGACGAGGTGGTGAGCTCTTCGCTGG
GTCTGCGACCTGACGGAGTCTTCCAACCTCGCCGATCGGGGAGATCTTCTTACGCCTCGTCAGGCCGTCTGACTTTGGAG
AGTTCGTCTCGCAGCCCCGCTCGGGTGGCATCGGCACTCTCCAGTTCGTGGAGGAGTCACTCCCTCGGTCTACTTCAACCCC
TTCTCCGGCTCCCCCGGCCACTACCCGACGAGTTCATCCGAACTTCGACGCCATCAGCGAGTCGGTGGACGGCTACGATTG
AATGTCCATGGTGGCGCGGCTGACCTAGCTCGGCTTCGACACCTGGACCACTGCCGCCGCTTCGCTGCTTCGCTCGGGATCT
CGCCGAGTTTGCTACTTTGAGCTGCCCCGAGGAGACCCCTCAGGGCCCGGCCACGGAGTGCGGATCGTCGTGCAAGGGGGT
CTCGACTCCACCTGCTTCGGATCTTCAGCCAGCGTCCGATCCTGGCCGAGCGCGAGCAAGGACAGACCCTTCTGACCCTGTAC
TGCATCTGCAACCAACCCCGCCCTGCATGAAAGTCTTTGTTGTCTGCTGTGTACTGAGTATAATAAAAGCTGAGATCAGCGACTA
CTCCGGACTTCCGTGTGTTCTGTATCAACAGTCCCTGTTCTTACCCGGAACGAGACCGAGCTCCAGCTCCAGTGTAAGCC
CCACAAGAAGTACCTCACCTGGCTGTTCCAGGGCTCTCCGATCGCCGTTGTCAACCACTGCGACAACGACGGAGTCTGTGTA
GCGGCCCTGCCAACCTTACTTTTCCACCCGAGAAGCAAGCTCCAGCTCTTCCAACCTTCTCCCCGGGACCTATCAGTGCGT
CTCGGGACCTGCCATCACACCTCCACCTGATCCCGAATACCACAGCGTGCCTCCCCGCTACTAACAACCAAACTACCCACCA
CGCCACCGTCGCGACCGCGGACATGTACAGAGCTCGAGAAGTACTAGGCCACAATACATGCCATATTAGACTATGAGGCCGA
GCCACAGCGACCCATGCTCCCCGCTATTAGTTACTTCAATCTAACCGCGGAGATGACTGACCACTGGCCAACAACAACGTCA
ACGACCTTCTCTGGACATGGACGGCCGCGCCTCGGAGCAGCGACTCGCCAACTTCGATTTCGCCAGCAGCAGGAGAGAGC
CGTCAAGGAGCTGCAGGACGGCATAGCCATCCACAGTGCAAGAAAGGCATCTTCTGCCTGGTGAAACAGGCCAAGATCTCC
TACGAGGTACCCCCGACCGACCATCGCCTCTCCTACGAGCTCCTGCAGCAGCGCCAGAAGTTCACCTGCCTGGTGGAGTCAA
CCCCATCGTCATACCCAGCAGTCGGGCGATACCAAGGGGTGCATCCACTGCTCCTGCGACTCCCCGACTGCGTCCACACTCT
GATCAAGACCTCTGCGGCCTCCGCGACCTCTCCCCATGAACTAATCACCCCTTATCCAGTGAAATAAATATCATATTGATGA
TGATTTAAATAAAAAATAATCATTTGATTTGAAATAAAGATACAATCATATTGATGATTTGAGTTTTAAAAATAAAGAATCACT
TACTTGAAATCTGATACCAGGTCTGTGTCATGTTTTCTGCCAACCAACCTCACTCCCCTTCCAGCTCTGGTACTGCAGACC
CCGGCGGGGTGCAAACTTCTCCACACGCTGAAGGGGATGTCAAATTCCTCTGTCCCTCAATCTTCATTTTATCTTATCAGA

Fig. 22H

TGTCCAAAAAGCGCGTCCGGGTGGATGATGACTTCGACCCCGTCTACCCCTACGATGCAGACAACGCACCGACCGTGCCTTC
 ATCAACCCCCCTTCGTCTCTTCAGATGGATTCCAAGAGAAGCCCTGGGGGTGCTGTCCTGCGACTGGCTGACCCCGTCACC
 ACCAAGAACGGGGAATCACCTCAAGCTGGGAGAGGGGGTGGACCTCGACTCCTCGGGAAAACTCATCTCCAACACGGCCA
 CCAAGGCCGCCGCCCTCTCAGTTTTTCCAACAACACCATTTCCCTTAACATGGATACCCCTCTTTATACCAAAGATGGAAAAAT
 ATCCTTACAAGTTTCTCCACCGTTAAACATATTTAAATCAACCATTCTGAACACATTAGCTGTAGCTTATGGATCAGGTTTAGGA
 CTGAGTGGTGGCACTGCTCTTGCAGTACAGTTGGCCTCTCCACTCACTTTTGATGAAAAAGGAAATATTTAAATTAACCTAGCC
 AGTGGTCCATTAAACAGTTGATGCAAGTCGACTTAGTATCAACTGCAAAAGAGGGGTCACTGTCACTACCTCAGGAGATGCAAT
 TGAAGCAACATAAGCTGGCCTAAAGGTATAAGATTTGAAGGTAATGGCATAGCTGCAAAACATTGGCAGAGGATTGGAATTT
 GGAACCACTAGTACAGAGACTGATGTCACAGATGCATACCAATTCAAGTTAAATGGGTACTGGCCTTACCTTTGACAGTACA
 GGCGCCATTGTTGCTTGGAAACAAAGAGGATGATAAACTTACATTATGGACCACAGCCGACCCCTCGCCAAATTGCAAAATATA
 CTCTGAAAAAGATGCCAACTCACACTTTGCTTGACAAAGTGGAAGTCAAATTCTGGGTACTGTGACTGTATTGGCAGTGA
 ATAATGGAAGTCTCAACCAATCACAACACAGTAAGCACTGCACTCGTCTCCCTCAAGTTTGATGCAAGTGGAGTTTGTCTAA
 GCAGTCCACATTAGACAAAGAATATTGGAACCTCAGAAAGGGAGATGTTACACCTGCTGAGCCCTATACTAATGCTATAGGT
 TTTATGCCTAACATAAAGGCTATCCTAAAAACACATCTGCAGCTTCAAAAAGCCATATTGTCAGTCAAGTTTATCTCAATGGG
 GATGAGGCCAAACCACTGATGCTGATTATTACTTTTAACTGAACTGAGGATGCAACTGCACTACAGTATCACTTTTCAATGG
 AAATGGGATAGTACTAAGTACACAGGTGAAACACTTGCTACCAGCTCCTTACCTTCTCTACATCGCCCAAGAATGAACACTG
 TATCCACCTGCGATGCCAACCTTCCACCCCACTCTGTCTATGGAAAACTCTGAAGCAGAAAAATAAAATAAAGTTCAAGT
 GTTTTATTGATTCAACAGTTTACAGGATTGAGCAGTTATTTTCTCCACCTCCAGGACATGGAATACACCACCTCTCCCC
 CCGCACAGCCTTGAACATCTGAATGCCATTGGTGTGACATGCTTTTGGTCTCCACGTTCCACACAGTTTCAGAGCGAGCCAG
 TCTCGGGTGGTCAGGGAGATGAAACCTCCGGGCACTCCGCGATCTGCACCTCACAGCTCAACAGCTGAGGATTGTCTCGG
 TGGTCCGGATCACGGTTATCTGGAAGAAGCAGAAGAGCGCGGTGGGAATCATAGTCCGCGAACGGGATCGGCCGGTGGTG
 TCGCATCAGGCCCCGAGCAGTCGCTGCCGCCGCGCTCGTCAAGCTGCTGCTCAGGGGGTCCGGGTCCAGGGACTCCCTCA
 GCATGATGCCACGGCCCTCAGCATCAGTCGTCTGGTGGCGGGCGCAGCAGCGCATGCGGATCTCGCTCAGGTGCTGCA
 GTACGTGCAACACAGGACCACAGGTTGTTCAACAGTCCATAGTTCAACACGCTCCAGCCGAACTCATCGCGGGAAGGATGC
 TACCCACGTGGCCGTCTGATCAGATCCTCAGGTAATCAAGTGGCGCTCCCTCCAGAACACGCTGCCACGTACATGATCTCT
 TGGGCATGTGGCGGTTACACACTCCCGGTACCACATCACCTCTGGTTGAACATGCAGCCCCGGATGATCTGCGGAACCAC
 AGGGCCAGCACCGCCCCGCCGATGCAGCGAAGAGACCCCGGTCCCGGCAATGGCAATGGAGGACCCACCGCTCGTACC
 CGTGGATCATCTGGGAGCTGAACAAGTCTATGTTGGCACAGCACAGGCATATGCTCATGCATCTCTCAGCACTCTCAGTCTCT
 CGGGGGTCAAAACCATATCCAGGGCACGGGGAATCTTGACAGGACAGCGAACCCCGCAGAACAGGGCAATCCTCGCACATA
 ACTTACATTGTGCATGGACAGGGTATCGCAATCAGGCAGCACCGGGTATCCTCCACCAGAGAAGCGCGGGTCTCGGTCTCT
 CACAGCGTGGTAAGGGGGCGCGGATACGGGTGATGGCGGGACGCGGTGATCGTGTTCGCGACCGTGTCTGATGCAAGT
 TGCTTTCGGACATTTTCGTAAGTGTGAGCAGAACCTGGTCCGGGCGCTGCACACCGATCGCGGGCGGGTCCCGGCGCTT
 GGAACGCTCGGTGTTGAAATGTAAACAGCCACTCTCTCAGACCGTGCAGCAGATCTAGGGCCTCAGGAGTGATGAAGATCC
 CATCATGCCTGATAGCTCTGATCAGATCGACACCGTGAATGGGCCAGACCCAGCCAGATGATGCAATTTTGTGGTTTCG
 GTGACGGCGGGGAGGGAAGAAGCAAGGAAGCAATGATTAACTTTTAACTCAAAACGGTCTCGGAGCACTTCAAAATGAAGGT
 CGCGGAGATGGCACCTCTCGCCCCGCTGTGTTGGTGGAAATAACAGCCAGGTCAAAGGTGATACGGTTCTCGAGATGTTCC
 ACGGTGGCTTCAGCAAAAGCCTCCACGCGCATCCAGAAACAAGACAATAGCGAAAGCGGGAGGGTTCTCTAATTCCTCAAT
 CATCATGTTACACTCTGCACCATCCCCAGATAATTTTCACTTTTCCAGCCTTGAATGATTGCAACTAGTTCCTGAGGTAATCCA
 AGCCAGCCATGATAAGAGCTCGCGCAGAGCGCCCTCCACCGGCATTCTTAAGCACACCCCTCATAATTCGAAGATATTCTGCTC
 CTGGTTACCTGCAGCAGATTGACAAGCGGAATATCAAAATCTCTGCCGCGATCCCTAAGCTCCTCCCTCAGCAATAACTGTAA
 GACTCTTTCATATCCTCTCCGAAATTTTAGCCATAGGACCACAGGAATAAGATTAGGGCAAGCCACAGTACAGATAAACCG
 AAGTCCCTCCCACTGAGCATTGCCAAATGCAAGACTGCTATAAGCATGCTGGCTAGACCCGGTGATATCTTCCAGATAAAGTGG
 ACAGAAAAATCACCCAGGCAATTTTAAAGAAAATCAACAAAAGAAAAATCCTCCAGGTGCAGGTTTAGAGCCTCGGGAACAACG
 ATGAAGTAAATGCAAGCGGTGCGTTCCAGCATGGTTAGTTAGCTGATCTGTAAAAAACAAAAATAAAAATTAACCATGCT
 AGCCTGGCGAACAGGTGGGTAAATCGTTCTCTCAGCACAGGACAGGCCACGGGGTCTCCGGCGCGACCCCTCGTAAAAATG
 TCGCTATGATTGAAAAACCATCACAGAGAGACGTTCCCGGTGGCCGGCGTGAATGATTGACAAGATGAATACACCCCGGAAC
 ATTGGCGTCCGCGAGTGAAAAAAGCGCCCGAGGAAGCAATAAGGCACTACAATGCTCAGTCTCAAGTCCAGCAAGCGATG
 CCATGCGGATGAAGCACAAAATCCTCAGGTGCGTACAAAATGTAATTACTCCCTCCTGCACAGGACGCAAGCCCCGATCC
 CTCCAGATACACATAAAAGCCTCAGCGTCCATAGCTTACCGAGCAGCAGCACACAACAGGCGCAAGAGTCAGAGAAAGGCT
 GAGCTCTAACCTGTCCACCGCTCTCTGCTCAATATATAGCCAGATCTACACTGACGTAAAGGCCAAAGTCTAAAAATACCCG
 CCAATAATCACACAGCCCAGCACAGCCCAGAAACCGGTGACACACTCAAAAAATACGCGCACTTCTCAACGCCCAAA
 CTGCCGTCAATTCGGGTTCCACGCTACGTATCGGAATTCGACTTTCAAATTCGTCGACCGTTAAAAACGTACCCGCCCCG
 CCCCTAACGGTCGCGGCTCTCTCGCCAATCACCTTCTCCCTCCCAAAATCAACAGCTCATTTGCATATTAACGCGACCAA
 AAGTTTGAGGTATATTATTGATGATG

Fig. 22I

AdC7 010-HIVgp140(E1469) Amino acids – SEQ ID NO: 11**The symbol “ * ” refers herein to stop codons in the non coding regions**

HHQ*YTSNFWCALICK*AV*IWGGRKVGRETGDR*GRGG*RFDDVAVRRSRFASSRGKSDVKRGVV*TRKYSIFPRSLTGNEVFLG
 GCK*KRAIFARKLNEEVKI*VISRLWQGGVFAEGRVDFDLRGGFDIRIFHLNFRVRCQSPVFLRTISFPRKCHLTVTITVLR*RKLRSP
 DPLWCTLSTICSDAA*LSQYLLPACVLEVAE*CASKI*ATTRQGLTDNCMKNLLRVRRFALLRDVRARYTR*H*LLTSMPTPPIDVND
 GKWPAWHYAQYMTLWDFPTWQYIYVLVIAITMVMRFWQYINGRG*RFDSRGFSPSLHPIDVNGSLFWHQNRDQDFPKCRNNSAP
 LTQMGGRRVRWEVYISRARLVNRQITRSFIAVVYHS*IANAVSASDTSVSNLRLEYLIRLTIG*LRLEFDATMRVMGILRSYQQWWI
 WGILGFWMMLMNCVWGNLWVTVYGVVWKEAKTTLFCASDAKAHKEEVHNIWATHACVPTDPNPQEIVLKNVTENFNMWK
 NDMVDQMHEDIISLWDQSLKPCVKLTPLCVTLNCSVDKIKGTATYNNATYNNNNNTISDMKNCSFNNTTEITDKKKKEYALFYKLDV
 VALDGKETNSTNSSEYRLINCNTSAVTQACPKVSFDPIPIHYCAPAGYAILKCNKTFNGTGPCNNVSTVQCTHGKIPVSTQLLNG
 SLAEVEVIRFENLTNNAKIIIVHLNESVEINCTRPSNNTRKSVRIGPGQTFATGDIIGDIRQAHCNISRKKNWNTTLQRVKEKLEKFPN
 KTIQFAPSSGGDLEITTHSFNCRGEFFCYTSDLFNSTYMSNNTGGANITLQCRIKQIIRMWQGVGQAMYPPIAGNITCKSNITGLL
 LTRDGGKEKNDTETFRPGGDMRDNRSELYKYKVEIKPLGIAPDKAKLTVQARQLLSGIVQQSNLLRAIEAQQHMLQLTVWG
 IKQLQTRVLAIERYLKDQQLGIWGCSGKLICTTAVPWNASWSNKSYYEIWGNMTWMQWDREINNYNTIYSLLEESQNNQKEKNE
 KDLLALDSWESLWSWFNITNWLW*GTSRVDPGGQTADQPRCLLVASHLLFAPPPCLP*PWKVPLPLSPFNKMRKLHRIV*VGVIL
 FWGVGWGRTARGRIGKTIAGMLGMRWALWLLRRKEPADLQ*IHLRVRRRK**NGIMGIMGLH**IGQISICWPPCM*PRTPA
 RHGPSSTTS*PDAMCTWGPAEACSCPTSATCNL*RCCWSPMPCE*A*RGCLT*MWSCGKF*DMMNPRPGAGPANAEASTP
 GFSPCVWR*RRTCDPHWCPCATGRSSAPAGKNLTVSSVWGRWRACMRGRMTKICVFLCVA**AEAPLREGYSALI*RGVSPP
 GRECVRM*WDPWRTAGPCSPRTLQ*PTRP*APRPWTQLPPQLLPPAPCAEWPAWATTALWWPTRLPPIPPA*TRRSSCC
 *WPSSRP*PSAWAS*PSRWLSCRRRRGRPLRP*KPNKK*INK*TETVDFNTES*IFI*FFARGRPWTTGLDH*APGGFFPGPRGG
 LGC*GTWA*ARPGGGGSSAGPRARGWCCCKSPSHSRGAGRGAAARCP*GGD*WPRAAPWCRC*RTC*AGRDACGGR*DASWP
 GS*DWRCRPPDPAGGSCCAGPPARCIRRTWGICHATWKGRRIERWRRPCDRPGFCTHP**WRWARGRRPGQRRFGRTHRSC
 GPG*ARHRPF**IWGGGCPTGGRRCPRSRGRSCPRRSASPR*ARRGGSCPPAGR*KKRFPGRGR*AGPKAGSGAAGTCRSRWG
 RR*PR*PAAGGS*GRDSCRPRGGGPPRSSRAHACSRARVPPGARPPARGALAARRSFAA*XRRPWAFWRGVARVPDGP
 AR*CALGHLDPADLLVSRVGATAGVGHQAMGVQRGQGPVLPQSQGPQRGLRHGEGVRAGLGACEGALQHPAGREPLVGA
 LRVGQVAIEHEFVVERLGRVALGAELTFGSVSADGTEGLEGVGGEEDGLGGVGVRAAAGADGLALHEPGEVGPVGVKNEVSSV
 LFDALFTSLGHELVSPDGKEAVRVPVDRLYGPVLERGAALVVEEPRPLRDEGPGPGQHEGGHVGAVVHQRVHLLQGMQA
 HVLVHVIQEGDWLVSVGHVGTGGPRGGIKGGGPLLVLTVFRIAVQERQLLG*VFPLEGWHNLGTQVVSF*KRGGFDIDGAVGDAF
 HEPLVHLVRKDDLFVVELGGEGAVEGVGEELGDGAHGLVLFLVALLGGDVELHVLARHALPFGEDGGELVGHDSPPAAVVQGD
 EVHAGGHAAQGLVGPAEAPALARAEGGQRVQHELVGGVGVHGEDAGQKLGVEVADAGVQIVQRRLPVAHGQRLVGAEGRA
 PGHGVRERGVHAADVVDVEGLLEDADVGGVAAPPADAGAHVVVQLVRGREETRAEVGALRLFGAVDDLAEDGVGVGGDGGP
 LEDVEVGVGQADRPDEVGVGLQLGDELGGDEDVQGA VVEGLLDDVLELALLPQLAVEKELFAVLPVLFEGEPVLIGTVRAHH
 VELVDGLVGAAALLHGEVSLCGLAQGGVGEGEVGAHHDLEELVLEVEVVAALLPELEVRALLVGGVGQSESNIVEEDLARAGHE
 VASDAERLGHLPVDDLGGEDDLVEAVDVPPDDVEFHESRAALNVGQLELVVVGELGGVAEPVLEGPVGDVGVGAEEGSPEIH
 GQGGQLQAVPVLTELLAHGHFFGGDAVEGAGVAVPAVPLELEGEVVGELDERRPGEFHDQHEGDELLAEGPHPGVGFHIVGEEEP
 FGARMRADGEELDLLPVGGMAVDVMEVEMPTARRALVLFIQASAVLATLHGMHVLHLYLGSFDEEFQWAVRWRLHLVLY
 VLAIGVAIVCLDGGHADEPAREAGPDFGSDGSESEDEGAQAGAVQGPETLRSQVSGQRRRAVDLQELFQGAREVQMVLDLHGA
 GGDVHGLQGPVPLGRHHRAPFLGRCFHAGQKRRRGRAPGGRGSGPGGRGGRGTSAPRAGRFWYCARRLA*ATTRLTSWI
 *RLWVKATGPVSLNLKESSTESISVSLTAACRRISCTSPELSW*AISVMNCSSISS*RSRPARSTVAARSLEMRPMSCEKAFMPASFQ
 TRL*TTAPSGSRARMTTWARLSSTWRVKTA*LQRRW*R*LSVVAMCSVTKKYMIQRRSGISLTSPRASKRSMAS*KSTAKLKNWEL
 RAETVNSSSSRRRMSAMVARTSRKAPGGSSSSSSSTNISSTSSSGGGGGGGALRRRRRTGRRSMKRSMSVPRRRRMVSVTARP
 SSRGRSVKTPPRISRWPPGGSPLGRERALTMHLINWPVGTPRKDLVSRSSTGSENR*TKASSQSQSGRLSPVSCSSGISGGGRAML
 LVMKLK*AVLRRRMVARSTRSLGPACWMRRRSAMPQAWS*HLARSL**SCMSRSTGTSSSPARPCMRVSPNPRWGWSARSAT
 TRSARMACCIWVRVWVWSSKSTKRW*APVLMV*EQLAMTDQLTVWWPGRTSSWYLRRE*ARVSKM*SLQVRTRYWYPTKCG
 GGWR*SGHRSVAGAPGARSSSMRRW*P*MYLDIQVMPAAVVEARGNSRTRFQMLRSGRK*FMVAAVWPVRAQSWML*TY
 GQKRKRSAARLRGLEAKRTGWAARVPRFESRIRLEPQLTWYHWSRLDPSLLTKPPGYGGGSFFGLGRWS*KTSKRGRKPPAMARC
 RSLEKESPLRRCGVPRFEPQRSAPAGFRG*RGRCGPVVSCTP*PADFSSYGASPSFSCVFARCIPYCGRCAPTLLNRPYRSSNSRR
 FCRPSSSQPLRPP*AEPAFSMTWPWKARGWRGWGRRRRSGTRACR*KGTARPTCPSTCSETGAARSPRRCAPASTRG
 GSCGAAWTESGC*GTRISRRS*RGSA PRARTWPRPTWSRRTSRP*RRRATSKNPSTTTCAR*SRARR*PWA*CTCGTCWRPSCR
 TPRASR*RRSCFWWCSTVGTTRRSGRRC*ISPSRAAGSWTW*TCRASWCRSAGCRCPSRWRLSTSRC*AWASTTLGRSTRPRT

Fig. 22J

CP*TRR*RSTGFTCA*P*KC*P*ATIWGCTATTGCTAR*APAAGAS*ATRS*CTACSGP*PGPGPRGRATLTWARTCAGSPAAGPW
 KLPVPPPTWRRWTMRRRRRASTWKTGATVFLDDAATATAS*SRDAGGAAEPAVRH*LLGRLDPGHATHHGADDPQSRSL*TAAS
 GQPALGHPGGRGALALEPHAREGAGHRERAGGEQGHPRRRRGRAGVQRAAGARGPLQQHQRADEPGPHGDRRARGGVAARAV
 PPRVEPLHGGAERLPEHAARQAPGPGGLHQLHQRAADGGRGAPERGVVAGALLPDQSPGLADREPEPGFQELAGTVGRA
 GPGRGPRDGVEPADAELAPAAAAGGALHGQRQREPRVLPLPA*PVPRGHRAGARGRADLPGDHPREPRAGPGGPGQPGGHP
 ELPADQPVAEDPAPVRAEHRGGAHPALRAAERGAVPDAGGHAQRRARHDRAQHGAAHVRSQPPVHQ*ADGLLASGGRHEL
 LLYQRHLEPALAPAAARVLHGRVRHARPQRRVPVGRRGQQRVLAAPRHHRVEERGRGPAAVLGAVRSRGCGRGA*GRQPLPEPA
 LFAEQRAQQRAGSADAAAPAGRGVPERLLVEARAREELPQ*RDREPGGQDEPLEDVRARAQGRAPS*QQRHRP*TPATRQAAG
 SGVGR*GFRRRQQRVGLGWEWWW*PVRSLAPPYRAPDVRI*KNKKRYSRPPWRPACVLLCCL**YDEARVPGSSSLVRERDAA
 GGGGGDAAPAGGALRAPAVPGAYGGAEQHSLLGAGTLVRYHPVVPGGQVVGHRLAELPERPQQLPDHRGAEQRFHPHGGQH
 PDHQL*RALAVGRPAENHHAHQHAQREVRHVQQVQVQAGDGLAQDPQWGRGG*EL*W*SGRADLRVGGV*AARGQLGDH
 DHRSDEQRHHRQLLGGGASERGAGERHRRREVRAHQLPAGLGRPRDRAGDAGRVHQRLPPRHRPAARLRRLHREPPQQPAGHP
 QAAALPGGLPDPVRGPGGGQHPRALGCRSL*EKQGGGRRSGDRSRGHRLYRGAGR*FC*RRGSGRGG*NRK*DSHPAGGEGQQ
 GQELQRRARGQEKHRLPQLVPLQLRRPREGRALLDAAHHLGRHLRRGASLLVAARHDARPGHLPLHASS*QLPGGGRRAPARLLQ
 ELLQRAGRLLAAARLHLAHLRLQLPREPDRPPARAHYHRQ*KRSCSHSRDPAAAQQYPGSPARDRH*RQTPHLRLRLQGP
 GRSRAARPLEPHLLKNVHSHLAQ**HRLGPARAQDVRRRSPTLHATPRARARALPRSLGRPQGPRAAHRRRRDRPGGGRAQ
 LHARRRRLHRRRRHRQRGGRCAPVRPRQEPAAHRPAPEHPRHARGASLAAQGAHQGTQGHAGGGQTRGLRQQRRQDP
 QTRGHGGGGGHRQHVPAAARQRLVGARRRHRCARARAHPPPSHLKMLTSLC*CVPAARRMSKRKYKEMLQVIAPEIYGPVAVKE
 ERKPRKLKRVKDKKEEDVDGLVEFVREFAPRRRVQWRGRKVKPVLPRGTTVFTPGERSGSASKRSYDEVYGEDILEQAVERLG
 EFAYGKRSRPAPLKEEAVSIPLDHGNPTPSLKPVTLLQVLPSPAAPRRGFKREGGEDLYPTMQLMVPKRQKLEDVLEHMKVDPEVQP
 EVKVRPIKQVAPGLGVQTVDIKIPTMETQTEPVKPTSTMEVQTDPMWMPAPASTRRRRKYGAASLLMPNYALHPSIIPTPGYRG
 TRFYRGYTSSRRKTTTTRRRRRRTRRSSTATSAAALVRRVYRSGREPLTLPRARYHPSIAI*LCRRLLADMALTCRLRPVITGYRGRKPRR
 RRLTGNGLRHHHRRRRRAISKRLGGGFLPALIPIIAAIGAIPGIAVAVQASQRH*DTAWKICNKKMD*RSWSCDVCF*MEDINFSS
 LAPRHGTRPFMTGWSIDIGNSQLNGGAFNWSSLSWGLKNFGSTLKTGYNKAWNSSTGQALREKLKEQNFQKQVVDGLASGINGV
 VDLANQAVQKQINSRLDAVPPAGSVEMPQVEELPLDKRGDKRPRDAEETLLTHTDEPPPYEEAVKGLPPTTRPVAPLATGVLPK
 SSSSQPATLDLPPASRPSTVAKPLPPVAVASRAPRGRPQANWQSTLNSIVGLGVQSVKRRRCY*CTL*RLTCLSVICIMSDAQKEE
 ARRRVARWPPHRCPSGRCTSPDRTLRST*VRVWCSSPAPQTPTSVWGTSLGTPRWRPRTM*PPTAASG*RCASCPWTARTTP
 TRTKCATRWPWATTACWTWPAPTLSAACWIGGPASNPTAPPTTAWLPRERPTLASGHIKLILIQKKPIHMEMHLCKALALQR
 MVFNLELTAMVRQSMQTKLINQSLKWWMLNGMTSLVLMKNMEALLSLTPK*SLAMVLLPSLPKKEARQM*PKPKQAVPKNMTL
 TWHSSIEVLPPA*PQKLCILRMWIKLQIPILYTRQVQMTVALLSIWVSSPCPTDPTTLASETTLV*CTTALAIWVYWLDRPPS
 *MLWWTCRTETPNCPTSSCLTLVWTEPGISVCGIRRWVTMTPMCALKITVWRMNFILTASPWMLWVELILTRELPMVIKPPGP
 KMILLMLLMNWARAILSPWRSTSRPTCGGTSSTRTWRCTCPTPTSTRPTSRCPPTPTIT*TAAWWRPRWWTPTSTSGRAGR
 WTPWTTSTPTTTATRADTAPCSWATGATCPSTSRCPKSFSPSRASCSCPGPTPTSGTSARTST*SCRAPSATTARTGPPSPSPAS
 TSTPPSSPWRTTPPPSRPCCATPTTSTPTTSSRRPTCSTPSRPTPTCPSPSRATGPPSAAGPSRASRPARRPRSAPGSTPTSSTRA
 PSPTSTAPSTSTPSRRSPSTPPSAGPATTAS*RPTSSKSSAPSTERGTTWPSAT*PRTGWSRCPWTTTSATRASTCPRATRTACT
 PSSATSSP*AARSWTRSTTRTRPSPWPTSTTTASSATSPPCARASPTPTPTRSSARAPSPASPRKSSATGSCGASPSPATSCP
 WARSPTSARTCTPTPTR*T*ISKSTPWMSPFMSLSKSSSTSECTSPTAASSRPSTCARPSRPATPPKPLASCKMTACAGSGEQE
 LRAILRDLGCGPCFLGTDFKRFPGFMAPHKLACAIVNTAGRETGGEHWLAFAWNPRSHTCYLFDPFGFSDERLKQIYQFEYEGLLRR
 SALATEDRCVTLEKSTQTVQGPRSAACGLFCCMFLHAFVHWPDRPMDKNPTMNLTLGVPNGMLQSPQVEPTLRRNQEALYRFLN
 AHSAYFRSHRARIKATAFDRMNQDM*SGVCM*MLYSS**TAHVYATFSEALTFRNRRGSAGSRHGPRAGIRCGTGTWAAT*TR
 GSAASARGGRGTSRSTACA*VAGRPAGRARRS*NRWDPRSARESYGTRGCTGTPSGPGASRSPAPSRR*CPPRDPRRWPSRR
 GSSCRSAAPCWARSACGCNRSAGGSASSGPARSSCPGTWPS*KPPAGGRPAAPCRPR*RRPRRTC*RTGWWRSQRRARSSARR
 CWPAAPRCAPSGSG*SWPGRGSPSARAARSRSPHPSRSCAPSGSSRSRAGTAACPRPRCTRAATARSRCSPSSCGRSGSASARPA
 GSGPSSWSGSCCW*RSAECRGAPRSHTGGRYGGTPRPARASAGRRTSGRSPRGTPSAASSLPCSPRPRKRSAGSGGSSPLSS*SPP
 PKSGGRSRPGSQTACRPSR*CARGES*SPRPPAPPRPAFRPCPG*CLAKAHAWSCGVSWAAEAAAETCWASASSRSPRLFLLL
 GRRPRPRGRHASSGAEAEATGSRGSAGGWQSPFRVRGCAPGGAALTDFLRGRPLCSPREQAWRLSHRRQHRHLPPPPPTRTSSS
 RMKA*PPRRPAPPPTPQPQTCKRWRNPSRLTWAT*RPSTRRSWQRAFPQRKRTTKSSQSRKQASRTRLGSSMATT*AGQRTC
 SSSIWPANASSRTRCSTAPRCPSAWRSSAAPTSSRRACPPSASPTAPASPTRASTSTRSSRCPRWPPTTSFSRTKGSPSPAAPT
 APAPTPCSTWAPAPAYLISPPWKRFPRSSRVWAATRLGPRTLCKEAERSMSTTAPWWSWKATTRAWRSSARSS*PTSPTRRSTCP
 PRS*APSWTRCSSAPRPSRRRCRTPRARTRASPWSATSSWRAGWERVAPPRAWKSGASS*WPWSW*PWSWSVCAASSPTR
 RPCARSRRCTTSSDTGSCARPARSPTWS*PTWSPTWASCTRTAWGRTCTTPCAGRPAATTSATASTCTSATPGRRRAWACGSSA

Fig. 22K

WRSRT*KSSASSCRRTSRPCPGSTSAAPPRTWPTSSSPSACG*RCATGCPTL*AKACCKTFALSSSNAPGSCPPAPRCPRTSCR*P
 SASAPRRSGATATCCAWPTTWPTTRT*SRTSAARACSSATAAATSARRTAPWPATPSC*ARPRSSAPSSCKAPARARGV*NSPRGC
 GPRPTCASSCPRTTIPSRSGSTRTNPSRPRPSCRPAASSPRGSPWPNCCKPSRNPKNFC*KRATGSTWTPRERSSTPASPRMPRGSS
 KKLKVELPPPPEDLEEDWESSQAEEEEMEDWDSTQAEEDSLQDSLEEEDEVEEAEEEEAAARPSSSAEEEEKASSTDTISAPGRGRGG
 RAHSRWDETRGFNPPTQTGKKERQGYKSWRGHKNNAIVSCLQACGGNISFTRRYLLFHRGVNFPNHLHYRHLHSPYYCFQEEAE
 TQQQQQQQKTSGSS*KIHSGGRWTEDRGERAGADPGAEPDLSHPLCHLPAESGARAGTESQEPFSALAHPLSVSQERRPTSAH
 SRGRRGSLQQVLAHS*RVARARPHTEKGGNYVTTCALRPTIIMSKEIPTPYMWSYQPMGLAAGAAQDYSTRMNWLSAGPAMI
 SRVNDIRAHNRQILLEQSAITATPRHHLNPRNWPAALVYQEIQPTTVLLPRDAQAEVQLTNSGVQLAGGAALCRHRPAQGIKRLVI
 RGRGTQLNDEVSSSLGLRPDGVFQLAGSGRSSFTPRQAVLTLESSSSQPRSGGIGTLQFVEEFTPSVYFNPFSGSPGHYPDEFIPNFD
 AISEVDGYD*MSHGGAADLARLRHLDHCRFRFCFARDLAEFAYFELPEEHPOGPAHGVRIVVEGGDLSHLLRIFSQRPIAEREQG
 QTLTLYCICNHPGLHESLCCLLCTEYNKS*DQRLRTSVCSYQPVPLHRERDRAPAPV*APQEVPHLAVPGLSDRRCQPLRQRRS
 PAERPCQPYFFHPQKQAPALPTLPPRDLVRLGTLPSHLPPDEYHSAVAPRY*QPNYPPTPPSRPRTCTELEKY*ATIHAIHRL*GRAT
 ATHAPRY*LLQSNRRR*LTHWPTTTSTTFSWTWTAAPRSSDSPNFAFASSRREPSRSCRTA*PSTSARKASSAW*NRPRSPTSRPRP
 TIASPTSSCSSARSSPAWSESTPSSSPSRAIRPGASTAPATPPTASTL*SRPSAASATSSP*TNHPLIQ*NKYHIDDDLNNK*SFDLK*R
 YNHIDDLSEFK*RITYLKSOTRSLMSFANTTSLPSSQLWYCRPRRAANFLHTLKGMSSNSCPSIFILSIRCPKASGWMMTSTPSTPT
 MQTTHRPCSSSTPPSSLQMDSKRSPWGCPDCLTSPSPRTGKSPSSWERTSTPRENSSPTRPPRPPPLSVFPTTFFPLTWIPLF
 IPKMENYPYKFLHR*TY*NQPF*TH*L*LMDQV*D*VVALLQYSWPLHSLMKKEILKLT*PVVH*QLMQVDLVSTAKEGSLSLPQ
 EMQLKAT*AGLKV*DLKVMA*LQTLAEDWNLEPLVQRLMSQMHTQFKNLWVLAALPLTVQAPLLGTRKMINLHYGPQPTPRQIA
 KYTLKKMPNSHFA*QSVEVKFWVL*LYWQ*IMEVSTQSQTQ*ALHSSPSSLMQVEFC*AAPH*TKNIGTSEREMLHLLSPILML*VL
 CLT*RPILKTHLQLQKAILSVKFISMGMRPNH*C*LLLLMKLRMLQAPTIVSLFNGNGIVLSTQVKHLLPAPSPSPSPKNEHCIPPCMP
 TLPTPLCLWKKL*STK*NKVQVYF*FNSFTGFEQLFFLHPRTWNTPPSPPAQ*P*TSECHW*WTCFWSPRSTQFQSEPVSGRSGR*
 NPPGTPASAPHSSTAEDCPRWSGSRSLSGRSRAAVGIIVRERDRPVVSHQAPQQSLPPPLRQAAAQGVVRVQGLPQHDAGHPQH
 SSGAAGAAAHADLAQVA AVRATQDHQVQQSIVQHAPAETHRGKDATHVAVVPDPQVNQVALPPEHAAHVHDLGHVAVVHLL
 PVPHHPLVEHAAPDDPAEPQGGHRRPARHAARKPRVPAMAMEDPPLVPVDHLGAEQVYVGTAAQAYAHASLQHSQLLGGQNHIP
 GHGELLQDSEPRRTGQSSHITYIVHGQGIARQHRVILHQRSAGLGLTAW*GGRPIRVMAGRG*SCSRPCHDAVAFGHFRTCCSRT
 WSGRCTPIAGGGPGAWNARC*NCKTATLSDRAADLGPQE**RSHHA**L*SHRPPWNGPDPAR*CNFVGFR*RRGREEQEEP*L
 TFNPNGLGALQNEGRGDGTSRPRCVGGK*QPGQR*YGRSDVPRWLPAKPPRAHPETRQ*RKREGSLIPQSSCYTPAPSPDNFHS
 SLE*FELVPEVNPSQP**RARAERPPPAFLSTPS*FQDILLVHLQQIDKRNKISAAIPKLLPQQ*L*VLFHILSEIFSHRTTRNKIRASHS
 TDKPKSSPVSIACKCTAISMLARPGDIFQITGQKITQAIKKINKRKILQVHV*SLGNNDVNASGAFQHG*LADL*KTKNKTNLHASL
 ANRWVNRLQHQAGHGVSGATLVKIVAMIENHHRETFPVAGVNDSTR*IHPRNIGVRE*KKAPEEAI RHYNASQSVQVQSDAMR
 MKHKILRCVQNVITPLLHRQSRPSRLQIHQSLSVHSLPSSSTQQAQSEK*ALTCPPALCSIYSPDLH*RKGQSLKIPAK*SHTPSTRP
 ETGDTLKKIRALPQTPKLPSFPGSHATSSEFDFQIPSTVKNVTRPAPNGRPSLGQSPSSLPKFKQLICILTRTKSLRYIID

Fig. 23A

AdC7 010-HIVgag(E1048) Nucleic Acids – SEQ ID NO: 4

CATCATCAATAATATACCTCAAACCTTTTGGTGCGGTTAATATGCAAATGAGCTGTTTGAATTTGGGGAGGGAGGAAGGTGAT
TGGCCGAGAGACGGGCGACCGTTAGGGGCGGGGCGGGTGACGTTTTGATGACGTGGCCGTGAGGCGGAGCCGGTTTGCAA
GTTCTCGTGGGAAAAGTGACGTCAAACGAGGTGTGGTTTGAACACGGAAATACTCAATTTCCCGCGCTCTCTGACAGGAAAT
GAGGTGTTTCTGGGCGGATGCAAGTGAAAACGGGGCCATTTTCGCGCGAAAACTGAATGAGGAAGTAAAAATCTGAGTAATTT
CGCGTTTATGGCAGGGAGGAGTATTTGCCGAGGGCCGAGTAGACTTTGACCGATTACGTGGGGGTTTCGATTACCGTATTTTT
CACCTAAATTTCCGCGTACGGTGTCAAAGTCCGGTGTTTTTACGTACGATATCATTTCCCCGAAAGTGCCACCTGACCGTAACTA
TAACGGTCCTAAGGTAGCGAAAGCTCAGATCTCCCGATCCCTATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGT
TAAGCCAGTATCTGCTCCCTGCTTGTGTGTTGGAGGTGCTGAGTAGTGCGCGAGCAAAATTAAGCTACAACAAGGCAAGGC
TTGACCGACAATTGCATGAAGAATCTGCTTAGGGTTAGGCGTTTTGCGCTGCTTCGCGATGTACGGGCCAGATATACGCGTTG
ACATTGATTATTGACTAGTTATTAATAGTAATCAATTACGGGGTCATTAGTTCATAGCCCATATATGGAGTTCGCGTTACATAA
CTTACGGTAAATGGCCCGCTGGCTGACCGCCCAACGACCCCCGCCATTGACGTCAATAATGACGTATGTTCCCATAGTAACG
CCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTACGGTAACTGCCACTTGGCAGTACATCAAGTGTATCATATG
CCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCGCTGGCATTATGCCAGTACATGACCTTATGGGACTTTCT
ACTTGGCAGTACATCTACGTATTAGTCATCGTATTACCATGGTGATGCGGTTTTGGCAGTACATCAATGGGCGTGGATAGCG
GTTTGACTCACGGGGATTTCGAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGGCACCAAAATCAACGGGACTTTCC
AAAATGTCGTAACAACTCCGCCCATTTGACGCAATGGGCGGTAGGCGTGACGGTGGGAGGTCTATATAAGCAGAGCTCGT
TTAGTGAACCGTCAGATCACTAGAAGCTTTATTGCGGTAGTTTATCACAGTTAAATTGCTAACGCAGTCAGTGCTTCTGACACA
ACAGTCTCGAAGCTTAAGCTGCAGAAGTTGGTCGTGAGGCACTGGGCAGGTAAGTATCAAGGTTACAAGACAGGTTTAAGGAG
ACCAATAGAACTGGGCTTGTGAGACAGAGAAGACTCTTGCGTTTCTGATAGGCACCTATTGGTCTTACTGACATCCACTTTG
CCTTTCTCTCCACAGGTGTCCACTCCAGTTCAATTACAGCTCTTAAGGCTAGAGTACTTAATACGACTCACTATAGGCTAGCGC
CACCATGGGCGCCAGAGCCAGCGTGCTGAGCGGGGAGAGCTGGATCGCTGGGAAAAGATTAGACTGAGGCCCGGAGGGA
AGAAAAAGTACAAGCTGAAACACATCGTGTGGGCCAGCAGGGAGCTGGAGCGCTTCGCGGTGAACCCCGGACTGCTGGAGA
CCTCCGAAGGCTGTGCGCAGATCCTGGGGCAGCTGCAGCCTTCCCTGCAGACAGGCTCCGAGGAGCTGCGGTCTCTGTATAAT
ACAGTGGCCACACTGTACTGTGTGCACCAGCGGATTGAGGTGAAGGATACAAAAGAGGCCCTGGAGAAGATTGAGGAGGAG
CAGAACAAAGAGCAAGAAGAAAGCCAGCAGGCCGCGCCGACACCGGCAATAGCTCCAGGTGAGCCAGAACTATCCAATTG
TGCAGAATCTGCAGGGCCAGATGGTGACCAGGCCATTTCCCAACGGACACTGAACGCCTGGGTGAAGGTGGTGGAGGAGA
AGGCCTTCAGCCCCGAAGTGATCCCTATGTTTCCGCCCTGTCCGAAGGCGCCACCCCTCAGGACCTGAACACCATGCTGAACA
CAGTGGGGGGACACCAGGCCCATGCGAGATGCTGAAGGAAACCATCAACGAGGAGGCCGCCGAGTGGGATCGGCTGCACC
CCGTGCACGCCGGGCCAATCGCCCCTGGCCAGATGAGGGAGCCAGAGGCTCTGACATCGCCGGCACCACATCTACCCTGCA
GGAACAGATCGGGTGGATGACCAATAACCCACCAATCCAGTGGGCGAGATCTACAAGAGGTGGATTATTCTGGGACTGAAC
AAAATTGTGCGCATGTATTCCCTACATCCATCCTGGACATCAGGCAGGGCCCTAAGGAACCTTTCCGCGACTACGTGGATCGG
TTCTACAAAACCTGCGCGCCGAGCAGGCCAGCCAGGAAGTGAAGAATTGGATGACAGAGACCTGCTGGTGCAGAACGCCA
ATCCTGACTGTAAAACCATCTGAAGGCCCTGGGCCCTGCCGCCACTGGAGGAAATGATGACCGCTGCCAGGGCGTGGG
CGGCCCTGGCCACAAAGCCAGGGTGTGGCCGAGGCCATGTCTCAGGTGACCAACTCTGCCACAATTATGATGCAGCGGGG
AACTTTCCGAACAGAGGAAGACCGTGAAGTGCTTCAACTGTGGCAAGGAGGGACACATCGCCAAGAATTGCCGCGCCCCAC
GGAAGAAGGGGTGTTGGAAATGCGGGAAGGAGGGCCACCAGATGAAAGACTGCACAGAGCGGCAGGCCAACTTTCTGGGC
AAGATTTGGCCAGCCACAAGGGCCGCCCGGAACTTTCTGCAGTCCAGGCCTGAGCCTACCGCCCCCTGAGGAATCCTT
CCGGTTCGGCGAGGAGACAACACCCCAAGCCAGAAGCAGGAACCCATCGACAAAGAGCTGTACCCCTGGCCAGCCTGAGA
TCCCTGTTCCGGAATGACCCAGCTCTCAGTGATGATCTAGCGTTAAACGGGCCCTTAGAGTCGACCCGGGCGGCCAAACC
GCTGATCAGCCTCGACTGTGCCTTCTAGTTGCCAGCCATCTGTTGTTTGGCCCTCCCCCGTGCCTTCTTGACCCTGGAAGGTGC
CACTCCCACTGTCCTTTCTAATAAAATGAGGAAATTGCATCGCATTGTCTGAGTAGGTGTATTCTATTCTGGGGGTGGGGT
GGGGCAGGACAGCAAGGGGGAGGATTGGGAAGACAATAGCAGGCATGCTGGGGATGCGGTGGGCTCTATGGCTTCTGAGG
CGGAAAGAACCAGCAGATCTGCAGATCTGAATTCATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGGCATTATGGGTA
TTATGGGTCTGCATTAATGAATCGGCCAGATATGCTGGCCACCGTGCATGTGACCTCGACCCCCGCAAGACATGGCCCCGAGT
TCGAGCACAACGTCATGACCCGATGCAATGTGCACCTGGGGTCCCGCCGAGGCATGTTTCATGCCCTACCAAGTGAACATGCAA
TTTGTGAAGGTGCTGCTGGAGCCCCGATGCCATGTCCAGAGTGAGCCTGACGGGGGTGTTTGACATGAATGTGGAGCTGTGGA
AAATTCTGAGATATGATGAATCCAAGACCAGGTGCCGGGCCCTGCGAATGCGGAGGCAAGCACGCCAGGCTTCAGCCCGTGTG
TGTGGAGGTGACGGAGGACCTGCGACCCGATCATTTGGTGTTGTCTGCAACGGGACGGAGTTCGGCTCCAGCGGGGAAGA
ATCTGACTAGAGTGAGTAGTGTGGGGGAGGTGGAGGGCTGTATGAGGGGCAGAATGACTAAAATCTGTGTTTTCTGTG

Fig. 23B

TGTTGCAGCAGCATGAGCGGAAGCGCCTCCTTTGAGGGAGGGGTATTGAGCCCTTATCTGACGGGGCGTCTCCCCTCCTGGGC
 GGGAGTGCCTCAGAATGTGATGGGATCCACGGTGGACGGCCGGCCGTGACGCCCGGAACTCTCAACCCTGACCTACGCG
 ACCCTGAGCTCCTCGTCCGTGGACGAGCTGCCGCCGAGCTGCTGCTCCGCCGCCAGCGCCGTGCGCGGAATGGCCCTGGG
 CGCCGGCTACTACAGCTCTCTGGTGGCCAACTCGACTTCCACCAATAATCCCGCCAGCCTGAACGAGGAGAAGCTGCTGCTGC
 TGATGGCCCAGCTCGAGGCCCTGACCCAGCGCTGGGCGAGCTGACCCAGCAGGTGGCTCAGCTGACGGCGGAGACGCGGG
 CCGCGGTTGCCACGGTGAACCAATAAAAAATGAATCAATAAATAAACGGAGACGGTTGTTGATTTTAACACAGAGTCTTG
 AATCTTTATTTGATTTTTCGCGCGCGGTAGGCCCTGGACCACCGGTCTCGATCATTGAGCACCCGGTGATTITTTCCAGGACC
 CGGTAGAGGTGGGCTTGATGTTGAGGTACATGGGCATGAGCCCGTCCCGGGGGTGAGGTAGCTCCATTGCAGGGCCTCG
 TGCTCGGGGGTGGTGTGTAATCACCCAGTCATAGCAGGGGCGCAGGGCGTGGTGTGCTGCACGATGTCCTTGAGGAGGAGA
 CTGATGGCCACGGGACGCCCTTGGTGTAGGTGTTGACGAACCTGTTGAGCTGGGAGGGATGCATGCGGGGGGAGATGAGA
 TGCATCTTGGCTGGATCTTGAGATTGGCGATGTTCCCGCCAGATCCCGCCGGGGTTCATGTTGTGCAGGACCACAGCAC
 GGTGTATCCGGCGCACTTGGGAATTTGTATGCAACTTGAAGGGAAGGCGTGAAAGAATTTGGAGACGCCCTTGTGACCG
 CCCAGGTTTTCCATGCACTCATCCATGATGATGGCGATGGGCCGTGGGCGGCGCCTGGGCAAAGACGTTTCGGGGGTGCG
 ACACATCGTAGTTGTGGTCTGGGTGAGCTCGTCATAGGCCATTTAATGAATTTGGGGCGGAGGGTGCCCGACTGGGGGAC
 GAAGGTGCCCTCGATCCCGGGGGCGTAGTTGCCCTCGCAGATCTGCATCTCCAGGCCTTGAGCTCGGAGGGGGGGATCATG
 TCCACCTGCGGGGCGATGAAAAAACGGTTTCCGGGGCGGGGAGATGAGCTGGGCCGAAAGCAGGTTCCGGAGCAGCTG
 GGACTTGCCGAGCCGGTGGGGCCGTAGATGACCCGATGACCGGCTGCAGGTGGTAGTTGAGGGAGAGACAGCTGCCGTC
 CTCGCGGAGGAGGGGGGCCACCTCGTTCATCATCTCGCGACATGCATGTTCTCGCGACGAGTTCGCCAGGAGGCGCTCGC
 CCCCCAGCAGAGGAGCTTTGACGCGAGGCGAAGTTTTTACGGCCTTGAGCCCGTGGCCATGGGCATTTTGGAGAGGGT
 CTGTTGCAAGAGTTCAGACGGTCCAGAGCTCGGTGATGTGCTCTAGGGCATCTCGATCCAGCAGACCTCCTCGTTTCGCGG
 GTTGGGGCGACTGCGGGAGTAGGGCACCAGGCGATGGGCGTCCAGCGAGGCCAGGGTCCGGTCTTCCAGGGTCCGAGGGT
 CCGCGTCAGCGTGGTCTCCGTACGGTGAAGGGGTGCGCGCCGGGCTGGGCGCTTGCAGGGGTGCGCTTCAGGCTCATCCGG
 CTGGTCGAGAACCGCTCCCGTCCGGCGCCTGCGCGTCCGCCAGGTAGCAATTGAGCATGAGTTCGTAGTTGAGCGCCTCGG
 CCGCGTGGCCCTTGGCGCGGAGCTTACCTTTGGAAGTGTGTCGCGACGCGGACAGAGGAGGGACTTGAGGGCGTAGAGCT
 TGGGGGCGAGGAAGACGGACTCGGGGGCGTAGGCGTCCGCGCCGAGCTGGCGCAGACGGTCTCGCACTCCACGAGCCAG
 GTGAGGTGCGGGCCGTTGGGGTCAAAACGAGGTTTCTCCGTGCTTTTGATGCGTTTCTTACCTCTGGTCTCCATGAGCTCG
 TGTCCTCCGCTGGGTGACAAAGAGGCTGTCCGTGTCCCGTAGACCGACTTATGGGCCGGTCTCGAGCGGGGTGCCGCGGT
 CCTCGTCGTAGAGGAACCCGCCACTCCGAGACGAAGGCCCGGTCCAGGCCAGCACGAAGGAGGCCACGTGGGAGGGGT
 AGCGGTGTTGTCCACGAGCGGGTCCACCTTCTCCAGGGTATGCAAGCACATGTCCCCTCGTCCACATCCAGGAAGGTGATT
 GGCTTGTAAGTGTAGGCCACGTGACCGGGGGTCCCGGCCGGGGGGGTATAAAGGGGGCGGGCCCTGCTCGTCTCACTG
 TCTTCCGATCGCTGTCCAGGAGCGCCAGCTGTTGGGGTAGGTATTCCCTCTGAAGGCTGGCATAACCTCGGCACTCAGGTT
 GTCAGTTTCTAGAAACGAGGAGGATTTGATATTGACGGTGCCGTTGGAGACGCCTTTCATGAGCCCTCGTCCATCTGGTCAG
 AAAAGACGATCTTTTTGTTGTGAGCTTGGTGGCGAAGGAGCCGTAGAGGGCGTGGAGAGGAGCTTGGCGATGGAGCGCA
 TGGTCTGGTTCTTTCTTGTGCGCGCGCTCCTTGGCGCGATGTTGAGCTGCACGTAAGTCCGCGCCACGCACTTCCATTGCG
 GGAAGACGGTGGTGTGCTCGTGGGCACGATTCTGACCCGCCAGCCGCGTGTGTCAGGGTGATGAGGTCCACGCTGGTGG
 CCACCTCGCCGCGCAGGGGCTCGTTGGTCCAGCAGAGGCGCCGCCCTTGCAGCAGCAGAGGGGGGACGCGGGTCCAGCA
 TGAGCTCGTGGGGGGGTGCGCGTCCACGGTGAAGATGCCGGGCGAAGCTCGGGGTGCAAGTAGCTGATGCAGGTGTCCA
 GATCGTCCAGCGCCGCTTGCCAGTCCGCGACGGCCAGCGCGCTCGTAGGGGTGAGGGGCGTGCCCCAGGGCATGGGGT
 GCGTGAGCGCGGAGGCGTACATGCCGAGATGTGCTAGACGTAGAGGGGCTCCTCGAGGACGCCGATGTAGGTGGGGTAGC
 AGCGCCCCCGCGGATGCTGGCGCGCACGTAGTGTACAGCTCGTGCAGGGGCGGAGGAGCCCCGTGCCGAGGTTGGAGC
 GTTGGCGCTTTTTCGCGCGGTAGACGATCTGGCGGAAGATGGCGTGGGAGTTGGAGGAGATGGTGGGCCTCTGGAAGATGT
 TGAAGTGGGCGTGGGGCAGGCCGACCGAGTCCCTGATGAAGTGGGCGTAGGAGTCTGACGCTTGGCGACGAGCTCGGCGG
 TGACGAGGACGTCCAGGGCGCAGTAGTCGAGGGTCTCTGGATGATGTGTAAGTGGGCTGAGCTGGCCCTTCTGCTTCCACAGCTCG
 CGGTTGAGAAGGAACCTTTCGCGGTCTTCCAGTACTTTCGAGGGGGAACCCGTCTGATCGGCACGGTAAGAGCCACCAT
 GTAGAAGTGGTTGACGGCCTTGTAGGCGCAGAGCCCTTCTCCAGGGGAGGGCGTAAGCTTGTGCGGCCTTGCAGGGGAG
 GTGTGGGTGAGGGCGAAGGTGTGCGCGACCATGACCTTGAGGAAGTGGTGTGAGTGTGAGGTGCTGCGAGCCGCCCTGCT
 CCCAGAGCTGGAAGTCCGTGCGCTTCTGTAGGCGGGGTGGGCAAAGCGAAAGTAACATCGTTGAAGAGGATCTTGCCCGC
 GCGGGGCATGAAGTGTGAGTGTGCGGAAAGGTGGGGCACCTCGGCCCGGTTGTTGATGACCTGGGCGGCGAGGACGAT
 CTCGTGGAAGCCGTTGATGTTGTGCCCCACGATGTAGAGTTCCACGAATCGCGGGCGGCCCTTAACGTGGGGCAGCTTCTTGA
 GCTCGTGTAGGTGAGCTCGGCGGGGTGCTGAGCCCGTGTGCTCGAGGGGCCAGTGGGCGACGTGGGGGTTGGCGCTGA
 GGAAGGAAGTCCAGAGATCCACGGCCAGGGCGGTCTGCAAGCGGTCCCGGTAAGTGTGAGGAACTGCTGGCCACGGCCATTTT

TCGGGGGGTGACGACAGTGAAGAGTGGCGGGGTCGCCGTGCCACGCGTCCCACTTGAGCTGGAGGGCGAGGTCGTGGGCGA
 GCTCGACGAGCGGCGGGTCCCGGAGAGTTTCATGACCAGCATGAAGGGGACGAGCTGCTTGCCGAAGGACCCCATCCAGGT
 GTAGGTTTTCCACATCGTAGGTGAGGAAGAGCCTTTGCGTGCGAGGATGCGAGCCGATGGGGAAGAACTGGATCTCCTGCCAC
 CAGTTGGAGGAATGGCTGTTGATGTGATGGAAGTAGAAATGCCGACGGCGCGCCGAGCACTCGTGCTTGTTTATACAAGC
 GTCCGCAGTGCTCGCAACGCTGCACGGGATGCACGTGCTGCACGAGCTGTACCTGGGTTCTTTGACGAGGAATTTCACTGGG
 CAGTGGAGCGCTGGCGGCTGCATCTGGTGCTGTACTACGTCTGGCCATCGGCGTGGCCATCGTCTGCCTCGATGGTGGTCAT
 GCTGACGAGCCCGCGCGGGAGGCAGGTCCAGACTTCGGCTCGGACGGGTCGGAGAGCGAGGACGAGGGGCGCGCAGGCCGG
 AGCTGTCCAGGGTCTGAGACGCTGCGGAGTCAGGTCACTGGGCGAGCGGCGCGCGGTTGACTTGACGAGAGCTTTCCAG
 GGCGCGCGGGAGGTCCAGATGGTACTTGATCTCCACGGCGCCGTTGGTGGCGACGTCCACGGCTTGACAGGGTCCCGTGCCCC
 TGGGGCGCCACCACCGTGCCCCGTTTCTTCTTGGGCGCTGCTTCCATGCCGGTCAGAAGCGGCGGCGAGGACGCGCGCCGGG
 CGGCAGGGGCGGCTCGGGACCCGGAGGCGAGGGGCGGCAGGGGACGTCGGCGCCGCGCGCGGGCAGGTTCTGGTACTGCG
 CCCGAGAAGACTGGCGTGAGCGACGACGCGACGGTTGACGTCTGGATCTGACGCTCTGGGTGAAGGCCACGGGACCCG
 TGAGTTTGAACCTGAAAGAGAGTTCGACAGAATCAATCTCGGTATCGTTGACGGCGGCTGCGCGAGGATCTCTGACGTCG
 CCCGAGTTGTCTGGTAGGCGATCTCGGTATGAAGTCTCGATCTCTCTCTGAAGGTCTCCGCGGCGGCGCGCTCGAC
 GGTGGCCGCGAGGTCTTGAGATGCGGCCATGAGCTGCGAGAAGGCGTTCATGCCGGCCTCGTTCCAGACGCGGCTGTA
 GACCACGGCTCCGTGCGGGTGCAGCGCGCGCATGACCACCTGGGCGAGGTTGAGCTCGACGTGGCGCGTGAAGACCGCGTA
 GTTGACAGAGGCGCTGGTAGAGGTAGTTGAGCGTGGTGGCGATGTGCTCGGTGACGAAGAAGTACATGATCCAGCGCGGAG
 CGGCATCTCGTGACGTGCGCCAGGGCTTCAAGCGCTCCATGGCCTCGTAGAAGTCCACGGCGAAGTTGAAAACTGGGAG
 TTGCGCGCCGAGACGGTCAACTCTCTCCAGAAGACGGATGAGCTCAGCGATGGTGGCGCGCACCTCGCGCTCGAAGGCC
 CGGGGGGCTCCTCTTCTCCATCTCTCTCTCCACTAACATCTCTTCTACTTCTCTCAGGAGGCGGCGGGGGAGGGG
 CCTGCGTGC CGCGCGGCGCACGGGCGAGCGGTGATGAAGCGCTCGATGGTCTCCCGCGCGGCGACGCATGGTCTCGGT
 GACGGCGCGCCCCTCTCGCGGGGCGCAGCGTGAAGACCGCGCGCATCTCCAGGTGGCCGCGGGGGGGTCTCCGT
 GGGCAGGGAGAGGGCGCTGACGATGCATCTTATCAATTGCCCCGATAGGACTCCGCGCAAGGACCTGAGCGTCTCGAGATCC
 ACGGATCCGAAAACCGCTGAACGAAGGCTTCGAGCCAGTCGAGTCGCAAGGTAGGCTGAGCCCGGTTTCTGTTCTTCG
 GGATTTGGGAGGCGGGCGGGCGATGCTGCTGGTGATGAAGTTGAAGTAGGCGTCTGAGACGGCGGATGGTGGCGAGG
 AGCACCAGGTCTTGCGCCGGCTTGTGGATGCGCAGACGGTCGGCCATGCCAGGCGTGGTCTGACACCTGGCGAGGT
 CTTGTAGTAGTCTGATGAGCCGCTCCACGGGCACCTCTCTCGCCGCGCGGCGCTGATGCGCGTGAGCCGAACCCG
 CGTGGGGCTGGACGAGCGCCAGGTGCGCGACGACGCGCTCGGCGAGGATGGCCTGCTGTATCTGGGTGAGGGTGGTCTGG
 AAGTCGTGCAAGTCGACGAAGCGGTGGTAGGCTCCGGTGTGATGGTATAGGAGCAGTTGGCCATGACGGACCACTTGACG
 GTCTGGTGGCCGGTTCGACGAGCTCGTGGTACTTGAGGCGCGAGTAGGCGCGCTGTCGAAGATGTAGTCGTTGCAGGTG
 CGCAGAGGTACTGGTATCCGACGAGGAAGTGCAGCGCGGCGCTGGCGGTAGAGCGGCCATCGCTCGGTGGCGGGGGCGCC
 GGGCGCGAGGTCTCGAGCATGAGGCGGTGGTAGCCGTAGATGTAACCTGGACATCCAGGTGATGCCGGCGGCGGTGGTGA
 GGCGCGCGGAACTCGCGACGCGGTTCCAGATGTTGCGCAGCGGCAGGAAGTAGTTTCATGGTGGCCGCGGTCTGGCCGT
 GAGGCGCGCGCAGTCGTGGATGCTCTAGACATACGGGCAAAAACGAAGCGGTGAGCGGCTGACTCCGTGGCTGGAGGC
 TAAGCGAACGGGTTGGGCTGCGCGTGTACCCCGTTTGAATCTGAATCAGGCTGGAGCCGCGAGCTAACGTGGTACTGGC
 TCCGCTCTGACCCAAGCCTGCTAACGAACCTCCAGGATACGGAGGCGGGTCTTTTTTGGCCTTGGTGGTGGTATGAAA
 AACTAGTAAGCGCGAAAGCGACCGCCCGCATGGCTCGCTGCCGTAGTCTGGAGAAAGAAATCGCCAGGGTTGCGTTGCGGT
 GTCCCCCGTTTCGAGCTCAGCGCTCGGCGCGGCGGATTCCGCGGCTAACGTGGGCGTGGCTGCCCCGTCGTTTCAAGAC
 CCTTAGCCAGCCGACTTCTCCAGTTACGGAGCGAGCCCTCTTTTTCTGTGTTTTTGCAGATGCATCCCGTACTGCGGCAGA
 TCGCCCCCACCCTCCACCTCAACCGCCCCCTACCGCCGCGAGCAGCAGCAACAGCCGCGCTTCTGCCCCGCCCCAGCAGCAGC
 CAGCCACTACCGCGGCGGCGCCGTGAGCGGAGCCGGCGTTCAATGACCTGGCCTTGAAGAGGGCGAGGGGCTGGCGC
 GGCTGGGGGCGTCTGCGCGGAGCGGCACCCGCGCTGCAGATGAAAAGGGACGCTCGCGAGGCCTACGTGCCAAGCAGA
 ACCTGTTTCAGAGACAGGAGCGGCGAGGAGCCCGAGGAGATGCGCGCCTCCGCTTCCACGCGGGGCGGGAGCTGCGGCGCG
 GCCTGGACCGAAAGCGGGTGTGAGGGACGAGGATTTGAGGCGGACGAGCTGACGGGGATCAGCCCCGCGCGCGCGCAC
 GTGGCCGCGGCCAACCTGGTACGCGGTACGAGCAGACCGTGAAGGAGGAGAGCAACTTCAAAAATCTTCAACAACCACG
 TCGCACGCTGATCGCGCGGAGGAGGTGACCCTGGGCTGATGCACCTGTGGGACCTGCTGGAGGCCATCGTGAGAACC
 CAGGACGAAGCCGCTGACGGCGCAGCTGTTTCTGGTGGTGCAGCACAGTCGGGACAACGAGACGTTACAGGAGGCGCTGCT
 GAATATCACCGAGCCCGAGGGCGGCTGGCTCTGGACCTGGTGAACATTCTGCAGAGCATCGTGGTGCAGGAGCGCGGGCTG
 CCGCTGTCCGAGAAGCTGGCGGCTATCAACTTCTCGGTGCTGAGCTGGGCAAGTACTACGCTAGGAAGATCTACAAGACCC
 GTACGTGCCATAGACAAGGAGGTGAAGATCGACGGGTTTTACATGCGCATGACCCTGAAAGTGTGACCCTGAGCGACGAT
 CTGGGGGTGTACCGCAACGACAGGATGCACCGCGGGTGAGCGCCAGCGCGGCGCGAGCTGAGCGACCAAGGAGCTGATG

Fig. 23D

CACAGCCTGCAGCGGGCCCTGACCGGGGCCGGGACCGAGGGGGAGAGCTACTTTGACATGGGCGCGGACCTGCGCTGGCAG
CCCAGCCGCCGGGCTTGGAAGCTGCCGGCGGTTCCCCCTACGTGGAGGAGGTGGACGATGAGGAGGAGGAGGGCGAGTAC
CTGGAAGACTGATGGCGCGACCGTATTTTTGCTAGATGCAGCAACAGCCACCGCCTCTGATCCCGCGATGCGGGCGGCGCTG
CAGAGCCAGCCGTCCGGCATTAACTCCTCGGACGATTGGACCCAGGCCATGCAACGCATCATGGCGCTGACGACCCGCAATCC
CGAAGCCTTTAGACAGCAGCCTCAGGCCAACCGGCTCTCGGCCATCCTGGAGGCCGTGGTGCCCTCGCGCTCGAACCCACGC
ACGAGAAGGTGCTGGCCATCGTGAACGCGCTGGTGGAGAACAAGGCCATCCGCGGCGACGAGGCCGGGCTGGTGTACAACG
CGTGCTGGAGCGCGTGGCCGCTACAACAGCACCAACGTGCAGACGAACCTGGACCGCATGGTGACCGACGTGCGCGAGG
CGGTGTGCGAGCGCGAGCGGTTCCACCGCGAGTGAACCTGGGCTCCATGGTGGCGCTGAACGCCTTCTGAGCACGCAGCC
CGCCAACGTGCCCCGGGGCCAGGAGGACTACACCACTTCATCAGCGCGCTGCGGCTGATGGTGGCCGAGGTGCCCCAGAGC
GAGGTGTACCAAGTCGGGGCCGGACTACTTCTCCAGACAGTCGCCAGGGCTTCAGACCCGTGAACCTGAGCCAGGCTTTCAA
GAACCTGCAGGGACTGTGGGGCGTGACGGCCCCGTGCGGGACCGCGCGACGGTGTGAGCCTGCTGACGCCGAACCTCGCG
CCTGCTGCTGCTGCTGGTGGCGCCCTTCACGGACAGCGGCAGCGTGAGCCGCGACTCGTACCTGGGCTACCTGCTTAACCTGT
ACCGCGAGGGCCATCGGGCAGGCGCACGTGGACGAGCAGACCTACCAGGAGATACCCACGTGAGCCGCGCGCTGGGCCAGG
AGGACCCGGGCAACCTGGAGGGCCACCTGAACCTTCTGCTGACCAACCGGTGCGAGAAGATCCCGCCCCAGTACGCGCTGAG
CACCGAGGAGGAGCGCATCCTGCGCTACGTGCAGCAGAGCGTGGGGCTGTTCTGATGCAGGAGGGGGCCACGCCAGCGC
CGCGCTCGACATGACCGCGCGCAACATGGAGCCAGCATGTACGCTCGCAACCGCCGTTTCATCAATAAGCTGATGGACTACT
TGCATCGGGCGGCCCATGAACCTGGACTACTTTACCAACGCCATCTTGAACCCGCACTGGCTCCCGCCGCCGGGTTCTACA
CGGGCGAGTACGACATGCCGACCCCAACGACGGGTTCTGTGGGACGACGTGGACAGCAGCGTGTCTCGCCGCGCCCCGC
CACCAACGTGTGGAAGAAAGAGGGCGGGGACCGCGCGCCGTCTCGCGCTGTCCGGTTCGCGCGGGTGTGCGCGCGCGGT
GCCTGAGGCCGCCAGCCCTTCCCGAGCCTGCCCTTTGCTGAACAGCGTGCGCAGCAGCGAGCTGGGTGCGCTGACGCGG
CCGCGCTGCTGGGCGAGGAGGAGTACCTGAACGACTCCTTGTGAGGCCCGAGCGCGAGAAGAACTTCCCAATAACGGGA
TAGAGAGCCTGGTGGACAAGATGAGCCGCTGGAAGACGTACGCGCACGAGCACAGGGACGAGCCCCGAGCTAGCAGCAGCG
CAGGCACCCGTAGACGCCAGCGACACGACAGGCAGCGGGGTCTGGTGTGGGACGATGAGGATTCCGCCGACGACAGCAGCG
TGTTGGACTTGGGTGGGAGTGGTGGTGAACCGTTGCTCACTTGCGCCCCGTATCGGGCGCCTGATGTAAGAATCTGAA
AAAATAAAAAACGGTACTCACCAAGGCCATGGCGACACGCGTGCGTTCTTCTGTTGTTGTAGTAGTATGATGAGGCGCGT
GTACCCCGAGGGTCTCTCCCTCGTACGAGAGCGTGATGCAGCAGGCGGTGGCGGCGCGCATGCAGCCCCGCTGGAGGC
GCCTTACGTGCCCCCGCGGTACCTGGCGCTACGGAGGGGCGGAACAGCATTGTTACTCGGAGCTGGCACCTTGTACGATA
CCACCCGTTGTACCTGGTGGACAACAAGTCGGCGGACATCGCCTCGCTGAACTACCAGAACGACCACAGCAACTTCTGACC
ACCGTGGTGCAGAACAACGATTTACCCCCACGGAGGCCAGCACCCAGACCATCAACTTTGACGAGCGCTCGCGGTGGGGCG
GCCAGCTGAAAACCATCATGCACACCAACATGCCAACGTGAACGAGTTCTGTACAGCAACAAGTTCAAGGCGCGGGTGAT
GGTCTCGCGCAAGACCCCAATGGGGTTCGCGGTGGATGAGAATTATGATGGTAGTCAGGACGAGCTGACTTACGAGTGGGTG
GAGTTTGAGCTGCCGAGGGGCAACTTCTCGGTGACCATGACCATCGATCTGATGAACAACGCCATCATCGACAATACTTGGC
GGTGGGGCGTCAAGACGGGGTGTGGAGAGCGACATCGGCGTGAAGTTCGACACGCGCAACTTCCGGCTGGGCTGGGACCC
CGTGACCGAGCTGGTGTGCGGGCGGTGTACACCAACGAGGCCTTCCACCCCGACATCGTCTGCTGCCCCGCTGCGGCGTG
GACTTACCGAGAGCCGCTCAGCAACCTGCTGGGCATCCGCAAGCGGCAGCCCTTCCAGGAGGGCTTCCAGATCCTGTACGA
GGACCTGGAGGGGGGCAACATCCCCGCGCTCTTGATGTGGAAGCCTATGAGAAAAGCAAGGAGGAGGCCGCCGAGCGGC
GACCGCAGCCGTGGCCACCGCCTTACCGAGGTGCGGGGCGATAATTTGCTAGCGCCGCGGCACTGGCCGAGGCGGCTGAA
ACCGAAAGTAAGATAGTCATCCAGCCGGTGGAGAAGGACAGCAAGGACAGGAGCTACAACGTGCTCGCGGACAAGAAAAAC
ACCGCCTACCGCAGCTGGTACCTGGCTACAACCTACGGCGACCCCGAGAAGGGCGTGCGCTCCTGGACGTGCTCACCACCTC
GGACGTACCTGCGGCGTGGAGCAAGTCTACTGGTTCGCTGCCCCGACATGATGCAAGACCCGGTCACTTCCGCTCCACGCGTC
AAGTTAGCAACTACCCGGTGGTGGGCGCCGAGCTCCTGCCGCTACTCCAAGAGCTTCTTAACGAGCAGGCGCTACTCG
CAGCAGCTGCGCGCCTTACCTCGTCAACGACGTCTTCAACCGCTTCCCGAGAACCAGATCCTCGTCCGCCCGCCGCGCCC
ACCATTACCACCGTCAGTGAACGTTCTGCTCTACAGATCACGGGACCTGCCGCTGCGCAGCAGTATCCGGGGAGTCCA
GCGCGTGACCGTCACTGACGCCAGACGCCGACCTGCCCTACGTCTACAAGGCCCTGGGCGTAGTCGCGCGCGCGCTCTCT
CGAGCCGCACCTTCTAAAAAATGTCCATTCTCATCTCGCCAGTAATAACACCGGTTGGGGCCTGCGCGCGCCAGCAAGATGT
ACGGAGGCGCTCGCAACGCTCCACGCAACACCCCGTGCGCGTGCGCGGGCACTTCCGCGCTCCCTGGGGCGCCCTCAAGGG
CCGCGTGCGCTCGCGCACCAACGTCGACGACGTGATCGACAGGTGGTGGCCGACGCGCGCAACTACACGCCCGCCGCGCG
CCCGCCTCCACCGTGAGCGCGTATCGACAGCGTGGTGGCCGATGCGCGCGGTTACGCCCGCGCAAGAGCCGGCGGCGGC
GCATCGCCCCGCGGACCCGAGCACCCCGCCATGCGCGCGGCGCGAGCCTTGTGCGCAGGGCCAGGCGCACGGGACGCA
GGGCCATGCTCAGGGCGGCCAGACGCGCGGCCCTCCGGCAGCAGCAGCGCGGCGAGGACCCGAGACGCGCGGCCACGGCG
GCGGCGGCGGCCATCGCCAGCATGTCCCGCCCGCGGCGCGGCAACGTGTACTGGGTGCGCGACGCGGCCACCGGTGTGCGC

Fig. 23E

GTGCCC GTGCGACCCGCCCCCTCGCACTTGAAGATGCTGACTTCGCGATGTTGATGTGTCCAGCGGCGAGGAGGATGTCC
 AAGCGCAAATACAAGGAAGAGATGCTCCAGGTCATCGCGCTGAGATCTACGGCCCCGCGTGAAGGAGGAAAGAAAGCCC
 CGCAAACCTGAAGCGGGTCAAAAAGGACAAAAAGGAGGAGGAAGATGTGGACGGAAGTGGTGGAGTTTGTGCGCGAGTTTCG
 CCCCCGGCGGCGCGTGCAGTGGCGCGGGCGGAAAGTGAAACCGGTGCTGCGGCCGCGCACCAGGTGGTCTTACGCCCGG
 CGAGCGTTCCGGCTCCGCTCCAAGCGCTCCTACGACGAGGTGTACGGGGACGAGGACATCCTCGAGCAGGCGGTGCGAGCGT
 CTGGGCGAGTTTGTCTACGGCAAGCGCAGCCGCCCCGCGCCCTTGAAGAGGAGGCGGTGTCCATCCCGCTGGACCACGGCA
 ACCCCACGCCGAGCCTGAAGCGGTGACCTGACGAGGTGCTGCCGAGCGCGCGCGCGCGGGGCTTCAAGCGCGAGG
 GCGGCGAGGATCTGTACCCGACCATGCAGCTGATGGTGCCAAGCGCCAGAAGCTGGAGGACGTGCTGGAGCACATGAAGG
 TGGACCCCGAGGTGCAGCCGAGGTCAAGGTGCGGCCATCAAGCAGGTGGCCCCGGGCTGGGCGTGCAGACCGTGGACA
 TCAAGATCCCCACGGAGCCCATGGAACGCAGACCGAGCCCGTGAAGCCAGCACCAGCACCATGGAGGTGCAGACGGATCC
 CTGGATGCCGGCGCGGCTTCCACCACTCGCCGAAGACGCAAGTACGGCGCGGCCAGCCTGCTGATGCCAACTACGCGCTG
 CATCCTTCCATCATCCCCACGCCGGGCTACCGCGGCACGCGCTTCTACCGCGGCTACACCAGCAGCCGCCGCAAGACCACC
 CGCCGCCGCGTGTGCGACCCGCCGCGCAGCAGCACCAGCGACTTCCGCCGCCGCTTGGTGGGAGAGTGTACCGCAGCGGGC
 GCGAGCCTCTGACCTGCGCGCGCGCGCTACCACCCGAGCATCGCCATTAACTCTGCCGTCGCTCCTACTTGCAGATATGG
 CCTCACATGCCGCTCCGCTCCCCATTACGGGCTACCGAGGAAGAAAGCCGCGCGTAGAAGGCTGACGGGGAACGGGCT
 GCGTCGCCATCACACCGGCGGCGGCGGCCATCAGCAAGCGGTTGGGGGAGGCTTCTGCCGCGCTGATCCCCATCATC
 GCCGCGCGATCGGGCGATCCCCGCATAGCTTCGTGGCGGTGCAGGCCTCTCAGCGCCACTGAGACACAGTTGAAAA
 TTTGTAATAAAAAAATGGAAGTACGCTCCTGGTCTGTGATGTGTGTTTTAGATGGAAGACATCAATTTTTCTGCCCTGGCAC
 CGCGACACGGCAGCGGCGGCTTATGGGCACCTGGAGCGACATCGGCAACAGCCAAGTGAACGGGGCGCCTTCAATTGGAG
 CAGTCTCTGGAGCGGGCTTAAGAATTCGGGTCCACGCTCAAAACCTATGGCAACAAGGCGTGAACAGCAGCACAGGGCAG
 GCGCTGAGGGAAGGCTGAAGAGCAGAACTTCCAGCAGAAAGTGGTTCGATGGCCTGGCTCGGGCATCAACGGGGTGGTG
 GACCTGGCAACCAGGCGCTGCAGAAACAGATCAACAGCCGCTGGACGCGGTCCCGCCGCGGGGTCCGTGGAGATGCCCC
 AGGTGGAGGAGGAGTGCCTCCCTGGACAAGCGCGGCGACAAGCGACCGCGTCCCGACGCGGAGGAGACGCTGCTGACGC
 ACACGGACGAGCCGCCCCGTACGAGGAGGCGGTGAACTGGGTCTGCCACCACGCGGCCGTGGCGCCTCTGGCCACCGG
 GGTGCTGAAACCCAGCAGCAGCAGCCAGCCGCGACCTGGACTTGCTCCGCTGCTTCCCGCCCTCCACAGTGGCTAAGC
 CCTGCGCGCGGTGGCGTGCCTGCGCGCGCCCCGAGGCGCCCCAGGCGAACTGGCAGAGCACTCTGAACAGCATCGT
 GGGTCTGGGAGTGCAGAGTGTGAAGCGCGCGCTGCTATTAAAGACACTGTAGCGCTTAACTTGCTTGTCTGTGTATAT
 GTATGTCGCGGACCAAGAAGGAGGAAGAGGCGCGTGCCTGAGTTGCAAGATGGCCACCCATCGATGCTGCCCCAGTGGG
 GTACATGCACATCGCCGACAGGACGCTTCGAGTACCTGAGTCCGGGTCTGGTGCAGTTGCCCGCGCCACAGACACCTACT
 TCAGTCTGGGGAACAAGTTAGGAACCCACGGTGGCGCCACGCACGATGTGACCACCGACCGCAGCCAGCGGCTGACGCT
 GCGCTTCTGTCGGTGGACCGCAGGACAACACCTACTCGTACAAAGTGCCTACACGCTGGCGTGGGCGACAACCGCTG
 CTGGACATGGCCAGCACCTACTTTGACATCCGCGCGTGTGGATCGGGGGCCAGCTTCAAACCTACTCCGGCACCGCTA
 CAACAGCCTGGCTCCAAGGGAGCGCCCAACACTTGCCAGTGGACATATAAAGCTGGTGATACTGATACAGAAAAACCTATA
 CATATGGAATGCACCTGTGCAAGGCATTAGCATTACAAAGGATGGTATTCAACTTGGAAGTACAGCGATGGTCAGGCAATC
 TATGCAGACGAACTTATCAACCAGAGCCTCAAGTGGGTGATGCTGAATGGCATGACATCACTGGTACTGATGAAAAATATGG
 AGGCAGAGCTCTTAAGCTGACACCAAAATGAAGCCTTGCTATGGTTCTTTGCCAAGCCTACCAATAAAGAAGGAGGCCAGG
 CAAATGTGAAAACCGAAACAGGCGGTACCAAGAATATGACATTGACATGGCATTCTTCGATAATCGAAGTGCAGCTGCCGCC
 GGCCTAGCCCCAGAAATTGTTTTGTATACTGAGAATGTGGATCTGGAAGTCCAGATACCCATATTGTATACAAGGAGGTAC
 AGATGACAGTAGCTCTTATCAATTTGGGTGAGCAGTCCATGCCAACAGACCCAACTACATTGGCTTCAGAGACAACCTTAT
 CGGTCTGATGTACTACAACAGCACTGGCAATATGGGTGACTGGCTGGACAGGCCTCCAGCTGAATGCTGTGGTGGACTTGC
 AGGACAGAAACACCGAACTGTCTACAGCTCTTGCTGACTCTGGGTGACAGAACCAGGTATTTAGTATGTGGAATCAG
 GCGGTGGACAGTTATGACCCGATGTGCGCATTATTGAAAATCACGGTGTGGAGGATGAACTTCTAACTATTGCTTCCCCCTG
 GATGCTGTGGGTAGAAGTACTTACCAGGGAATTAAGGCCAATGGTGATAATCAAACCACTGGACCAAGATGATACTGT
 TAATGATGCTAATGAATTGGGCAAGGGCAATCTTTGCCATGGAGATCAACATCCAGGCCAACCTGTGGCGGAACCTCCTCT
 ACGCGAACGTGGCGCTGTACCTGCCGACTCCTACAAGTACACGCGCGCAACATCACGCTGCCACCAACACCAACACCTAC
 GATTACATGAACGGCGCGTGGTGGCGCCCTCGCTGGTGGACGCTACATCAACATCGGGGCGCGTGGTGGTGGACCCCA
 TGGACAACGTCAACCCCTTCAACCACACCGCAACGCGGCCCTGCGATACCGCTCCATGCTCCTGGGCAACGGGCGCTACGTG
 CCCTTCCACATCCAGGTGCCCCAAAAGTTTTCGCCATCAAGAGCCTCCTGCTCCTGCCCGGTCTACACCTACGAGTGGAACT
 TCCGCAAGGACGTCAACATGATCCTGCAGAGCTCCTCGGCAACGACCTGCGCACGGACGGGGCTCCATCGCCTTACCAGC
 ATCAACCTCTACGCCACCTTCTCCCATGGCGCACAACACCGCTCCACGCTCGAGGCCATGCTGCGCAACGACCAACGAC
 CAGTCTTCAACGACTACCTCTCGGCGGCCAATGCTCTACCCATCCCGGCCAACGCCACCAACGTCGCCATCTCCATCCCT

Fig. 23F

CGCGCAACTGGGCCGCTTCCGCGGCTGGTCCTTACGCGCCTCAAGACCCGCGAGACGCCCTCGCTCGGCTCCGGGTTCGAC
CCCTACTTCGTCTACTCGGGCTCCATCCCCTACCTCGACGGCACCTTCTACCTCAACCACACCTTCAAGAAGGTCTCCATCACCTT
CGACTCCTCCGTAGCTGGCCCCGCAACGACCGCCTCTGACGCCAACGAGTTTCAAATCAAGCGCACCGTCGACGGAGAG
GGGTACAACGTGGCCAGTGCAACATGACCAAGGACTGGTTCCTGGTCCAGATGCTGGCCCACTACAACATCGGCTACCAGG
GCTTCTACGTGCCCCGAGGGCTACAAGGACCGCATGTACTCTTCTCCGCAACTTCCAGCCCATGAGCCGCCAGGTCTGGAC
GAGGTCAACTACAAGGACTACCAGGCCGTACCCTGGCTACCAGCACAACAACCTCGGGCTTCGTGGCTACCTCGCGCCAC
CATGCGCCAGGGCCAGCCCTACCCGCCAACTACCCCTACCCGCTCATCGGCAAGAGCGCGCTCGCCAGCGTCACCCAGAAAA
AGTTCCTCTGCGACCGGGTCATGTGGCGCATCCCCTTCTCCAGCAACTTCATGTCCATGGGCGCGCTCACCGACCTCGGCCAGA
ACATGCTCTACGCCAACTCCGCCACGCGCTAGACATGAATTCGAAGTCGACCCCATGGATGAGTCCACCTTCTCTATGTTGT
CTTCGAAGTCTTCGACGTCTGCGAGTGCACAGCCCCACGCGGCGTCATCGAGGCGCTTACCTGCGCACGCCCTTCTCGGC
CGGCAACGCCACCACCTAAGCCTCTTGCTTCTTGAAGATGACGGCTGCGCGGGCTCCGGCGAGCAGGAGCTCAGGGCCATC
CTCCGCGACCTGGGCTGCGGGCCCTGCTTCTGGGCACCTTCGACAAGCGCTTCCGGGATTTCATGGCCCCGACAAGCTGGC
CTGCGCCATCGTCAACACGGCCGGCCGCGAGACCGGGGGCGAGCACTGGCTGGCCTTCGCTGGAACCCGCGCTCCACACC
TGCTACCTCTTCGACCCCTTCGGGTTCTCGGACGAGCGCCTCAAGCAGATCTACCAGTTCGAGTACGAGGGCCTGCTGCGTCGC
AGCGCCTGGCCACCGAGGACCGCTGCGTCACCCTGGAAGTCCACCCAGACCGTCGAGGGTCCGCGCTCGGCCGCTGCG
GGCTCTTCTGCTGCATGTTCTGACGCCTTCGTGCACTGGCCGACCGCCCCATGGACAAGAACCCACCATGAACCTGCTGA
CGGGGTGCCAACGGCATGCTCCAGTCGCCCAGGTGGAACCCACCTGCGCCGAACAGGAGGCGCTTACCGCTTCTC
AACGCCCACTCCGCTACTTTCGCTCCACCGCGCGCATCGAGAAGGCCACCGCTTCGACCGCATGAATCAAGACATGTAA
TCCGGTGTGTATGTGAATGCTTTATTCATATAATAAACAGCACATGTTTATGCCACCTTCTCTGAGGCTCTGACTTTATTA
GAAATCGAAGGGGTTCTGCCGGCTCTCGGCATGGCCCCGCGGCGAGGATACGTTGCGGAAGTGGTACTTGGGCAGCCACTTG
AACTCGGGGATCAGCAGCTTCGGCACGGGGAGGTGCGGGAACGAGTCGCTCCACAGCTTGCAGCTGAGTTGCAGGGCGCCC
AGCAGGTCGGGCGCGGAGATCTTGAATCGCAGTTGGGACCCGCGTTCTGCGCGGAGAGTTACGGTACACGGGGTTGCAG
CACTGGAACACCATCAGGGCCGGGTGCTTCACGCTCGCCAGACCGTCGCGTCGGTGATGCCCTCCAGTCCAGATCCTCGGC
GTTGGCCATCCGAAGGGGGTCATCTTGCAAGTCTGCCGCCCATGCTGGGCACGCAGCCGGGCTTGTGGTTGCAATCGCAGT
GCAGGGGGATCAGCATCATCTGGGCGCTGCTCGGAGCTCATGCCCGGTACATGGCCTTCATGAAAGCCTCCAGCTGGCGGAA
GGCCTGCTGCGCCTTGCCGCCCTCGGTGAAGAAGACCCCGCAGGACTTGCTAGAGAACTGGTTGGTGGCGCAGCCAGCGTCG
TGACGCAGCAGCGCGCGTCTGTTGGCCAGCTGCACCACGCTGCGCCCCCAGCGTTCTGGGTGATCTTGGCCCGGTGCG
GGTCTCTCTCAGCGCGCGTGGCGTTCTCGCTCGCCACATCCATCTCGATCGTGTGCTCCTTCTGGATCATCAGGTCCCGTG
CAGGCACCGCAGCTTGCCCTCGGCCTCGGTGCAACCGTGCAGCCACAGCGCGCAGCCGGTGCTCTCCAGTTCTTGTGGGCGA
TCTGGGAGTGCGAGTGCAGGAAGCCCTGCAGGAAGCGGCCCATCATCGTGGTCAGGGTCTTGTGCTGGTGAAGGTGAGCGG
AATGCCGCGGTGCTCCTGTTACATACAGGTGGCAGATACGGCGGTACACCTCGCCCTGCTCGGGCATCAGCTGGAAGGCG
GACTTCAGGTGCTCTCCACGCGGTACCGGTCCATCAGCAGCGTCATCACTTCATGCCCTTCTCCAGGCCGAACGATCGGC
AGGCTCAGGGGGTTCTTACCGTTGTCATCTTAGTCGCGCGCGCCGAAGTCAGGGGGTCTTCTCGTCCAGGGTCTCAAACAC
TCGCTTGCCGTCCTTCTCGGTGATGCGCACGGGGGAAAGCTGAAGCCACGGCCGCAAGCTCCTCCTCGGCCTGCCTTTCGT
CCTCGTGTCTGGCTGATGTCTTCAAAGGCACATGCTTGGTCTTGCGGGGTTTCTTTTGGGCGGCAGAGGCGCGCGCGGA
GACGTGCTGGGCGAGCGCGAGTTCTCGCTCACCACGACTATTTCTTCTCCTTGGCCGTCGTCGAGACCACGCGCGGTAGGC
ATGCTCTTCTGGGGCAGAGGCGGAGGCGACGGGCTCTCGCGGTTGCGGGGCGGTGGCAGAGCCCTTCCGCGTTCGGG
GGTGGCTCTGCGCGGCGTCTGCTGACTGACTTCTCCGCGGCCGCGCATTGTGTTCTCTAGGGAGCAAGCATGGAGACTC
AGCCATCGTCGCCAACATCGCCATCTGCCCCCGCCCGCCGACGAGAACCAGCAGCAGCAGAATGAAAGCTTAACCGCCCCG
CCGCCAGCCCCACCTCCGACGCCGACGCCAGACATGCAAGAGATGGAGGAATCCATCGAGATTGACCTGGGCTACGTGA
CGCCCGCGGAGCACGAGGAGGAGCTGGCAGCGCTTTTTCAGCCCCGAAGAGAACCACCAAGAGCAGCCAGAGCAGGAAG
CAGAGAGCGAGCAGAACCAGGTGGGCTCGAGCATGGCGACTACCTGAGCGGGGCGAGGACGTGCTCATCAAGCATCTGG
CCCGCAATGCATCATCGTCAAGGACGCGCTGCTGACCGCGCGGAGGTGCCCTCAGCGTGGCGGAGCTCAGCCGCGCTAC
GAGCGCAACCTCTTCTCGCGCGCGTGCCCCCAAGCGCCAGCCAAACGGCACCTGCGAGCCCAACCCGCGCTCAACTTCTAC
CCGGTCTTCGCGGTGCCCCGAGGCCCTGGCCACCTACCACCTCTTTTTCAAGAACCAAAGGATCCCGTCTCTGCGCGCCAAC
CGACCCCGCGCGACGCCCTGCTAACCTGGGCCCGCGCGCCGCTACCTGATATCGCCTCCTTGAAGAGGTTCCCAAGAT
CTTCGAGGGTCTGGGACGACGAGACTCGGGCCGCAACGCTCTGCAAGGAAGCGGAGAGGAGCATGAGCACCACAGCGC
CCTGGTGGAGTTGGAAGGCGACAACGCGCGCTGGCGGTCTCAAGCGCACGGTCGAGCTGACCACTTCGCTACCCGGCG
CTAACCTGCCCCCAAGGTCTGAGCGCCGTATGGACCAGGTGCTCATCAAGCGCGCCTCGCCCTCTCGGAGGAGGAGAT
GCAGGACCCCGAGAGCTCGGACGAGGGCAAGCCCGTGGTCAAGCAGCAGCAGCTGGCGCGCTGGCTGGGAGCGAGTAGCA
CCCCCAGAGCCTGGAAGAGCGGCGCAAGCTCATGATGGCGTGGTCTGGTGACCGTGGAGCTGGAGTGTCTGCGCGCTT

Fig. 23G

CTTCGCCGACGCGGAGACCCTGCGCAAGGTCGAGGAGAACCTGCACTACCTCTTCAGACACGGGTTCTGCGCCAGGCCTGC
AAGATCTCCAACGTGGAGCTGACCAACCTGGTCTCCTACATGGGCATCTGCACGAGAACCCTGGGGCAGAACGTGCTGCA
CACCACCCTGCGCGGGGAGGCCCGCCGCGACTACATCCGCGACTGCGTCTACCTGTACCTTGCCACACCTGGCAGACGGGCA
TGGGCGTGTGGCAGCAGTGCCTGGAGGAGCAGAACCTGAAAGAGCTCTGCAAGCTCCTGCAGAAGAACCTCAAGGCCCTGTG
GACCGGGTTCGACGAGCGCACCACCGCCGCGGACCTGGCCGACCTCATCTTCCCCGAGCGCCTGCGGCTGACGCTGCGCAAC
GGGCTGCCCAGCTTTATGAGCCAAAGCATGTTGCAAACTTTGCTCTTTTCATCCTCGAACGCTCCGGGATCTGCCCCCACC
TGCTCCGCGCTGCCCTCGACTTCGTGCCGCTGACCTTCCGCGAGTGCCCCCGCCGCTCTGGAGCCACTGCTACCTGCTGCGC
CTGGCCAACCTACCTGGCCTACCACTCGGACGTGATCGAGGACGTGACGGCGAGGGCCTGCTCGAGTGCCACTGCCGCTGCA
ACCTCTGCACGCCGACCGCTCCCTGGCCTGCAACCCCGAGCTGCTGAGCGAGACCCAGATCATCGGCACCTTCGAGTTGCAA
GGCCCCGCGAGGGCAAGGGGGGTCTGAACTCACCCGGGGCTGTGGACCTCGGCCTACTTCGCGCAAGTTCGTGCCCGAG
GACTACCATCCCTTCGAGATCAGTTCTACGAGGACCAATCCAGCCGCCAAGGCCGAGCTGTCGGCCTGCGTCATCACCCA
GGGGGCCATCTGGCCCAATTGCAAGCCATCCAGAAATCCCGCCAAGAATTTCTGCTGAAAAAGGGCCACGGGGTCTACTTGG
ACCCCCAGACCGGAGAGGAGCTCAACCCAGCTTCCCCAGGATGCCCCGAGGAAGCAGCAAGAAGCTGAAAGTGGAGCTGC
CGCGCCCGCCGAGGATTTGGAGGAAGACTGGGAGAGCAGTCAGGCAGAGGAGGAGGAGATGGAAGACTGGGACAGCACT
CAGGCAGAGGAGGACAGCCTGCAAGACAGTCTGGAGGAGGAAGACGAGGTGGAGGAGGCAGAGGAAGAAGCAGCCGCCG
CCAGACCGTCGTCCTCGCGGAGGAGGAGAAAGCAAGCAGCAGGATACCATCTCGCTCCGGGTGGGGTTCGCGCGGCC
GGGCCACAGTAGATGGGACGAGACCGGGCGCTTCCGAACCCACACCCAGACCGGTAAGAAGGAGCGGCAGGGATACA
AGTCTGGCGGGGGCACAAAAACGCCATCGTCTCCTGCTTGAAGCCTGCGGGGGCAACATCTCTTACCCGGCGCTACCTG
CTCTTCCACCGCGGGGTGAACCTTCCCCGCAACATCTTGCTTACTACCGTCACCTCCACAGCCCCCTACTACTGTTTCAAGAAG
AGGCAGAAACCCAGCAGCAGCAGCAGCAGCAGCAAAACCAGCGGCAGCAGCTAGAAAATCCACAGCGCGGCAGGTGGACT
GAGGATCGCGGCGAACGAGCCGGCGCAGACCCGGGAGCTGAGGAACCGGATCTTCCACCCTCTATGCCATCTTCAGCAG
AGTCGGGGGCAAGAGCAGGAACCTGAAAGTCAAGAACCGTTCTCTGCGCTCGCTCACCCGAGTTGTCTGTATCACAAGAGCG
AAGACCAACTTCAGCGCACTCTCGAGGACGCCGAGGCTCTTCAACAAGTACTGCGCGCTCACTCTTAAAGAGTAGCCCGCG
CCCGCCACACAGGAAAAAGGCGGGAATTACGTACACACCTGCGCCCTTCGCCCCGACCATCATGAGCAAAGAGATTCCC
ACGCTTACATGTGGAGCTACCAGCCCCAGATGGGCCTGGCCGCCGGCGCCGCCCCAGGACTACTCCACCCGCATGAAGTGGCT
CAGTGCCGGGCCCCGCGATGATCTACGGGTGAATGACATCCGCGCCACCGAAACCAGATACTCTAGAACAGTCAGCGATCA
CCGCCACGCCCCGCCATCACCTTAATCCGCGTAATTGGCCCGCCGCTGGTGTACCAGGAAATTCCCCAGCCACGACCGTAC
TACTTCCGCGAGACGCCAGGCCGAAGTCCAGCTGACTAACTCAGGTGTCCAGCTGGCCGGCGGCGCCGCTGTGTCTGTAC
CGCCCCGCTCAGGGTATAAGCGGCTGGTGTATCCGAGGCAGAGGCACACAGCTCAACGACGAGGTGGTGAGCTCTTCGCTGG
GTCTGCGACCTGACGGAGTCTTCAACTCGCCGATCGGGGAGATCTTCTTACGCCTCGTCAGGCCGTCTGACTTTGGAG
AGTTCGTCTCGCAGCCCCGCTCGGGTGGCATCGGCACTCTCCAGTTCGTGGAGGAGTTCACTCCCTCGGTCTACTTCAACCCC
TTCTCCGGCTCCCCCGGCACTACCCGACGAGTTCATCCGAACCTTCGACGCCATCAGCGAGTCGGTGACGGCTACGATTG
AATGTCCCATGGTGGCGCGGCTGACCTAGCTCGGCTTCGACACCTGGACCACTGCCGCCGCTTCCGCTGCTTCGCTCGGGATCT
CGCCGAGTTTGCCTACTTTGAGCTGCCCGAGGAGACCCCTCAGGGCCCGGCCACGGAGTGCGGATCGTCGTGCAAGGGGGT
CTCGACTCCACCTGCTTCGATCTTCAGCCAGCGTCCGATCCTGGCCGAGCGGAGCAAGGACAGACCCTTCTGACCTGTAC
TGCATCTGCAACACCCCGCCCTGCATGAAAGTCTTTGTTGTCTGTGTACTGAGTATAATAAAAGCTGAGATCAGCGACTA
CTCCGGAATTCGTTGTTCTGTATCAACAGTCCCTGTTCTTACCCGGAACGAGACCGAGCTCCAGTCCAGTGTAAGCC
CCACAAGAAGTACCTCACCTGGCTGTTCCAGGGCTCTCCGATCGCGTTGTCAACCACTGCGACAACGACGGAGTCTGTGTA
GCGGCCCTGCCAACCTTACTTTTCCACCCGAGAAAGCAAGCTCCAGCTCTTCAACCCCTCTCCCCGGGACCTATCAGTGCGT
CTCGGGACCCCTGCCATCACACCTTCCACCTGATCCGAATACCACAGCGTCGCTCCCCGCTACTAACAACCAAACTACCCACCA
CGCCACCGTCGCGACCGCGGACATGTACAGAGCTCGAGAAGTACTAGGCCACAATACATGCCATATTAGACTATGAGGCCGA
GCCACAGCGACCCATGCTCCCCGCTATTAGTTACTTCAATTAACCGCGGAGATGACTGACCACTGGCCAACAACAACGTCA
ACGACCTTCTCTGGACATGGACGGCCGCGCCTCGGAGCAGCGACTCGCCAACTTCGATTTCGCCAGCAGCAGGAGAGAGC
CGTCAAGGAGCTGAGGACGGCATAGCCATCCACAGTGCAAGAAAGGCATCTTCTGCTGGTGAAACAGGCCAAGATCTCC
TACGAGGTACCCCCGACCGACCATCGCCTCTCTACGAGCTCCTGCAGCAGCGCCAGAAGTTCACCTGCCTGGTGGAGTCAA
CCCCATCGTCATCACCCAGCAGTCGGGCGGATACCAAGGGGTGCATCCACTGCTCCTGCGACTCCCCGACTGCGTCCACACTCT
GATCAAGACCCCTGCGGCCTCCGCGACCTCTCCCCATGAACTAATCACCCCTTATCCAGTGAAATAAATATCATATTGATGA
TGATTTAAATAAAAAATAATCATTTGATTTGAAATAAAGATACAATCATATTGATGATTTGAGTTTAAAAAATAAAGAATCACT
TACTTGAAATCTGATACAGGTCTCTGTCCATGTTTTCTGCCAACACCACTCACTCCCCTCTCCAGCTCTGGTACTGCAGACC
CCGGCGGGCTGCAAACTTCTCCACACGCTGAAGGGGATGTCAAATTCCTCTGCTCCCTCAATCTTCATTTATCTTATCAGA
TGTCAAAAAGCGCGTCCGGGTGGATGATGACTTCGACCCGCTACCCCTACGATGCAGACAACGCACCGACCGTGCCTTC

Fig. 23H

ATCAACCCCCCTTCGTCTCTCAGATGGATTCCAAGAGAAGCCCCTGGGGGTGCTGTCCCTGCGACTGGCTGACCCCGTCACC
 ACCAAGAACGGGGAAATCACCTCAAGCTGGGAGAGGGGGTGGACCTCGACTCCTCGGGAAAACATCTCCAACACGGCCA
 CCAAGGCCGCCGCCCTCTCAGTTTTTCCAACAACACCATTTCCCTTAACATGGATACCCCTCTTTATACCAAAGATGGAAAATT
 ATCCTTACAAGTTTCTCCACCGTTAAACATATTTAAATCAACCATTTCTGAACACATTAGCTGTAGCTTATGGATCAGGTTTAGGA
 CTGAGTGGTGGCACTGCTCTTGCAGTACAGTTGGCCTCTCCACTCACTTTTGATGAAAAAGGAAATATTTAAATTAACCTAGCC
 AGTGGTCCATTAAACAGTTGATGCAAGTCGACTTAGTATCAACTGCAAAAGAGGGGTCACTGTCACTACCTCAGGAGATGCAAT
 TGAAAGCAACATAAGCTGGCCTAAAGGTATAAGATTTGAAGGTAATGGCATAGCTGCAAAACATTGGCAGAGGATTGGAATTT
 GGAACCACTAGTACAGAGACTGATGTACAGATGCATACCAATTAAGTTAAATTGGGTACTGGCCTTACCTTTGACAGTACA
 GCGCCATTGTTGCTTGGAACAAAGAGGATGATAAACTTACATTATGGACCACAGCCGACCCCTCGCCAAATTGCAAAATATA
 CTCTGAAAAAGATGCCAACTCACACTTTGCTTGACAAAGTGTGGAAGTCAAATTCTGGGTACTGTGACTGTATTGGCAGTGA
 ATAATGGAAGTCTCAACCAATCACAACACAGTAAGCACTGCACTCGTCTCCCTCAAGTTTGATGCAAGTGGAGTTTTGCTAA
 GCAGTCCACATTAGACAAAGAATATTGGAACCTCAGAAAGGAGATGTTACACCTGCTGAGCCCTATACTAATGCTATAGGT
 TTTATGCCTAACATAAAGGCCTATCCTAAAAACACATCTGCAGCTTCAAAAAGCCATATTGTCACTCAAGTTTATCTCAATGGG
 GATGAGGCCAAACCACTGATGCTGATTATTACTTTAATGAACTGAGGATGCAACTGCACCTACAGTATCACTTTTCAATGG
 AAATGGGATAGTACTAAGTACACAGGTGAAACACTTGCTACCAGCTCCTTACCTTCTCTACATCGCCCAAGAATGAACACTG
 TATCCACCTGCGATGCCAACCTTCCACCCCACTCTGTCTATGGAAAAACTCTGAAGCACAATAAAAAAAGTTCAAGT
 GTTTTATTGATTCAACAGTTTTACAGGATTGAGCAGTTATTTTCTCCACCTCCAGGACATGGAATACACCACCTCTCCCC
 CCGCACAGCCTTGAACATCTGAATGCCATTGGTGATGGACATGCTTTTGGTCTCCACGTTCCACACAGTTTCAGAGCGAGCCAG
 TCTCGGGTCGGTCAGGGAGATGAAACCTCCGGGCACTCCGCGATCTGCACCTCACAGCTCAACAGCTGAGGATTGCTCTCGG
 TGGTCCGGATCACGGTTATCTGGAAGAAGCAGAAGAGCGCGGTGGGAATCATAGTCCGCGAACGGGATCGGCCGGTGGTG
 TCGCATCAGGCCCGCAGCAGTCGCTGCCGCCGCGCTCGTCAAGCTGCTGCTCAGGGGGTCCGGGTCCAGGGACTCCCTCA
 GCATGATGCCACGGCCCTCAGCATCAGTCGTCTGGTGGCGGGGCGCAGCAGCGCATGCGGATCTCGCTCAGGTGCTGCA
 GTACGTGCAACACAGGACCACAGGTTGTTCAACAGTCCATAGTTCAACACGCTCCAGCCGAACTCATCGCGGAAGGATGC
 TACCACGTGGCCGTCGTACCAGATCCTCAGGTAATCAAGTGGCGTCCCTCCAGAACACGCTGCCACGTACATGATCTCT
 TGGGCATGTGGCGTTTACCACCTCCCGTACCACATACCCTCTGGTTGAACATGCAGCCCCGGATGATCCTGCGGAACCAC
 AGGGCCAGCACCGCCCCGCCGCCATGCAGCGAAGAGACCCCGGTCCCGCAATGGCAATGGAGGACCAACCGCTCGTACC
 CGTGGATCATCTGGGAGCTGAACAAGTCTATGTTGGCACAGCACAGGCATATGCTCATGCATCTCTCAGCACTCTCAGCTCCT
 CGGGGGTCAAACCATATCCAGGGCACGGGGAATCTTGACAGACAGCGAACCCCGCAGAACAGGGCAATCCTCGCACATA
 ACTTACATTGTGCATGGACAGGGTATCGCAATCAGGCAGCACCGGGTGATCCTCCACCAGAGAAGCGCGGGTCTCGGTCTCT
 CACAGCGTGTAAGGGGGCCGGCCGATACGGGTGATGGCGGGACGCGGTGATCGTGTTCGCGACCGTGTGATGAGT
 TGCTTTCCGACATTTTCTGACTTGCTGTAGCAGAACCTGGTCCGGGCGCTGCACACCGATCGCCGGCGGGTCCCGGCGCTT
 GGAACGCTCGGTGTTGAAATTGTAACACAGCACTCTCTCAGACCGTGCAGCAGATCTAGGGCCTCAGGAGTGATGAAGATCC
 CATCATGCCTGATAGCTCTGATCACATCGACCACCGTGAATGGGCCAGACCCAGCCAGATGATGCAATTTTGTGGGTTTCG
 GTGACGGCGGGGGAGGGGAAGAACAGGAAGAACCATGATTAACTTTAAATCCAAACGGTCTCGGAGCACTTCAAATGAAGGT
 CGCGGAGATGGCACCTCTCGCCCCGCTGTGTTGGTGGAAAAAATACAGCCAGGTCAAAGGTGATACGGTTCTCGAGATGTTCC
 ACGGTGGCTTCCAGCAAGCCTCCACGCGCATCCAGAAACAAGACAATAGCGAAAGCGGGAGGGTTCTCTAATTCCTCAAT
 CATCATGTTACACTCTGCACCATCCCCAGATAATTTTCATTTTCCAGCCTTGAATGATTGCAACTAGTTCCTGAGGTAATCCA
 AGCCAGCCATGATAAAGAGCTCGCGCAGAGCGCCTCCACCGGCATTCTTAAGCACACCTCATAATCCAAGATATTCTGCTC
 CTGGTTACCTGCAGCAGATTGACAAGCGGAATATCAAAATCTCTGCCGCGATCCCTAAGCTCCTCCCTCAGCAATAACTGTAA
 GTACTCTTTCATATCTCTCCGAAATTTTAGCCATAGGACCACAGGAATAAGATTAGGGCAAGCCACAGTACAGATAAACCG
 AAGTCTCCCCAGTGAGCATTGCCAAATGCAAGACTGCTATAAGCATGCTGGCTAGACCCGGTGATATCTTCCAGATAACTGG
 ACAGAAAATCACCCAGGCAATTTTAAAGAAAATCAACAAAAGAAAAATCCTCCAGGTGCACGTTTAGAGCCTCGGGAACAACG
 ATGAAGTAAATGCAAGCGGTGCGTTCCAGCATGTTAGTTAGCTGATCTGTAAAAAACAAAAATAAACATTAAACCATGCT
 AGCCTGGCGAACAGGTGGGTAAATCGTTCTCTCAGCACAGGCAGGCCACGGGGTCTCCGGCGCGACCCCTGTAAAAATTG
 TCGCTATGATTGAAAACCATCACAGAGAGACGTTCCCGGTGGCCGGCGTGAATGATTGACAAGATGAATACACCCCGGAAC
 ATTGGCGTCCGCGAGTGAAAAAAGCGCCGAGGACAATAAGGCACTACAATGCTCAGTCTCAAGTCCAGCAAGCAAGCGATG
 CCATGCGGATGAAGCACAAAATCCTCAGGTGCGGTACAAAATGTAATTACTCCCTCCTGCACAGGCAGCGAAGCCCGGATCC
 CTCCAGATACACATAAAAGCCTCAGCGTCCATAGCTTACCGAGCAGCAGCACACAACAGGCGCAAGAGTCAGAGAAAGGCT
 GAGCTCTAACCTGTCCACCGCTCTCTGCTCAATATATAGCCAGATCTACACTGACGTAAAGGCCAAAGTCTAAAAATACCCG
 CCAATAATCACACACGCCAGCACACGCCAGAAACCGGTGACACACTCAAAAAAATACGCGCACTTCTCAAACGCCCAAA
 CTGCCGTCAATTCGGGTTCCACGCTACGTCATCGGAATTCGACTTTCAAATTCGTCGACCGTTAAAAACGTACCCGCCCG
 CCCCTAACGGTCGCCCGTCTCTCGGCAATCACCTTCTCCCTCCCAAAATCAAACAGCTCATTTGCATATTAACGCGACCAA
 AAGTTTGAGGTATATTATTGATGATG

Fig. 23I

AdC7 010-HIVgag(E1048) Amino acids – SEQ ID NO: 12**The symbol “ * ” refers herein to stop codons in the non coding regions**

HHQ*YTSNFWCALICK*AV*IWGGRKVVIGRETGDR*GRGG*RFDDVAVRRSRFASSRGKSDVKRGVV*TRKYSIFPRSLTGNEVFLG
GCK*KRAIFARKLNEEVKI*VISRLWQGGVFAEGRVDFDLRGGFDIRIFHLNFRVRCQSPVFLRTISFPRKCHLTVTITVLR*RKLRS
DPLWCTLSTICSDAA*LSQYLLPACVLEVAE*CASKI*ATTRQGLTDNCMKNLLRVRRFALLRDVARYTR*H*LLTSY***SITGSLVH
SPYMEFRVT*LTVNGPPG*PPNDPRPLTSIMTYVPIVTPIGTFH*RQWVEYLR*TAHLAVHQVYHMPSTPPIDVNDGKWPAPWHYA
QYMTLWDFPTWQYIYVLVIAITMVMRFWQYINGRG*RFDSRGFPSLHPIDVNGSLFWHQNRDQFPCRNNAPLTQMGGRRVR
WEVYISRARLVNRQITRSFIYVYHS*IANAVSASDTTVSNLSCRSWS*GTGQVSIKVTQV*GDQ*KLGLSRQRRLLRF**APIGLTD
IHFAFLSTGVHSQFNYS*G*ST*YDSL*ASATMGARASVLSGGELDRWEKIRLPGGKKYKLVKHIVWASRELERFAVNPGLETSE
GCRQILGQLQPSLQTGSEELRSLYNTVATLYCVHQRIEVKDTKEALEKIEEENQNSKKKAQQAADTGNSSQVSQNYPIVQNLQGG
MVHQAIPTLNNAWVKVVEKAFAFSEVPMFSALEGATPQDLNMLNTVGGHQAAMQMLKETINEEAAEWDRLHPVHAGPIA
PGQMREPRGSDIAGTTSTLQEQIGWMTNPPPIVGEIYKRWIILGLNKIVRMYSPSILDIRQGPKEFRDYVDRFYKTLRAEQASQE
VKNWMTETLLVQANPDCKTILKALGPAATLEEMMTACQGVGGPGHKARVLAEMSQVTNSATIMMQRGNFRNRKTKVCFN
CGKEGHIAKNCRAPRKGCWKCGKEGHQMKDCTERQANFLGKIWPSHKGRPGNLFQSRPEPTAPPEESFRFGEETTPSQKQEP
DKELYPLASRLSFGNDPSSQ**SSV*TGPLESTRAAKPLISLDCAF*LPAICCLPLPRAFLDPGRCHSHCPFLIK*GNICALSE*VSFYSG
GWGGAGQQGGGLGRQ*QACWGCGLGYGF*GGKNQICRSEFIYVGCGERGNEMALWVLWVCINESARYAGHRACDLAPPQD
MARVRAQRHDPMQCAPGVPPRHVHALPVQHAICEGAAGARCHVQSEPDGGV*HECGAVENSEI**IQDQVPLRMRRQARQA
SARVCGGDGGPATRSFGVVLQRDGVRLQGRGI*LE*VVFGGGGGLV*GAE*LKSVFFCVLQQHERKRL*GRGIQPLSDGASPLLG
GSASECDGIHGGPARAAELFNPDLRDELLVGRSCRRSCCFRRQRARNGPGRRLQLSGGQLDFHQ*SRQPERGEAAAADG
PARGPDPAPGRADPAGGSAAGGDAGRCHGENQJKNESINKRRRLILTSLESFDFSRVAVGPGPPVSIIEHPVDFQDPVEVGLD
VEVHGHEPVPVGEVAPLQGLVLGGGVVNHPIVAGAQGVVLHVDLEEEDGHGQPLGVGVDEPVELGGMHAGGDEMHLGLDLEI
GDVPAQIPPGVHVVDHGHGVSGALGEFVMQLGREGVKEFGDALVTAQVFHALIHDDGDGPVGGGLGKDVSGVGHIVVVLGE
LVIGHFNEFGAEGARLGDEGALDPGGVVALADLHPLGLELGGGDHVLHRLGDEKNGRGGGDELGRKQVPEQLGLAAAGGAVDDP
DDRQVVEGETAAVLAEEGGHLVHHLAHMHVLAHEFRQALAPQREELLQRGEVFRLEPVGHGHFEGELLQEFQTVPELGDVL
*GISIQQTSSFRGLRLRE*GTRRWASSEARVRSFQGRVRSVSVSVTKGCPAGWALARVFRILRLVENRSRSPACASAR*QLSM
SS*LSASAAWPLARSLPLEVCPQTGQRDLRA*SLGARKTDSGA*ASAPQLAQTVSHSTSQVRSGLGSKTRFPFCFLMRFLPLVSM
SSCPRWVTKRLSVSP*TDFMGRSSSGVPRSS*RNPAHSETKARVQASTKEATWEG*RSLSSTSGSTFSRVCKHMSPSSTSRKIVGL*V
*AT*PGVPAGGV*KGAGPCSSSLSSGSLRSASCWGRYLSKAGITSALRLSVSRNEEDLITVPLETFMSPSSIWSEKTIFFLLSLVAK
EP*RALERSLAMERMVWFFSLSARSLAAMLSCYSRATHFHSGKTVSSSGTILTRQPRLCRVMRSTLVATSPRRGSLVQQRPPPLR
EQKGGSGSSMSSSGSASTVKMPGRSSGSK*LMQVSRSSAACQSRTASARS*GLRGVPQGMGCVSAEAYMPQMS*T*RGSSRT
PM*VG*QRPPRLART*SYSSCEGARSPVPRLERCGFSAR*TIWRKMAWELEEMVGLWKMLKWAUWGRPTESLMKWA*ESCSL
ATSSAVTRTSRAQ*SRVSWMMSYLSWPFCHSSRLRRNSSRSFYSSRGNPS*SAR*EPTM*NWLTAL*AAQPFSTGRA*ACAAL
RREVWVRKVSRTMTLRNWCLKSRSSQPPCSQSWKSVRFL*AGLGKAKVTSKRLPARGMKLRVMRKGWGTSARLLMTWAAR
TISSKPLMLCPTM*SSTNRGRPLTWGSFLSSS*VSSAGSLSPCCSRAQSATWGLALRKEVQRSTARAVCKRSRY*NCNWPTAIFSGVT
Q*KVRGSPCQRSHLSWRARSWASSTSGGSPESFMTSMKGTSCLPKDIQV*VSTS*VRKSLSVRGCEPMGKNWISCHQLEEWLLM
*WK*KCRRRAEHSCCLYKRPQCSQRCTGCTCCTCTWVPLTRNFSGQWSAGGCIWCCTTSWPSAWPSSASMVVMILTSRGRQ
VQTSARTGRRARTRARRPELSRVLRRCGVRSVSGGARLTCSRFSRARGRSRWYLISTAPLVATSTACRVPCPWGATTVPFFLGAA
SMPVRSGGEDARRAAGAARDPEAGAAGARRRRARAGSGTAPGEDWRERRRDG*RPGSASG*RPRDP*V*T*KRVQRNQSRYR
*RRPAAGSLARRPSCPGRRRS*TAESPPEGLRGRARRWRPGRWRGCP*AARRRSCRPRSRGCRPLRRGRARA*PPGRG*A
RRGA*RPRSCRAGGRGS*AWWRCAR*RRST*SSGGAASR*RRPLSAPWPRRSPRRS*KTGSCAPRRSTPPPEDG*AQRWWRA
PRARRPRGAPLLPSLPPPLTSLLLPPQEAAGEGPCVAGGARADGR*SARWSPRAGDAWSR*RRARPRGAAA*RRRRASPGGRRG
GLRWAGRGR*RCILSIGP*GLRART*ASRDPRDPKTAERRLRASRSRKVG*ARFLVLRGFREAGGRCCW**S*SRRS*DGGWWRG
APGPWARLAGCADGRPCRRGPDTRWGPCSSPA*AAPRAPPPRPRGRACA*ARTRAGAGRAPGRRRRARRRGPVAVSG*GWSG
SRRSRRSGRLRC*WYRSSWP*RTS*SGGRVARARGT*GASRRACRRCSRCRCARGTGIRRGSAAGGAAIARWRGRARRGP
RA*GGGSRCTWTSR*CRRRWRRRAGTRGRGSRCCAAAGSSWWPRSGP*GARSRGCSRHTGKNESGQRLDSVAWRLSERVG
LRVYPGSNLESWGSRS*RTGTGPVSTQAC*RNLQDTEAGRFLALVAGHEKLVSAESDRPRWLAADVWRKNRQGCVAVCPGSSLSA
RRRPDSAAANVGVAAPSFRPLSQPTSPVTERAPFLVFLPDASRTAADAPPPSTSTAPTAATAAATAGASAPAAAASHYRGGRRRS
RRSV*PGLGRGRGAGAAGGVVAGAAPARADEKGRSRLRAQAEVQRQERRGARGDARLPLRGAGAAARPGPKAGAEGRGFR
GGRADGDQPRARARGRGQPGHGVADREGGEQLPKILQQPRAHADRRARGDGPDPAPVGPAGGHRAEPHEQAADGAAVSGG
AAQSGQRDVQGGAAEYHRARGPLAPGPGEHSAEHRGAGARAAAVREAGGYQLLGAEPGQVLR*EDLQDPVRAHRQGGEDRRV

Fig. 23J

LHAHPESADPERRSGGPVQRQDAPRGERQPPARAERPGADAQPAAGPDRGRDRGGELL*HGRGPALAAQPPGLGSCRRFPLRG
 GGGR*GGGGRVPGRLMARPYFC*MQQQPPPPDAMRAALQSQPSGINSSDDWTQAMQRMALTRNPEAFRQQPQANRLSA
 ILEAVVPSRSNPHEKVLAINNALVENKAIRGDEAGLVYNALLERVARYNSTNVQTNLDRMVTDVREAVSQRERFHRESNLGSMVAL
 NAFLSTQPANVPRGQEDYTNFISALRLMVAEVPQSEVYQSGPDYFFQTSRQGLQTVNLSQAFKNLQGLWGVQAPVGDRAVSSLL
 TPNSRLLLLLVAPFTDSGSVSRDSYLGILLNLYREAIGQAHVDEQTYQEITHVSALGQEDPGNLEATNLFLLTNRSQKIPQYALSTEE
 ERILRYVQQSVGLFLMQEGATPSAALDMTARNMEPSMYARNRPFINKLMDYLHRAAAMNSDYFTNAILNPHWLPPPFGYTGEYD
 MPDPNDGFLWDDVDSSVFSRPPATTVWKKEGGDRRPSALSGRAGAAAAPPEASPFPSLPFSLNSVRSELGRLTRPRLLGEEEYL
 NDSLLRPEREKNFPNNGIESLVDKMSRWKTYAHEHRDEPRASSAGTRRRQRHQRGLVWDDDESDADDSSVLDLGGSGGGNPF
 AHLRPRIGRLM*ESEKINGTHQGHGDQRAFFSVVCSSMMRRVYPEGPPSYESVMQQAVAAAMQPPLEAPVPPRYLAPTEGR
 NSIRYSELAPLYDTRRLYLVDNKSADIASLNYQNDHNSFLTTVVQNNDFTPTEASTQTINFDESRWGGQLKIMHTNMPNVNEFM
 YSNKFKARVMVSRKTPNGVAVDENYDGSQDELTYEWVEFELPEGNFSVTMTIDLNNAIIDNYLAVGRQNGVLESIGVKFDTRN
 FRLGWDVPTELVMPGVYTNEAFHPDIVLLPGCGVDFTESRLSNLLGIRKRPQFQEGFQILYEDLEGGNIPALLDVEAYEKSKEAAAA
 ATAAVATASTEVRGDNFASAAVAEAAETESKIVIQPEVKDSKDRSYNVLADKNTAYRSWYLAYNYGDPEKGVRSWTLTSDVTC
 GVEQVYWSLPDMMQDPVTRSTRQVSNYPVVGAE LLPVYSKSFNEQAVYSQQLRAFTSLTHVFNRFENQILVRPPAPTITTVSE
 NVPALTDHGTLPRLSSIRGVQRTVTDARRRTPYVYKALGVVAPRVLSSRTF*KMSILISPSNNTGWGLRAPSKMYGGARQSTQH
 PVRVRGHFRAPWGALKGRVRSRTTVDVIDQVADARNYTPAAAPASTVDAVIDSVVADARRYARAKSRRRIARRHRSTPAMRA
 ARALLRRARRTGRRAMLRAARRAASGSSSAGRTRRRAATAAAAAIASMSRPRRGNVYVVRDAATGVRVPVTRPPRT*RC*LRDV
 DVSQRRGGCPSANTRKRCSSRLRSTAPR*RRKESPA*SGSKRTKRRRKMWTDWWSLCASSPPGGACSGAGGK*NRCCGPAP
 RWSSRPASVPAPPSAPTTRCTGTRTSSRRSSVWASLLTASAAAPR*KRRRCPSRWTTATPRRA*SR*PCSRCCRARRRAGASSA
 RAARICTRPCS*WCPSARSWRTCWST*RWTPRCSPSRRCGPSSRWPRAWACRPWTSRSPSPWKRRPSP*SPAPAPWRCRPIG
 CRRRLPLAEDASTARPAC*CPTRCIPSSPRRATAARASTAATPAAAAARPPAAAVVAPAAAAPRLPPPPWCGECTAAGASL*PC
 RARATTRASPFNSAVASYLQIWPSHAASASPLRATEEESRAVEG*RTGCVAITTGGGAPSASGWGEASCP*SPSSPRRSGRSPA*
 LPWRCRPLSATETQLGKFVIKKWTDAPGPVMCVRWKSIFRPWHRDTARGRLWAPGATSATAN*TGAPSIGAVSGAGLRISGPR
 SKPMATRRTGTAQGR*GKS*KSRTSSRRWSMAWPRASTGWWTWTPRCPNRNSTAAWTSRPRGPWRCPWRWRSCLPWTSA
 ATSDRVPTRRRR*RTRTSRPTRRR*NWVCPPRGPWRLWPPGC*NPAASASPRPWTCLRLPAPPQWLSPCRRWPSRRAPPEA
 APRRTGRAL*TASWVWECEV*SAASAIKRHCSA*LACLCVYVCPTRRRRKRRAELQDGHPIAAPVGVHAHRRTRGRFGVPESGS
 GAVRPRHRHLLQSSEQV*EPHGGAHARC DHRPQPAADAALRARGPRGQHLLVQSALHAGRGRQPRAGHGQHL*HPRRAGSG
 AQLQTLRLHRLQPGSQSAQHLPVDI*SW*Y*YRKNLYWKCTCARH*HYKGWYSTWN*QRWSGNLCRRNLSTRASSG*C*M
 A*HHWY*KIWRQSS*A*HQNEALLWFFCQAYQ*RRRPGKCNENRRYQRI*H*HGILR*SKCSCRRSPRNCVFY*ECGSGNSRY
 PYCIQGRYR*Q*LFYQFGSAVHAQQTQLHLWLQRQLYRSDVLQQHWQYGTGTGLPAECCGGLAGQKHRTVLPALA*LSG*QN
 QVFQYVESGGGQL*PRCAHY*KSRCGG*TS*LLPPGCCG*N*YLPGN*GW*SNHLDQR*YC*C*IGQGQSFHGDQHPG
 QPVAELPLRERGAVPARLLQVHAGQHHAHQHQLRLHERPRGGALAGGRLHQHARGALVAGPHGQRQPLQPPQRGPAIPLHA
 PGQRALRALPHPGAPKVRHQPAPARVLHLRVELPQGRQHDPALPRQRPAGHRLHRLHQLRLHLLPHGAQHRLHARGH
 AAQRHQRVPLQRLPLGGQHALPHPGQRHQRHHLPLAQLGLRPLVLHAPQDPRDALARLRVRPLRLGLHLPLRRHLLPQPHL
 QEGLHHLRLRLQRLARQRPDPDAQRVRNQAHRRRRGVQRGPVQHDQGLVPGPDAGPLQHRLPGLLRARGLQGPVHLLPLQPLAH
 EPPGRGRGQLQGLPRHPLPAQQLGLRRLPRAHHPAGPALPRQLPLPAHRQERRRQRHPEKVLPRPGHVAHPLLQQLHVHGRA
 HRPRPEHALRQLRPRARHEFRSRPHG*VHPSLCLRLRRLRPSAPAPRRHRGRLPAHALLGRQRHLSLLLAR*RPAPAPASRSSG
 PSSATWAAGPASWAPSTSASRDSWPRTSWPAPSSTRPAARPGASTGWPSPGTRAPTATSSSTPSGSRSSASSRSTSSSTRACCVAA
 PWPPRTAASPWKSPRRPCRVRARPPAGSSAACCTPSCTGPTAPWTRTPP*TC*RGCTACSSRPRWNPPCAATRRRSTASSTPTP
 PTFAPTARASRRPPSTA*ITCNPCVCECFIHHNKQHMFMPPSLRL*LYLEIEGVLPAALGMARGQGYVAELVLGQPLELGDQQLR
 HGEVGERVAPQLARELQGAQQVGRGDLEIAVGTRVLARVTVHGVALEHHQGRVLHARQHRRVGDALHVQILGVGHPEGGHL
 AGLPPHAGHAAGLVVAIVQGDQHHLGLLGAHARVHGLHESLQLAEGLLRLAALGEEDPAGLARELVGGAASVVHAAARVVVGQ
 LHHAAPPVAVLGLDGPVGVLLQRALPVLARHIHLDRVLLDHHGVPVQAPQLALGLGAPVQPQRAAGALPVVLDLGVVHEALQEA
 AHRGQGLVAGEGQRNAAVLLVHIQVADTAVHLALLGHQLEGGQLQVALHAVPVHQQRHFFHALLPGRNDRQAQGVLRHCHLSR
 RRRSQGVVLVQGLKHSVLAVLLGDAHGGKAEAHGRQLLLGLPFVLAVLADVLRHMLGLAGFLFRQRRRRRRRAGRARVLAHHDYF
 FSLAVVRDHAAGVGMPLLGQRRRRRALAVRRAAGRAPSAFGGALLAALL*LTSSAAGHCVLLGSKHGDSAIVANIAICPRRRRRREPAA
 AE*KLNRPAAQPHLRRRSPRHARDGGIHRD*PGLRDARGARGGAGSALFSPGREPPRAARAGSRERAEPGWARAWRLPERGRGR
 AHQASGPPMHHRQGRAARPRRGAPQRGGAQPLRAQPLLAARAPQAPAQRHLRAQAPQLLPGLRGARGPGHLPPLFQEPKDP
 RLLPRQPHPRRRPAQPGRRPPT*YRLLGRGSQDLRGSGQRRDSGRERSARKRRGA*APQRPGGVGRRQRAPGGPQAHRADPL
 RLPGAQAPQGHERRHGPAGAHQARLAPLGGGDAGPRELGRGQARGQRRRAAGALAGSE*HPPEPGRAAQAHDRGPGDRGAG
 VSAPLLRRRGDPAQGRGEPALPLQTRVRAPGLQDLQRGADQPLHGHAPAREPPGAERAAHHPARGGPPRLHPLRLPVPLPLHA

Fig. 23K

DGHGRVAAVPGGAEPERALQAPAEPPQGPVDRVRAHHRRGPRPHLPAPAAADAAQRAARLYEPKHVAKLSLFHPRTLDPAR
HLLRAALGLRAADLPRVPPAALEPLLPAAPGQLPGLPLGRDRGRQRRGPARVPLPLQLHAAPLPGLQPPAAERDPDRHLRVARP
RRGQGGSETHPGAVDLGLLAQVRARGPLSLRDQVLRGPIAAQGRAVGLRHHPGGHPGPIASHPEIPRISAEKGPRGLLGPDRR
GAQPQLPPGCPPEEAARS*KWSCRRRRRIWRKTGRAVRQRRRRWKTGTALRQRTACKTVWRRKTRWRRQRKKQPPDRRPRRR
RRKQAAARIPSLRVGVAAAGPTVDGTRPGASRTPPRPVRRSGRDTSPGGGKTTPSSPACKPAGATSPSPGATCSSTAG*TSPATSCI
TTVTSTAPTTVSKKRQKPSSSSSRKPAAARKSTAAAGGLRIAANEPAQTRERNRIFPTLYAIFQQSRGQEQLKVNRLSLRSLTRSC
LYHKSEDQLQRTLEDAEALFNKYCALTLKE*PAPAHTRKKAGITSPAPFARPS*AKRFPRLTCGATSPRAWPPAPPRTTPPA*TG
SVPGPR*SHG*MTSAPTETRY*NSQRSPRPAILIRVIGPPPWCTRKFPSPRPYFRETPRPKSS*LTQVSSWPAAPPCVVTAPLRV
*SGW*SEAEHSSSTRW*ALRWVCDLLESSNSPDRGDLPSRLVRPS*LWVRPRSPARVASALSSSWRSSLPSTSTPSPAPPATTR
TSSRTSTPSASRWATIECPMVARLT*LGFDTWTTAAASAASLGISPLPTLSCPRSTLRARPTECGSSSKGVSTPTCFGSSASVRSWP
SASKDRPF*PCTASATTPACMKVFFVCCVLSIIKAEISDYSGLPCVPAINQSLFFTGNELQLQCKPHKKYLTWLFQGSPIAVVNHCD
NDGVLLSGPANLTFSTRSKLQLFQPFPGTYQCVSGPCHHTFHLPNTTASLPATNNQTHQRHRRDRGHVQSSRSTRPQYMPILD
YEAEPQRPMPLPAISYFNLTGGDD*PTGQQQRQPSPGHGRPRLGAATRPTSHSPAAGESRQGAAGRSHPPVQERHLLPGETGQ
DLLRGHPDRPSLLRAPAAAEVHLPGRSQPHRHHPAVGRYQGVHPLLLRLPRLPHSDQDPLRPPPPHELITLPSSEINIILMMI*
IKNNHLI*NKDTIILMI*VLKNKESLT*NLIPGLPCFLPTPPHSPLPSSGTADPGGLQTSSTR*RGCIQPPVPQSSFYLLSDVQKARPGG
**LRPRLPLRCRQRTDRALHQPPLRLFRWIPREAPGGAVPATG*PRHHQERGNHPQAGRGGGPRLLGKTHLQHGHHQGRRPSQFF
QQHHFP*HGYPQLYQRWKIILTSFSTVKHIKINHSEHISCSLWIRFTEWWHCSCSTVGLSTHF**KRKY*N*PSQWSINS*CKST*YQ
LQKRGHCHYLRCN*KQHKLA*RYKI*R*WHSCKHWWQIRIGIWNH*YRD*CHRCIPNSS*IGYWPYL*QYRRHCCLEQRG**TYIMD
HSRPLAKLQNIL*KRCQTHTLDDKVVKSNSGYCDCIGSE*WKSQPNHKKHCHCTRLPQV*CKWSFAKQLHIRQRILELQKGRCYTC*
ALY*CYRFYA*HKGLS*KHICSFKKPYCQSSLSQWG*GQTTDADYF**N*GCNLHLQYHFSMEMG*Y*VHR*NTCYQLLHLLHRP
RMNTVSHAPACQFPFPHSVYVGKNSEAQNKIKFCFIDSTVLQDSSSYFSSTLPGHGIHPLPPHSLEHLNAIGDGHAFGLHVPHSFRAS
QSRVGQGDETLRALPHLHLTAQQLRIVLGGRDHGYLEAEERRWES*SANGIGRWCRIRPRSSRCRRRSVKLLLRGSGSRDLSMM
PTALSISRLVRRQAQRMRLSLRSLQYVQHRTTFLNSP*FNTLQPKLIAGRMMLPTWPSYQILR*IKWRSQNTLPTYMISLGMWRFTT
SRYHITLWLNMQPRMILNRHRASTAPPAMQRRDPGSRQWQWRTHRSYPWIIWELNKSMLAQHRHMLMHLFSTLSSSGVKTSIQ
GTGNSCRTANPAEQGNPRT*LTLCMDRVSQSGSTG*SSTREARVSQSRGKGAGRYG*WRDAADRVRDRVMMQLLSDIFVLAV
AEPGPGAAHRSPAAVPAAGTLGVEIVKQPLSQTVQI*GLRDEDPIMPDSDDHIDHRGMGQTQPDAILLFGDGGGGKNRKN
HD*LLIQTVESEHFKMKAEMAPLAPAVLVENNSQVKGDTVLEMFHGGFQQSLHAHIQKQDNSESGRVL*FLNHHVTLHHPQIIFI
FPALNDSN*FLR*IQASHDKELAQSALHRHS*APHNKIFCSWFTCSRLTSGISKSLPRSLSSSLNNCKYSFISSPKFLAIGPPGIRLGQ
ATVQINRSPQ*ALPNARLL*ACWLDPVISSR*LDRKSPRQFLRKSTKEKSSRCTFRASGTTMK*MQAVRSSMVS*LICKKQKIKH*T
MLAWRTGG*IVLSSTRQATGSPARPS*KLSL*LKTITERRSRWPA*MIRQDEYTPGTLASASEKKRPRKQ*GTTMLSLKSSKAMP
CG*STKSSGAYKM*LLPSCGTSEAPDPSRYTKASASIAAYRAAAHNRRKSQRKAE*PVHPLSAQYIAQIYTDVKAKV*KYPNNHTRPA
HAQKPVTHSKKYAHFLKRPNCRHRVPTLRHNSTFKFRPLKTSAPPLTVARLSANHLPPSPNSNSSFAY*RAPKV*GILLMM

Fig. 24A

AdC6 020-DU172gp160(E1620) Nucleic Acids – SEQ ID NO: 5

CATCATCAATAATATACCTCAAACCTTTTGGTGCGGTTAATATGCAAATGAGCTGTTTGAATTTGGGGAGGGAGGAAGGTGAT
TGGCTGCGGGAGCGGCGACCGTTAGGGGCGGGGCGGGTGACGTTTTGATGACGTGGCTATGAGGCGGAGCCGGTTTGCAAG
TTCTCGTGGGAAAAGTGACGTCAAACGAGGTGTGGTTGAACACGGAAATACTCAATTTCCCGCGCTCTCTGACAGGAAATG
AGGTGTTTCTGGGCGGATGCAAGTGAAAACGGGCCATTTTCGCGCGAAAACCTGAATGAGGAAGTGAAAATCTGAGTAATTTT
GCGTTTATGGCAGGGAGGAGTATTTGCCGAGGGCCGAGTAGACTTTGACCGATTACGTGGGGGTTTCGATTACCGTATTTTTC
ACCTAAATTTCCGCGTACGGTGTCAAAGTCCGGTGTTTTACGTACGATATCATTTCCCGGAAAGTGCCACCTGACCGTAACTAT
AACGGTCCTAAGGTAGCGAAAGCTCAGATCTCCGATCCCTATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGTT
AAGCCAGTATCTGCTCCCTGCTTGTGTGTTGGAGGTCGCTGAGTAGTGCGCGAGCAAAATTTAAGCTACAACAAGGCAAGGCT
TGACCGACAATTGCATGAAGAATCTGCTTAGGGTTAGGCGTTTTGCGCTGCTTCGCGATGTACGGGCCAGATATACGCGTTGA
CATTGATTATTGACTAGTATGCCAAGTACGCCCTATTGACGTCAATGACGGTAAATGGCCCGCTGGCATTATGCCAGTAC
ATGACCTTATGGGACTTTCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCGGTTTTGGCAGTACA
TCAATGGGCGTGGATAGCGGTTTGAATCACGGGGATTTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGTTGGCACC
AAAATCAACGGGACTTTCCAAAATGTCGAACAACCTCGCCCCATTGACGCAAATGGGCGGTAGGCGTGTACGGTGGGAGGT
CTATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCACTAGAAGCTTTATTGCGGTAGTTTATCACAGTTAAATTGCTAACGC
AGTCAGTGCTTCTGACACAACAGTCTCGAACTTAAGGCTAGAGTACTTAATACGACTCACTATAGGCTAGTTAAGGCTAGAGTT
CGACGCCACCATGCGCGTGATGGGCATCTGCGCTCTACCAGCAGTGGTGGATCTGGGGCATCTGGGCTTCTGGATGCTGA
TGATCTGCAACGTGTGGGCAACCTGTGGGTGACCGTGACTACGGCGTGCCCGTGGAAGGAGGCCAAGACCACCTGTT
CTGCGCTCCGACGCCAAGGCCACAAGGAGGAGGTGCACAACATCTGGGCCACCCACGCTGCGTGCCACCGACCCCAAC
CCCCAGGAGATCGTGCTGAAGAACGTGACCGAGAACTTCAACATGTGGAAGAACGACATGGTGACCAGATGCACGAGGAC
ATCATCTCCCTGTGGGACCACTCCCTGAAGCCCTGCGTGAAGCTGACCCCTGTGCGTGACCTGAACTGCTCCGACGTGAA
GATCAAGGGCACCAACGCCACCTACAACAACGCCACCTACAACAACAACAACACCATCTCCGACATGAAGAACTGCTCCTCAA
CACCACCACCGAGATCACCGACAAGAAGAAGGAGTACGCCCTGTTCTACAAGCTGGACGTGGTGCCCTGGACGGCAAG
GAGACCAACTCCACCAACTCCTCCGAGTACCGCCTGATCAACTGCAACACCTCCGCGTGACCCAGGCTGCCCAAGGTGTCC
TTCGACCCCATCCCATCCACTACTGCGCCCCCGCGGCTACGCCATCCTGAAGTGCAACAACAAGACCTTCAACGGCACCGGC
CCCTGCAACAACGTGTCCACCGTGAGTGCAACCCACGGCATCAAGCCCGTGGTGTCACCCAGCTGCTGCTGAACGGCTCCCT
GGCCGAGGAGGAGGTGGTGATCCGCTTCGAGAACCTGACCAACAACGCCAAGATCATCATCGTGACCTGAACGAGTCCGTG
GAGATCAACTGACCCGCCCCCTCCAACAACACCCGCAAGTCCGTGCGCATCGGCCCGGCCAGACCTTCTCGCCACCGGCGA
CATCATCGGCGACATCCGCCAGGCCACTGCAACATCTCCGCAAGAAGTGGAACACCACCTGCAGCGCGTGAAGGAGAAG
CTGAAGGAGAAGTTCCCCAACAAGACCATCCAGTTCGCCCCCTCCTCCGCGGCGACCTGGAGATCACCAACCACTCCTTCAAC
TGCCGCGGCGAGTTCTTCTACTGCTACACCTCCGACCTGTTCAACTCCACCTACATGTCCAACAACACCGGCGGCGCAACATC
ACCCTGCAGTGCCGCATCAAGCAGATCATCCGCATGTGGCAGGGCGTGGGCCAGGCCATGTACGCCCCCCCCATCGCCGCA
ACATCACCTGCAAGTCCAACATACCGGCCTGCTGCTGACCCGCGACGGCGGCAAGGAGAAGAACGACACCGAGACCTTCCG
CCCCGGCGGCGGCGACATGCGCGCAACTGGCGCTCCGAGCTGTACAAGTACAAGGTGGTGGAGATCAAGCCCTGGGCATC
GCCCCGACAAGGCCAAGCGCCGCTGGTGAGCGCGAGAAGCGCGCCGTGGGCATCGGCGCCGTGTTCTGGGCTTCTGTG
GGCGCCCGGCGAGCACCATGGGCGCCGCGCAGCATGACCCTGACCGTGCAAGGCCCGCCAGCTGCTGAGCGGCATCGTGCAAGC
AGCAGAGCAACCTGCTGCGCGCCATCGAGGCCAGCAGCACATGCTGCAGCTGACCGTGTGGGGCATCAAGCAGCTGCAGAC
CCGCGTGCTGGCCATCGAGCGCTACCTGAAGGACCAGCAGCTGCTGGGCATCTGGGGCTGCAGCGGCAAGCTGATCTGCACC
ACCGCCGTGCCCTGGAACGCCAGCTGGAGCAACAAGAGCTACGAGGAGATCTGGGGCAACATGACCTGGATGCAGTGGGAC
CGCGAGATCAACAACCTACCAACACCATCTACAGCTGCTGGAGGAGAGCCAGAACCAGCAGGAGAAGAACGAGAAGGAC
CTGCTGGCCCTGGACAGCTGGGAGAGCCTGTGGAGCTGGTTCAACATCAACAACTGGCTGTGGTACATCCGCATCTTCATCAT
CATCGTGGGCGGCTGATCGGCCTGCGCATCATCTTCGCCGTGCTGAGCATCGTGAACCGCGTGCGCCAGGGCTACAGCCCCC
TGAGCTTCCAGACCTGACCCCCAGCCCCGCGAGCCGACCGCCTGGGCCGATCGAGGAGGAGGGCGGCGAGCAGGACC
GCGCCCGCAGCGTGCGCCTGGTGAACGGCTTCTGGCCCTGGCCTGGGAGGACCTGCGCAGCCTGTGCCTGTTGAGCTACCAC
CGCTGCGCGACCTGATCCTGATCGCCGCCGCGCCGCCCTGCTGGGCCGAGCAGCCTGTGGGGCTGCAGAAGGGCT
GGGAGGCCCTGAAGTACCTGGGACGCTGGTGCACTACTGGGGCTGGAGCTGAAGAAGAGCGCCATCAGCCTGTTGACG
CCATCGCCATCACCGTGGCCGAGGGCACCGACCGCATCATCAACATCGTGACGCGCATCAGCCGCGCTTCTACAACATCCCCC
GCCGCATCCGCCAGGGCTTCGAGGCCACCTGCAGTAAGGTACCTCTAGAGTCGACCCGGGCGGCCAAACCGCTGATCAGCCT
CGACTGTGCCTTCTAGTTGCCAGCCATCTGTTGTTTGCCCTCCCCGTGCTTCTTGACCTGGAAGGTGCCACTCCCACTGT
CCTTCTCAATAAAATGAGGAAATTGCATCGCATTGTCTGAGTAGGTGTCATTCTATTCTGGGGGTGGGGTGGGCGAGGACA

Fig. 24B

GCAAGGGGGAGGATTGGGAAGACAATAGCAGGCATGCTGGGGATGCGGTGGGCTCTATGGCTTCTGAGGCGGAAAGAACC
AGCAGATCTGCAGATCTGAATTCATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGGCATTATGGGTATTATGGGTCTGC
ATTAATGAATCGGTCAGATATCGACATATGCTGGCCACCGTGCATGTGGCTCGCACCCCGCAAGACATGGCCCGAGTTCGA
GCACAACGTCATGACCCGCTGCAATGTGCACCTGGGCTCCGCGGAGGCATGTTTCATGCCCTACAGTGCAACATGCAATTTGT
GAAGGTGCTGCTGGAGCCCGATGCCATGTCCAGAGTGAGCCTGACGGGGGTGTTTGACATGAATGTGGAGCTGTGGAAAATT
CTGAGATATGATGAATCCAAGACCAGGTGCCGGGCTGCGAATGCGGAGGCAAGCACGCCAGGCTTCAGCCCGTGTGTGTGG
AGGTGACGGAGGACCTGCGACCCGATCATTGGTGTGTCTGCAACGGGACGGAGTTCGGCTCCAGCGGGGAAGAATCTGA
CTAGAGTGAGTAGTGTGGGGCTGGGTGTGAGCCTGCATGAGGGGCGAGAATGACTAAAATCTGTGGTTTTCTGTGTGTTC
AGCAGCATGAGCGGAAGCGCTCCTTTGAGGGAGGGGTATTCAGCCCTTATCTGACGGGGCGTCTCCCTCCTGGGCGGGAG
TGCGTCAGAAATGTATGGGATCCACGGTGGACGGCGGCGCGTGCAGCCCGCAACTCTCAACCTGACCTACGCGACCCCTG
AGCTCCTCGTCCGTGGACGCAGCTGCCGCCGAGCTGCTGCTCCGCGCCAGCGCGCTGCGCGGAATGGCCCTGGGCGCCG
GCTACTACAGCTCTCTGTGGCCAACTCGAGTTCACCAATAATCCCGCCAGCTGAACGAGGAGAAGCTGCTGCTGCTGATG
GCCAGCTCGAGGCCCTGACCCAGCGCTGGGCGAGCTGACCCAGCAGGTGGCTCAGCTGCAGGCGGAGACGCGGGCCGCG
GTTGCCACGGTGAAAACCAAATAAAAAATGAATCAATAAATAACCGGAGACGGTTGTTGATTTTAACACAGAGTCTTGAATCT
TTATTTGATTTTTCGCGCGCGGTAGGCCCTGACCACCGGTCTCGATCATTGAGCACCCGGTGGATCTTTTCCAGGACCCGGTA
GAGGTGGGCTTGATGTTGAGGTACATGGGCATGAGCCGTCCCGGGGGTGGAGGTAGCTCCATTGACGGGCCCTCGTGCTC
GGGGATGGTGTGTAATCACCCAGTCATAGCAGGGGCGCAGGGCGTGGTGCTGCACGATGCTCTTGAGGAGGAGACTGAT
GGCCACGGGCGAGCCCTTGTTGAGGTGTTGACGAACCTGTTGAGCTGGGAGGGATGCATGCGGGGGGAGATGAGATGCAT
CTTGGCCTGGATCTTGAGATTGGCGATGTTCCCGCCAGATCCCGCGGGGGTTCATGTTGTGACGAGACCACGACAGCGGTGT
ATCCGGTGCATTTGGGAATTTGTATGCAACTTGGAAAGGAAGGCGTGAAAGAATTTGGAGACGCCCTGTGACCGCCAG
GTTTTCCATGCACTCATCCATGATGATGGCGATGGGCCCTGGGCGGCGGCTGGGCAAAGACGTTTCGGGGGTGCGACACA
TCGTAGTTGTGGTCTGGGTGAGCTCGTCATAGGCCATTTAATGAATTTGGGGCGGAGGGTGCCGACTGGGGGACGAAGG
TGCCCTCGATCCCGGGGGCGTAGTTGCCCTCGCAGATCTGCATCTCCAGGCCTTGAGCTCGGAGGGGGGGATCATGTCCACC
TGCGGGGCGATGAAAAAACGGTTCCGGGGCGGGGGAGATGAGCTGGGCCGAAAGCAGGTTCCGGAGCAGCTGGGACTT
GCCGCAACCGGTGGGGCCGTAGATGACCCCGATGACCGGCTGCAGGTGGTAGTTGAGGGAGAGACAGCTGCCGTCCTCGCG
GAGGAGGGGGGCCACCTCGTTCATCATCTCGCGCACATGCATGTTCTCGCGCACGAGTTCGCCAGGAGGCGCTCGCCCCCA
GCGAGAGGAGCTCTTGACGCGAGGCGAAGTTTTTCAGCGGCTTGAGTCCGTGCGCCATGGGCATTTTGGAGAGGGTCTGTTG
CAAGAGTTCCAGACGGTCCAGAGCTCGGTGATGTGCTCTAGGGCATCTCGATCCAGCAGACCTCTGTTTCGCGGGTGGG
GCGACTGCGGGAGTAGGGCACCAGGCGATGGGCGTCCAGCGAGGCCAGGGTCCGGTCTTCCAGGGCCGAGGGTCCGCGT
CAGCGTGGTCTCCGTACGGTGAAGGGGTGCGCGCGGGGCTGGGCGCTTGCGAGGGTGCGCTTACGGCTCATCCGGCTGGTC
GAGAACCCTCCGGTGGGCGCCCTGCGCGTGGGCCAGGTAGCAATTGAGCATGAGTTCGTAGTTGAGCGCCTCGGCCGCGT
GGCCCTTGGCGCGGAGCTTACCTTTGGAAGTGTGTCCGACAGCGGGACAGAGGAGGAGTTCAGGGCGTAGAGCTTGGGGG
CGAGGAAGACGGAAGTTCGGGGGCGTAGGCGTCCGCGCCGAGCTGGCGCAGACGGTCTCGCACTCCACGAGCCAGGTGAGGT
CGGGGCGGTTGGGGTCAAAAACGAGGTTTCTCCGTGCTTTTATGATGCGTTTCTTACCTCTGGTCTCCATGAGCTCGTGCCCC
GCTGGGTGACAAAGAGGCTGTCCGTGTCCCGTAGACCGACTTATGGGCCGTCTCGAGCGGGGTGCCGCGTCTCGTC
GTAGAGGAACCCCGCCACTCCGAGACGAAGGCCCGGGTCCAGGCCAGCACGAAGGAGGCCACGTGGGAGGGGTAGCGGT
CGTTGTCCACAGCGGGTCCACCTTCTCAGGGTATGCAAGCACATGTCCCCCTCGTCCACATCCAGGAAGGTGATTGGCTTGT
AAGGTAGGCCACGTGACCGGGGGTCCCGCGCGGGGGGTATAAAAGGGGGCGGGGCCCTGCTCGTCTCACTGTCTCCG
GATCGCTGTCCAGGAGCGCCAGCTGTTGGGGTAGGTATTCCTCTCGAAGGCGGGCATGACCTCGGCACTCAGGTTGTCAATT
TCTAGAAACGAGGAGGATTTGATATTGACGGTGCCGTTGGAGACGCTTTTCATGAGCCCTCGTCCATTTGGTCAGAAAAGAC
GATCTTTTGTGTCGAGCTTGGTGCGAAGGAGCCGTAGAGGGCGTTGGAGAGCAGCTTGGCGATGGAGCGCATGGTCTGG
TTCTTTTCTTGTGCGCGCGCTCCTTGGCGCGCATGTTGAGCTGCAGTACTCGCGCGCCACGCACTTCCATTGCGGGAAGACG
GTGGTGAGCTCGTGGGCGACGATTCTGACCCGCCAGCGCGGTTGTGACGGGTGATGAGGTCCACGCTGGTGGCCACCTCGC
CGCGCAGGGGCTGTTGGTCCAGCAGAGGCGCCGCCCTTGGCGGAGCAGAAGGGGGGGCAGCGGGTCCAGCATGAGCTCGT
CGGGGGGGTGGCGTCCACGGTGAAGATGCCGGGCGAGGCTCGGGGTGGAAGTAGCTGATGCAGGTGCCAGATTGTCCA
GCGCCGCTTGCAGTCGCGCACGGCCAGCGCGGCTCGTAGGGGCTGAGGGGCGTGCCCCAGGGCATGGGGTGGGTGAGCG
CGGAGGCGTACATGCCGAGATGTCGTAGACGTAGAGGGGCTCCTCGAGGACGCCGATGTAGGTGGGGTAGCAGCGCCCC
CGCGGATGCTGGCGCGCACGTAGTCGTACAGCTCGTGCAGGGGCGGAGGAGCCCCGTGCCGAGGTTGGAGCGTTGCGGCT
TTTCGGCGCGGTAGACGATCTGGCGGAAGATGGCGTGGGAGTTGGAGGAGATGGTGGGCCCTTGGAAAGATGTTGAAGTGGG
CGTGGGGCAGGCCGACCGAGTCCCTGATGAAGTGGGCGTAGGAGTCTGCGAGCTTGGCGACGAGCTCGGCGGTGACGAGGA
CGTCCAGGGCGCAGTAGTCGAGGGTCTCTTGGATGATGTCATACTTGAAGTGGCCCTTCTGCTTCCACAGCTCGCGGTTGAGA

Fig. 24C

AGGAACTCTTCGCGGTCTTCCAGTACTCTTCGAGGGGGAACCCGTCTGATCGGCACGGTAAGAGCCCACCATGTAGAACTG
GTTGACGGCCTTGTAGGCGCAGCAGCCCTTCTCCACGGGGAGGGCGTAAGCTTGC GCGGCCCTTGC GCGAGGGAGGTGTGGGT
GAGGGCGAAGGTGTCGCGCACCATGACCTTGAGGAACTGGTGCTTGAAGTCGAGGTCGTGCGAGCCGCCCTGCTCCAGAGT
TGGAAGTCCGTGCGCTTCTGTAGGCGGGGTAGGCAAAGCGAAAGTAACATCGTTGAAGAGGATCTTGCCCGCGCGGGGCA
TGAAGTTGCGAGTGATGCGGAAAGGCTGGGGCACCTCGGCCCGTTGTTGATGACCTGGGCGGCGAGGACGATCTCGTCGA
AGCCGTTGATGTTGTGCCGACGATGTAGAGTTCCACGAATCGCGGGCGGCCCTTGACGTGGGGCAGCTTCTTGAGCTCGTCG
TAGGTGAGCTCGGCGGGGTGCTGAGCCCGTGCTGCTGAGGGGCCAGTCGGCGACGTGGGGGTGGCGCTGAGGAAGGA
AGTCCAGAGATCCACGGCCAGGGCGGTCTGCAAGCGTCCCGTACTGACGGAAGTGTGGCCACAGGCCATTTTTTCGGGG
GTGACGCAGTAGAAGGTGCGGGGGTCCCGTGCCAGCGGTCCACTTGAGCTGGAGGGCGAGGTGCTGGGCGAGCTCGACG
AGCGGCGGGTCCCCGAGAGTTTCATGACCAGCATGAAGGGGACGAGCTGCTTGCCGAAGGACCCATCCAGGTGTAGTTT
CCACATCGTAGGTGAGGAAGAGCCTTTCGGTGCGAGGATGCGAGCCGATGGGGAAGAACTGGATCTCCTGCCACAGTTGGA
GGAATGGCTGTTGATGTGATGGAAGTAGAAATGCCGACGGCGCGCCGAGCACTCGTGCTTGTGTTTATACAAGCGTCCGCAG
TGCTCGAACGCTGCACGGGATGCACGTGCTGCACGAGCTGTACCTGGGTTCTTTGGCGAGGAATTTAGTGGGCAGTGGA
GCGCTGGCGGCTGCATCTCGTGCTGTACTACGTCTTGCCATCGGCGTGGCCATCGTCTGCCTCGATGGTGGTCATGCTGACG
AGCCCGCGCGGGAGGCAGGTCCAGACCTCGGCTCGGACGGGTGCGAGAGCGAGGACGAGGGCGCGCAGGCCGAGCTGTC
CAGGGTCTGAGACGCTGCGGAGTCAGGTGAGTGGGCGAGCGCGCGCGGTTGACTTGAGGAGCTTTTCAGGGCGCG
CGGGAGGTCCAGATGGTACTTGATCTCCACGGCGCCGTTGGTGGCTACGTCCACGGCTTGACGGGTGCCGTGCCCTGGGGC
GCCACCACCGTGCCCCGTTTCTTGGGCGTGCTTCCATGTCGTCAGAAAGCGGCGGCGAGGACGCGCGCGGGCGGCAG
GGGCGGCTCGGGGCCGAGGCAGGGGCGGAGGGGACGTCGGCGCGCGCGGGGAGGTTCTGGTACTGCGCCCGGA
GAAGACTGGCGTGAGCGACGACGCGAGGTTGACGTCTGGATCTGACGCTCTGGGTGAAGGCCACGGGACCCGTGAGTTT
GAACCTGAAAGAGAGTTCGACAGAATCAATCTCGGTATCGTTGACGGCGGCTGCCGAGGATCTCTTGACGTCGCCCCGAGT
TGTCTGGTAGGCGATCTCGGTCATGAACTGCTCGATCTCTCTCTGAAGGTCTCCGCGGCCGCGCGCTCGACGGTGGCC
GCGAGGTCGTTGGAGATGCGGCCCATGAGCTGCGAGAAGGCGTTCATGCCGGCTCGTTCCAGACGCGGCTGTAGACCACGG
CTCCGTCGGGTCGCGCGCGCATGACCACCTGGGCGAGGTTGAGCTCGACGTGGCGCGTGAAGACCGCGTAGTTGCAGA
GGCGCTGGTAGAGGTAGTTGAGCGTGGTGGCGATGTGCTCGGTGACGAAGAAGTACATGATCCAGCGGCGGAGCGGCATCT
CGTGACGTCGCCCAGGGCTTCCAAGCGTTCATGGCCTCGTAGAAGTCCACGGCGAAGTTGAAAACTGGGAGTTGCGCGC
CGAGACGGTCAACTCTCTCCAGAAGACGGATGAGCTCGGCGATGGTGGCGCGCACCTCGCGCTCGAAGGCCCGGGGGG
CTCTCTTCCATCTCTCTCTCTCTCTCCACTAACATCTCTTCTACTTCTCTCAGGAGGCGGTGGCGGGGAGGGGCCCTG
CGTCGCCGCGCGCGCACGGGACAGGTCGATGAAGCGCTCGATGGTCTCCCCGCGCGGCGACGCATGGTCTCGGTGACG
GCGCGCCGTCCTCGCGGGGCGCAGCATGAAGACGCCGCGCGCATCTCCAGGTGGCCGCGGGGGGCTCCGTTGGG
AGGGAGAGGGCGTGACGATGCATCTTATCAATTGACCGTAGGGACTCCGCGCAAGGACCTGAGCGTCTCGAGATCCACGG
GATCCGAAAACCGCTGAACGAAGGCTTCGAGCCAGTCGAGTCGCAAGGTAGGCTGAGCCCGTTTCTGTTCTTCGGGTATT
TGGTCGGGAGGCGGGCGGGCGATGCTGCTGGTGATGAAGTTGAAGTAGGCGGTCTGAGACGGCGGATGGTGGCGAGGAG
CACCAGGTCCTTGGGCCCGGCTTGTGGATGCGCAGACGGTCGGCCATGCCCCAGGCGTGGTCTGACACCTGGCGAGGTCC
TTGTAGTAGTCTGCATGAGCCGCTCCACGGGACCTCTCTCGCCGCGCGGCGTGCATGCGCGTGAGCCGAACCCGCG
CTGCGGCTGGACGAGCGCCAGGTGCGCGACGACGCGCTCGGTGAGGATGGCCTGCTGGATCTGGGTGAGGGTGGTCTGGAA
GTCGTCGAAGTCGACGAAGCGGTGGTAGGCTCCGTTGATGGTGTAGGAGCAGTTGGCCATGACGGACCAAGTTGACGGT
CTGGTGGCCGGGTGCGACGAGCTCGTGGTACTTGAGGCGCAGTAGGCGCGCTGTCGAAGATGTAGTCTGTCAGGCGCG
CACGAGGTACTGGTATCCGACGAGGAAGTGCGGCGGCGGCTGGCGGTAGAGCGGCCATCGCTCGGTGGCGGGGGCGCCGG
GCGCGAGGTCTCGAGCATGAGGCGGTGGTAGCCGTAGATGTACCTGGACATCCAGGTGATGCCGCGGCGGTTGGTGGAGG
CGCGCGGAACTCGCGGACGCGGTTCCAGATGTTGCGCAGCGGCAGGAAGTAGTTTCATGGTGGCCGCGTCTGGCCCGTGA
GGCGCGCGCAGTCGTGGATGCTTAGACATACGGGCAAAACGAAAGCGGTACGCGGCTCGACTCCGTGGCCTGGAGGCTA
AGCGAACGGGTTGGGCTGCGCGTGTACCCGGTTCGAATCTCGAATCAGGCTGGAGCCGACGTAACGTGGTACTGGCACTC
CCGTCTCGACCAAGCCTGCTAACGAAACCTCCAGGATACGGAGGCGGGTCTTTTTTGGCCTTGGTCTGCTGGTCATGAAAA
CTAGTAAGCGCGGAAAGCGGCCGCGCGATGGCTCGCTGCCGTAGTCTGGAGAAAGAATCGCCAGGGTTGCGTTGCGGTGT
GCCCCGTTTCGAGCCTCAGCGCTCGGCGCGGCGGATTCCGCGGCTAACGTGGGCGTGGCTGCCCCGTCGTTTCCAAGACCC
CTAGCCAGCCGACTTCTCCAGTTACGGAGCGAGCCCTCTTTTTTTCTTGTGTTTTTGCAGATGCATCCCGTACTGCGGCA
GATGCGCCCCACCTCCACCACAACCGCCCCTACCGCAGCAGCAGCAACAGCCGCGCTTCTGCCCCGCCCCAGCAGCAGC
CAGCCACTACCGCGGCGGCGCCGTGAGCGGAGCGGCGTTAGTATGACCTGGCCTTGAAGAGGGCGAGGGGCTGGCGC
GGCTGGGGGCGTCTGCGCGGAGCGGCACCCGCGCGTGCAGATGAAAAGGGACGCTCGCGAGGCCTACGTGCCAAGCAGA
ACCTGTTAGAGACAGGAGCGGCGAGGAGCCCCGAGGAGATGCGCGCTCCCGCTTCCACGCGGGGCGGGAGCTGCGGCGCG

Fig. 24D

GCCTGGACCGAAAGCGGGTGCTGAGGGACGAGGATTTTCGAGGCGGACGAGCTGACGGGGATCAGCCCCGCGCGCGCAC
GTGGCCGCGGCCAACCTGGTCACGGCGTACGAGCAGACCGTGAAGGAGGAGAGCAACTTCCAAAAATCCTTCAACAACCACG
TGCGCAGCTGATCGCGCGGAGGAGGTGACCCTGGGCTGATGCACCTGTGGGACCTGCTGGAGGCCATCGTGACAGAACCC
CACGAGCAAGCCGCTGACGGCGCAGCTGTTTCTGGTGGTGCAGCACAGTCGGGACAACGAGACGTTTCAGGGAGGCGCTGCT
GAATATCACCGAGCCCGAGGGGCCGCTGGCTCCTGGACCTGGTGAACATTTTGACAGCATCGTGGTGCAGGAGCGCGGGCTG
CCGCTGTCCGAGAAGCTGGCGGCCATCAACTTCTCGGTGCTGAGTCTGGGCAAGTACTACGCTAGGAAGATCTACAAGACCCC
GTACGTGCCATAGACAAGGAGGTGAAGATCGACGGGTTTTACATGCGCATGACCCTGAAAGTGCTGACCCTGAGCGACGAT
CTGGGGGTGTACCGCAACGACAGGATGCACCGCGCGGTGAGCGCCAGCCGCCGCGGAGCTGAGCGACCAGGAGCTGATG
CACAGCCTGCAGCGGGCCCTGACCGGGGCCGGGACCGAGGGGGAGAGCTACTTTGACATGGGCGCGGACCTGCGCTGGCAG
CCCAGCCGCCGGCCCTTGAAGCTGCCGGCGGTTCCCCCTACGTGGAGGAGGTGGACGATGAGGAGGAGGAGGGCGAGTAC
CTGGAAGACTGATGGCGCGACCGTATTTTGTAGATGCAGCAACAGCCACCGCCGCCCTCTGATCCCGCGATGCGGGCG
GCGCTGCAGAGCCAGCCGTCCGGCATTAACTCCTCGGACGATTGGACCCAGGCCATGCAACGCATCATGGCGCTGACGACCC
GCAATCCCGAAGCCTTAGACAGCAGCCTCAGGCCAACCGGCTCTCGGCCATCCTGGAGGCCGTGGTGCCTCGCGCTCGAAC
CCCACGCACGAGAAGGTGCTGGCCATCGTGAACCGCTGGTGGAGAACAAGGCCATCCGCGGTGACGAGGCCGGGCTGGTG
TACAACGCGCTGCTGGAGCGCTGGCCCCGCTACAACAGCACCAACGTGCAGACGAACCTGGACCGCATGGTGACCGACGTGC
GCGAGGCGGTGTCGACGCGGAGCGGTTCCACCGGAGTGAACCTGGGCTCCATGGTGGCGCTGAACGCCCTTCTGAGCAC
GCAGCCCGCAACGTGCCCCGGGGCCAGGAGGACTACCAACTTCATCAGCGCGCTGCGGCTGATGGTGGCCGAGGTGCC
CAGAGCGAGGTGTACAGTCGGGGCCGACTACTTCTCCAGACAGTCGCCAGGGCTTGACAGCCGTGAACCTGAGCCAGG
CTTTCAAGAACTTGAGGGACTGTGGGGCGTGCAGGCCCGGTGCGGGACCGCGCAGCGTGTGAGCCTGCTGACGCCGA
ACTCGCGCTGCTGCTGCTGGTGGCGCCCTTACCGACAGCGGCAGCGTGAAGCCGCGACTCGTACCTGGGCTACCTGCTT
AACCTGTACCGCGAGGCCATCGACAGGCGCACGTGGACGAGCAGACCTACCAGGAGATACCCACGTGAGCCGCGCGCTG
GGCCAGGAGGACCCGGGCAACCTGGAGGCCACCCTGAATTCCTGCTGACCAACCGGTGCGAGAAGATCCCGCCCCAGTACG
CGTGAGCACCGAGGAGGAGCGCATCCTGCGCTACGTGCAGCAGAGCGTGGGGCTGTTCTGATGCAGGAGGGGGCCACGC
CCAGCGCGGCGCTCGACATGACCGCGCGCAACATGGAGCCCAGCATGTACGCCCGCAACCGCCGTTTCATCAATAAGCTGATG
GACTACTTGATCGGGCGGCCCGCATGAACTCGGACTACTTTACCAACGCCATCTTGAACCCGCACTGGCTCCCGCGCCCGG
GTTCTACACGGGCGAGTACGACATGCCCCACCCCAACGACGGGTTCTGTGGGACGACGTGGACAGCAGCGTGTCTCGCCG
CGTCCAGGAACCAATGCCGTGTGGAAGAAAGAGGGCGGGGACCGGCGGCCGTCCTCGGCGCTGTCCGGTCGCGCGGGTGCT
GCCGCGCGGTGCCGAGGCGGCCAGCCCTTCCCGAGCCTGCCCTTTTCGCTGAACAGCGTGCAGCAGCAGAGCTGGGTC
GGCTGACGCGACCGCGCCTGCTGGGCGAGGAGGAGTACCTGAACGACTCCTTGTGAGGCCGAGCGCGAGAAGAACTTCCC
CAATAACGGGATAGAGAGCCTGGTGGACAAGATGAGCCGCTGGAAGACGTACGCGCACGAGCACAGGGACGAGCCCCGAGC
TAGCAGCGCAGGCACCCGTAGACGCCAGCGGCACGACAGGCAGCGGGGACTGGTGTGGGACGATGAGGATTCCGCCGACGA
CAGCAGCGTGTGGACTTGGGTGGGAGTGGTGGTAACCCGTTTCGCTCACCTGCGCCCCGATCGGGCGCCTGATGTAAGAA
TCTGAAAAAATAAAGACGGTACTACCAAGGCCATGGCGACCAGCGTGCGTTCTTCTGTTGTTGTAGTAGTATGATGAG
GCGCGTGTACCCGGAGGGTCTCTCCCTCGTACGAGAGCGTGATGCAGCAGGCGGTGGCGGCGCGATGCAGCCCCGCTG
GAGGCGCCTTACGTGCCCCGCGGTACCTGGCGCTACGGAGGGGCGGAACAGCATTGTTACTCGGAGCTGGCACCTTGT
ACGATACACCCGTTGTACCTGGTGGACAACAAGTCGGCAGACATCGCCTCGCTGAACTACCAGAACGACCACAGCAACTTC
CTGACCACCGTGGTGCAGAACAAACGATTTACCCCCACGGAGGCCAGCACCCAGACCATCAACTTTGACGAGCGCTCGCGGTG
GGGCGGCCAGCTGAAAACCATCATGCACACCAACATGCCAACGTGAACGAGTTCATGTACAGCAACAAGTTCAAGGCGCGG
GTGATGGTCTCGCGCAAGACCCCCAACGGGGTGGATGATGATTATGATGGTAGTCAGGACGAGCTGACCTACGAGTGGGTGG
AGTTTGAGCTGCCCAGGGCAACTTCTCGGTGACCATGACCATCGATCTGATGAACAACGCCATCATCGACAACTACTTGGCG
GTGGGGCGGCAGAACGGGGTGTGGAGAGCGACATCGGCGTGAAGTTCGACACGCGCAACTCCGGCTGGGCTGGGACCCC
GTGACCGAGCTGGTGTGTCGGGGCGGTACACCAACGAGGCTTCCACCCGACATCGTCTGCTGCCCCGCTGCGGCGTGG
ACTTCACCGAGAGCCGCTCAGCAACTGCTGGGCATCCGCAAGCGGCAGCCCTTCCAGGAGGGCTTCCAGATCCTGTACGAG
GACCTGGAGGGGGCAACATCCCCGCGCTCTGGATGTGCAAGCCTACGAGAAAAGCAAGGAGGATAGCACCGCCGCGGCG
ACCGCAGCCGTGGCCACCGCCTCTACCGAGGTGCGGGGCGATAATTTTGCTAGCGCTGCGGCAGCGGCCGAGGCGGTGAAA
CCGAAAGTAAGATAGTATCCAGCCGGTGGAGAAGGACAGCAAGGACAGGAGCTACAACGTGCTCGCGGACAAGAAAAACA
CCGCTACCGCAGCTGGTACCTGGCTACAACACGGCGACCCCGAGAAGGGCGTGCGCTCTGGACGCTGCTCACCACCTCG
GACGTCACTGCGCGTGGAGCAAGTCTACTGGTGCCTGCCCCACATGATGCAAGACCCGGTCACTTCCGCTCCACGCGTCA
AGTTAGCAACTACCCGGTGGTGGGCGCCGAGCTCTGCCGCTACTCCAAGAGCTTCTTCAACGAGCAGGCGCTACTCGC
AGCAGCTGCGCGCTTCACTCGCTACGCACGTCTTAACCGCTTCCCGAGAACAGATCCTCGTCCGCCGCCCGCGCCCA
CCATTACCACCGTCAGTGAACAGTTCTCTGCTCTACAGATCACGGGACCTGCGGCTGCGCAGCAGTATCCGGGGAGTCCAG

Fig. 24E

CGCGTGACCGTCACTGACGCCAGACGCCGACCTGCCCCCTACGTCTACAAGGCCCTGGGCGTAGTCGCGCCGCGCGTCCTCTC
GAGCCGCACCTTCTAAAAAATGTCCATTCTCATCTCGCCAGTAATAACACCGGTTGGGGCTGCGCGCGCCAGCAAGATGT
ACGGAGGCGCTCGCAACGCTCCACGCAACACCCCGTGC GCGTGC GCGGGCACTTCGCGCTCCCTGGGGCGCCCTCAAGGG
CCGCGTGC GCTCGCGCACCAACGTCGACGACGTGATCGACCAGGTGGTGGCCGACGCGCGCAACTACACGCCGCGCGCGG
CCCGTCTCCACCGTGAGCGCGTCACTGACAGCGTGGTGGCCGACGCGCGCGGTACGCCCCACCAAGAGCCGGCGCGCGG
GCATCGCCCGCGCGCACCGGAGCACCCCGCCATGCGCGCGCGCGAGCCTTGCTGCGCAGGGCCAGGCGCACGGGACGCA
GGGCCATGCTCAGGGCGGCCAGACGCGCGGCTCCGGCAGCAGCAGCGCCGGCAGGACCCGACAGCGCGGGCCACGGCG
GCGGGCGGGCCATCGCCAGCATGTCCCGCCCGCGGCGCGGCAACGTGTACTGGGTGCGCGACGCCGCCACCGGTGTGCGC
GTGCCCGTGC GCAACCGCCCCCTCGCACTTGAAGATGCTGACTTCGCGATGTTGATGTGTCAGCGGCGAGGAGGATGTCC
AAGCGCAAATACAAGGAAGAGATGCTCCAGGTATCGCGCTGAGATCTACGGCCCCGCGCGCGGTGAAGGAGGAAAGA
AAGCCCCGAACTGAAGCGGGTCAAAAAGGACAAAAAGGAGGAGGAAGATGACGGAAGTGGTGGAGTTTGTGCGCGAGTTC
GCCCCCGCGCGCGGTGCACTGGCGCGGGCGGAAAGTGAAACCGGTGCTGCGGCCGCGCACACGGTGGTCTTACGCCC
GGCGAGCGTTCCGGCTCCGCTCCAAGCGCTCTACGACGAGGTGTACGGGGACGAGGACATCCTCGAGCAGGCGGTGCGAGC
GTCTGGGCGAGTTTGGCTACGGCAAGCGCAGCCGCCCCGCGCCCTTGAAAGAGGAGGCGGTGTCCATCCCGCTGGACACGG
CAACCCACGCGGAGCCTGAAGCGGTGACCCTGCAGCAGGTGCTACCGAGCGCGGCGCGCGCGGGGCTTCAAGCGCGA
GGGCGGCGAGGATCTGTACCGACCATGCAGCTGATGGTGCCCAAGCGCCAGAAGCTGGAGGACGTGCTGGAGCATGAA
GGTGGACCCGAGGTGCAGCCGAGGTCAAGGTGCGGCCATCAAGCAGGTGGCCCCGGGCTGGGCGTGCAGACCGTGGA
CATCAAGATCCCCACGAGGCCATGGAAACGAGACCGAGCCCGTGAAAGCCAGCACCAGCACCATGGAGGTGCAGACGGAT
CCCTGGATGCCAGCACCAGCTTCCACCAGCACTCGCCGAAGACGCAAGTACGGCGCGGCCAGCCTGCTGATGCCAACTACGC
GCTGCATCCTTCCATCATCCCCACGCCGGGTACCGCGGCACGCGCTTACCGCGGTACACCAGCAGCCGCCGCGCAAGA
CCACCACCCGCCGCGTCTGTCGAGCCGCCGAGCAGCACCAGCGACTTCCGCTTGGTGGGAGAGTGTATCGCAGCGGGCG
CGAGCCTCTGACCTGCCGCGCGCGCTACACCCGAGCATCGCCATTAACTACCGCTCCTACTTGCAGATATGGCCCTCA
CATGCCGCTCCGCGTCCCATACGGGCTACCGAGGAAGAAAGCCGCGCGTAGAAGGCTGACGGGGAACGGGCTGCGTC
GCCATCACACCGCGCGCGCGGCCATCAGCAAGCGTTGGGGGAGGCTTCTGCCGCGCTGATCCCATCATCGCCGCG
GGCGATCGGGGCGATCCCGGCATAGCTTCCGTGGCGGTGCAGGCCTCTACGCGCACTGAGACACAAAAAGCATGGATTT
GTAATAAAAAAATGGACTGACGCTCCTGGTCTGTGATGTGTGTTTTAGATGGAAGACATCAATTTTTCGTCCTGGCA
CCGCGACACGGCACGCGGCCGTTTATGGGCACCTGGAGCGACATCGGCAACAGCCAAGTGAACGGGGCGCCTTCAATTGGA
GCAGTCTCTGGAGCGGGTTAAGAATTCGGGTCCACGCTCAAAACCTATGGCAACAAGGCGTGAACAGCAGCACAGGGCA
GGCGTGAAGGAAAAGCTGAAAGAACAGAACTTCCAGCAGAAGGTGGTTGATGGCCTGGCCTCAGGCATCAACGGGGTGGT
TGACCTGGCCAACAGGCCGTGCAGAAACAGATCAACAGCCGCTGGACGCGGTCCCGCCGCGGGGTCCGTGGAGATGCC
CAGGTGGAGGAGGAGTGCCTCCCTGGACAAGCGCGGCGACAAGCGACCGCTCCCGACGCGGAGGAGACGCTGCTGACG
CACACGAGCAGCCGCCCCGTACGAGGAGGCGGTGAACTGGGCCTGCCACCACGCGGCGCGTGGCGCTCTGGCCACCG
GAGTGTGAAACCCAGCAGCAGCCAGCCGCGACCTGGACTTGCTCCGCTCGCCCTCCACAGTGCTAAGCCCTGCCG
CCGTTGGCGTGC GTCGCGCGCCCCGAGGCCGCCCCAGGCGAACTGGCAGAGCACTCTGAACAGCATCGTGGGTCTGG
GAGTGCAAGTGTGAAGCGCCGCGCTGCTATTAAGACACTGTAGCGCTTAACTTGCTTGTGTGTATATGTATGTCC
GCCGACCAAGGAGGAGTGTGAAGAGCGCGTGC GCGAGTTGCAAGATGGCCACCCATCGATGCTGCCCCAGTGGGCGT
ACATGCACATCGCCGACAGGACGCTTCGGAGTACCTGAGTCCGGGTCTGGTGCAGTTCGCCGCGCCACAGACACCTACTT
AGTCTGGGGAACAAGTTTAGGAACCCACGGTGGCGCCACGCAGATGTGACCACCGACCGCAGCCAGCGGCTGACGCTGC
GCTTCGTGCCGTTGACCGCGAGGACAACACCTACTCGTACAAAGTGCGCTACACGCTGGCCGTGGGCGACAACCGCGTGT
GGACATGGCCAGCAGCTACTTTGACATCCGCGCGTGTGGACCGGGGCCCTAGCTTCAAACCTACTCTGGCACCAGCTACA
ACAGCCTAGCTCCCAAGGGAGCTCCCAATTCAGCCAGTGGGAGCAAGCAAAAACAGGCAATGGGGGAACTATGGAACACA
CACATATGGTGTGGCCCCAATGGGCGGAGAGAATATTACAAAAGATGGTCTTCAAATTGGAAGTACGTTACAGCGAATCAG
AATAAACCAATTTATGCCGACAAAACATTTCAACCAAGAACGCAAGTAGGAGAAGAAAATTGGCAAGAACTGAAAACTTTA
TGGCGGTAGAGCTCTTAAAAAGACACAAACATGAAACCTTGCTATGGCTCTATGCTAGACCCACCAATGAAAAAGGAGGTC
AAGCTAACTTAAAGTTGGAGATGATGGAGTTCACCAACAAAGAAATTCGACATAGACCTGGCTTCTTTGATACTCCGGTGGC
ACCGTGAACGGTCAAGACGAGTATAAAGCAGACATTGTGATGTATACGAAAACACGTATTTGGAACTCCAGACACGCATGT
GGTATACAAACAGGCAAGGATGATGCAAGTTCTGAAATTAACCTGGTTGAGCAGTCTATGCCAACAGACCCAACTACATTG
GGTTCAGGGACAATTTATCGGTCTTATGTACTACAACAGCACTGGCAATATGGGTGTGCTTGTGGTCAAGGCTCCAGCTGA
ATGCTGTGGTTGATTTGCAAGACAGAAACACCGAGCTGTCTACAGCTCTTGTGACTCTTTGGGTGACAGAACCCGGTATT
TCAGTATGTGGAACAGGCGGTGGACAGTTATGACCCGATGTGCGCATATCGAAAACCATGGTGTGGAGGATGAATTGCC
AACTATTGCTTCCCTTGGACGGCTCTGGCACTAACCGCGCATACCAAGGTGTGAAAGTAAAGATGGTCAAGATGGTGATG

Fig. 24F

TTGAGAGTGAATGGGAAAATGACGATACTGTTGCAGCTCGAAATCAATTATGTAAAGGTAACATTTTCGCCATGGAGATTAAT
CTCCAGGCTAACCTGTGGAGAAGTTTCTCTACTCGAACGTGGCCCTGTACCTGCCGACTCCTACAAGTACACGCCGACCAAC
GTCACGCTGCCGACCAACACCAACACCTACGATTACATGAATGGCAGAGTGACACCTCCCTCGCTGGTAGACGCCTACCTCAAC
ATCGGGGCGCGCTGGTCGCTGGACCCCATGGACAACGTCAACCCCTCAACCACCACGCAACGCGGGCTGCGCTACCGCTC
CATGCTCCTGGGCAACGGGCGCTACGTGCCCTTCCACATCCAGGTGCCCCAAAAGTTTTCGCCATCAAGAGCCTCCTGCTCCT
GCCCGGGTCTACACCTACGAGTGGAACCTCCGCAAGGACGTCAACATGATCTGCAGAGCTCCTAGGCAACGACCTGCGCA
CGGACGGGGCTCCATCGCCTTACCAGCATCAACCTCTACGCCACCTTCTTCCCATGGCGCACAACACCGCCTCCACGCTCG
AGGCCATGCTGCGCAACGACACCAACGACCAAGTCTTCAACGACTACCTCTCGGCGGCCAACATGCTCTACCCCATCCCGGCCA
ACGCCACCAACGTGCCCATCTCCATCCCCTCGCGCAACTGGGCGCCTTCCGCGGATGGTCTTACGCGCCTGAAGACCCGCG
AGACGCCCTCGCTCGGCTCCGGGTTCCGACCCCTACTTCTGCTACTCGGGCTCCATCCCCTACCTAGACGGCACCTTCTACCTCAA
CCACACCTTCAAGAAGGTCTCCATACCTTCGACTCCTCCGTGAGCTGGCCCGGCAACGACCGCCTCCTGACGCCAACGAGTT
CGAAATCAAGCGCACCGTCGACGGAGAGGGATAACAGTGGCCAGTGCAACATGACCAAGGACTGGTTCCTGGTCCAGATG
CTGGCCCACTACAACATCGGCTACCAGGGCTTCTACGTGCCCGAGGGCTACAAGGACCGCATGTACTCCTTCTTCCGCAACTTC
CAGCCCATGAGCCGCCAGGTCTGTGGACGAGGTCAACTACAAGGACTACCAGGCCGTACCCCTGGCCTACCAGCACAACAATC
GGGCTTCGTGCGCTACCTCGCGCCACCATGCGCCAGGGCCAGCCCTACCCCGCCAACTACCCCTACCCGCTCATCGGCAAGA
GCGCCGTGCGCAGCGTACCCAGAAAAAGTTCTCTGCGACCGGGTCATGTGGCGCATCCCCTTCTCCAGCAACTTTCATGTCCA
TGGGCGCGCTACCGACCTCGGCCAGAACATGCTCTACGCCAACTCCGCCACGCGCTAGACATGAATTCGAAGTCGACCCC
ATGGATGAGTCCACCTTCTCTATGTTGTCTTGAAGTCTTGCAGCTGTCGAGTGACCCAGCCCCACCGCGGCGTCATCGAA
GCCGTCTACCTGCGCACGCCCTTCTCGGCCGGCAACGCCACCACTAAGCCGCTCTTGCTTCTGCAAGATGACGGCGGGCTCC
GGCGAGCAGGAGCTCAGGGCCATCCTCCGCGACCTGGGCTGCGGGCCCTGCTTCTGGGACCTTCGACAAGCGCTTCCCTG
GATTCATGGCCCCGACAAGCTGGCCTGCGCCATCGTGAACACGGCCGCGCGAGACCGGGGGCGAGCACTGGCTGGCCTT
CGCCTGGAACCCGCGCTCCACACATGCTACCTTTCGACCCCTTCGGGTTCTCGGACGAGCGCCTCAAGCAGATCTACCAGTT
CGAGTACGAGGGCCTGCTGCGTCGACGCGCCCTGGCCACCGAGGACCGCTGCGTCACCTGGAAAAAGTCCACCCAGACCGTG
CAGGGTCCGCGCTCGGCCGCTGCGGGCTTCTGCTGTCATGTTCTGTCACGCTTCTGTCAGTGGCCCCGACCGCCCCATGGAC
AAGAACCCACCATGAACTTACTGACGGGGGTGCCAACGGCATGCTCCAGTCGCCCCAGGTGGAACCCACCTGCGCCGCAA
CCAGGAAGCGCTTACCGCTTCTCAATGCCACTCCGCTACTTTCGCTCCACCGCGCGCATCGAGAAGGCCACCGCCTT
CGACCGCATGAATCAAGACATGTAAAAAACCGGTGTGTGTATGTGAATGCTTTATTATATAATAAACAGCACATGTTTATGCCAC
CTTCTCTGAGGCTCTGACTTTATTTAGAAATCGAAGGGGTCTGCCGGCTCTCGGCATGGCCCGCGGGCAGGGATACGTTGCG
GAACTGGTACTTGGGCAGCCACTTGAACCTCGGGGATCAGCAGCTTGGGCACGGGGAGGTGGGGAAACGAGTCGCTCCACAG
CTTGCGCGTGAGTTGCAGGGCGCCAGCAGGTGCGGGCGGGAGATCTTGAATCGCAGTTGGGACCCGCGTTCTGCGCGCGA
GAGTTGCGGTACACGGGGTTCAGCACTGGAACACCATCAGGGCGGGGTGCTTACGCTTGCCAGCACCGTCGCGTCGGTGA
TGCCCTCCACGTCCAGATCCTCGGCGTTGGCCATCCCGAAGGGGGTCATCTTGAGGTCTGCCGCCCATGCTGGGCACGCAG
CCGGGCTTGTGTTGCAATCGCAGTGACGGGGATCAGCATCATCTGGGCCTGCTCGGAGCTCATGCCGGGTACATGGCCTT
CATGAAAGCCTCCAGCTGGCGGAAGGCCTGCTGCGCCTTGCCGCCCTCGGTGAAGAAGACCCCGCAGGACTTGCTAGAGAAC
TGTTTGGTGGCGCAGCCGGCTGCTGACGCAGCAGCGCGCTGTTGTTGGCAGCTGCACACGCTGCGCCCCCAGCGGT
TCTGGGTGATCTTGGCCCGGTTGGGGTTCTCTTCAGCGCGCGCTGCCGTTCTCGCTCGCCACATCCATCTCGATAGTGTGCT
CCTTCTGGATCATCAGGTCCCGTGACGGCACCGCAGCTTGCCCTCGGCTTCCGTGACGCGTGCAGCCACAGCGCGCAGCCG
GTGCACTCCAGTTCTTGTGGGCGATCTGGGAGTGCGAGTGACGAAGCCCTGCAGGAAGCGGCCCATCATCGCGGTACAGGG
TCTTGTGCTGGTGAAGGTACGCGGGATGCCGCGGTGCTCCTCGTTACATACAGGTGGCAGATGCGGCGGTACACCTGCCCC
TGCTCGGGCATCAGCTGGAAGGCGGACTTACAGTCTCTCCACGCGGTACCGGTCCATCAGCAGCGTCATCACTTCCATGCC
CTTCTCCAGGCCGAAACGATCGGCAGGCTCAGGGGGTTCTTACCGCCATTGTCATCTAGTCGCCCGCCGAGGTACAGGG
GGTCGTTCTCGTCCAGGGTCTCAAACACTCGCTTGCCGTCTTCTCGATGATGCGCACGGGGGAAAGCTGAAGCCACGGCC
GCCAGCTCCTCCTCGGCTGCTTTCGTCTCGCTGTCTGGCTGATGTCTTGCAAAGGCACATGCTTGGTCTTGGGGGTTTCT
TTTTGGGCGGAGAGGGCGGCGGATGTGCTGGGAGAGCGGAGTTCTGTTACCACGACTATTCTTCTTCTTGGCCGTG
TCCGAGACCACGCGGGGTAGGCATGCTTCTGGGGCAGAGGGGAGGCGACGGGCTCTCGGGTTCGGCGGGCGGGCTG
GCAGAGCCCTTCCGCGTTGGGGGTGCGCTCTGGCGGCGCTGCTGACTGACTTCTCCGCGGCGCGGCCATTGTGTTCTCC
TAGGGAGCAACAACAAGCATGGAGACTCAGCCATCGTCGCCAACATCGCCATCTGCCCCCGCCGACCGCCGACGAGAACCA
GCAGCAGAATGAAAGCTTAACCGCCCCGCGCCAGCCCCACCTCCGACCGCGCGGCCCCAGACATGCAAGAGATGGAGGAA
TCCATCGAGATTGACCTGGGCTACGTGACGCGCGGAGCACGAGGAGGAGCTGGCAGCGCGCTTTTCAGCCCCGGAAGAGA
ACCAACCAAGAGCAGCCAGAGCAGGAAGCAGAGAACGAGCAGAACCAGGCTGGGCACGAGCATGGCGACTACCTGAGCGGG
GCAGAGGACGTGCTCATCAAGCATCTGGCCCGCAATGCATCATCGTCAAGGACGCGCTGCTGACCCGCGCGGAGGTGCCCCCT

Fig. 24G

CAGCGTGGCGGAGCTCAGCCGCGCCTACGAGCGCAACCTCTTCTCGCCGCGCGTGCCCCCAAGCGCCAGCCCAACGGCACCT
GTGAGCCCAACCCGCGCCTCAACTTCTACCCGGTCTTCGCGGTGCCCCGAGGCCCTGGCCACCTACCACCTCTTTTTCAAGAACC
AAAGGATCCCCGTCTCCTGCCGCGCAACCGCACCCGCGCGGACGCCCTGCTCAACCTGGGCCCCGGCGCCCCGCTACCTGAT
ATCACCTCCTTGAAGAGGTTCCCAAGATCTTCGAGGGTCTGGGCAGCGACGAGACTCGGGCCGCAACGCTCTGCAAGGAA
GCGGAGAGGAGCATGAGCACCACAGCGCCTGGTGGAGTTGGAAGGCGACAACGCGCGCCTGGCGGTCTCAAGCGCACGG
TCGAGCTGACCCACTTCGCCTACCCGGCGCTCAACCTGCCCCCAAGGTATGAGCGCGTCATGGACCAGGTGCTCATCAAG
CGCGCCTCGCCCTCTCGGAGGAGGAGATGCAGGACCCCGAGAGTTCGGACGAGGGCAAGCCCGTGGTCAGCGACGAGCAG
CTGGCGCGCTGGCTGGGAGCGAGTAGCACCCCCAGAGCCTGGAAGAGCGGCGCAAGCTCATGATGGCCGTGGTCTGGTG
ACCGTGAGCTGGAGTGTCTGCGCCGCTTCTTGGCGACGCGGAGACCCTGCGCAAGGTGAGGAGAACCTGCACTACCTCTT
CAGGCACGGGTTCTGTGCCAGGCCTGCAAGATCTCCAACGTGGAGCTGACCAACCTGGTCTCCTACATGGGCATCTGCAAG
AGAACCCTGGGGCAAAACGTGCTGCACACCACCTGCGCGGGGAGGCCCGCCGCGACTACATCCGCGACTGCGTCTACCT
GTACCTCTGCCACACCTGGCAGACGGGCATGGGCGTGTGGCAGCAGTGCCTGGAGGAGCAGAACCTGAAAGAGCTCTGCAA
GCTCCTGCAGAAGAACCTCAAGGCCCTGTGGACCGGGTTCGACGAGCGTACCACCGCCTCGGACCTGGCCGACCTCATCTTC
CCGAGCGCCTGCGGCTGACGCTGCGCAACGGGTGCCCCGACTTATGAGCCAAAGCATGTTGCAAACTTTGCTCTTTCATCC
TCGAACGCTCCGGGATCTGCCGCGCACCTGCTCCGCGCTGCCCTCGGACTTCGTGCCGCTGACCTTCGCGAGTGCCCCCGC
CGCTCTGGAGCCACTGCTACTTGTGCGCCTGGCCAACTACCTGGCCTACCACTCGGACGTGATCGAGGACGTGAGCGGCGAG
GGTCTGCTGGAGTGCCACTGCCGCTGCAACCTCTGCACGCCGACCGCTCCCTGGCCTGCAACCCCCAGCTGCTGAGCGAGAC
CCAGATCATCGGCACCTTCGAGTTGCAAGGCCCGGCGACGGCGAGGGCAAGGGGGTCTGAAACTACCCCGGGGCTGTG
GACCTCGGCCTACTTGCGAAGTTCGTGCCGAGGACTACCATCCCTTCGAGATCAGGTTCTACGAGGACCAATCCCAGCCGCC
CAAGGCCGAGCTGTGGCCTGCGTCATCACCCAGGGGGCCATCTGGCCCAATTGCAAGCCATCCAGAAATCCCGCCAAGAAT
TTCTGCTGAAAAAGGGCCACGGGTCTACTTGGACCCCCAGACCGGAGAGGAGCTCAACCCAGCTTCCCCAGGATGCCCGG
AGGAAGCAGCAAGAAGCTGAAAGTGGAGCTGCCGCCCGGAGGATTGGAGGAAGACTGGGAGAGCAGTCAGGCAGAGG
AGGAGGAGATGGAAGACTGGGACAGCACTCAGGCAGAGGAGGACAGCCTGCAAGACAGTCTGGAGGAGGAAGACGAGGT
GGAGGAGGAGAGGAAGAAGCAGCCGCCGCGCAGACCGTCTGCTCGGCGGAGAAAGCAAGCAGCAGGATACCATCTCCGC
TCCGGGTGCGGGTTCGCGCGGCCGGGCCACAGTAGGTGGGACGAGACCGGGCGCTTCCCGAACCCACCCAGACCGG
TAAGAAGGAGCGGCAGGGATACAAGTCTGGCGGGGGCACAAAACGCCATCGTCTCCTGCTTGAAGCCTGCGGGGGCAA
CATCTCCTTACCCGGCGTACCTGCTCTTCCACCGCGGGGTGAACCTCCCCGCAACATCTTGCACTTACTACCGTCACCTCCAC
AGCCCTACTACTGTTTCAAGAAGAGGCAGAAACCCAGCAGCAGCAGAAACCAGCGGCAGCAGCAGCTAGAAAAATCCACA
GCGGCGGACAGTGGAAGTGGAGTTCGCGCGCAACGAGCCGGCGCAGACCCGGGAGCTGAGGAACCGGATCTTCCACCCCTC
TATGCCATCTTCCAGCAGAGTCGGGGGACAGGAGCAGGAAGTGAAGTCAAGAACCGTTCTGCGCTCGCTACCCGCAAGTTG
TCTGTATCACAAGAGCGAAGACCAACTTCAGCGCACTCTCGAGGACGCCGAGGCTCTTCAACAAGTACTGCGCGTCACTCT
TAAAGAGTAGCCCGCGCCGCCACACAGGAAAAAGGCGGAATTACGTACACACCTGCGCCCTTCGCCGACCATCATGAG
CAAAGAGATTCCACGCTTACATGTGGAGCTACCAGCCCCAGATGGGCTGGCCGCCGCGCGCCAGGACTACTCCACCC
GCATGAACTGGCTCAGTGCCGGGCCGCGATGATCTACGGGTGAATGACATCCGCGCCACCGAAACAGATACTCTAGAA
CAGTCAGCGATACCGCCACGCCCGCATCACCTTAATCCGCGTAATTGGCCCGCGCCCTGGTGTACCAGGAAATCCCCAG
CCCACGACCGTACTACTTCCGCGAGACGCCAGGCCGAAGTCCAGCTGACTAACTCAGGTGTCCAGCTGGCCGGCGGCGCCG
CCTGTGTCGTACCCGCCCGCTCAGGGTATAAAGCGGCTGGTGATCCGAGGCAGAGGCACACAGCTCAACGACGAGGTGGTG
AGCTCTTCGCTGGGTCTGCGACCTGACGGAGTCTTCAACTCGCCGATCGGGGAGATCTTCCTTACGCCTCGTCAGGCCGTC
CTGACTTTGGAGAGTTCGTCTCGCAGCCCCGCTCGGGCGGCATCGGCACTCTCCAGTTCGTGGAGGAGTTCACTCCCTCGGTC
TACTTCAACCCCTTCTCCGGCTCCCCCGGCCACTACCCGACGAGTTCATCCGAACCTCGACGCCATCAGCGAGTCGGTGGAC
GGCTACGATTGAATGTCCATGGTGGCGCAGCTGACCTAGCTCGGCTTCGACACCTGGACCACTGCCGCCGCTTCCGCTGCTTC
GCTCGGGATCTCGCCGAGTTTGCTACTTTGAGCTGCCCGAGGAGCACCTCAGGGCCAGCCACGGAGTGCGGATCATCGT
CGAAGGGGGCCTCGACTCCACCTGCTTCGGATCTTCAGCCAGCAGCGATCCTGGTCGAGCGCGAACAAGGACAGACCCTTC
TTACTTTGACTGCATCTGCAACACCCCGCCTGCATGAAAGTCTTTGTTGTCTGCTGTGACTGAGTATAATAAAGCTGAGA
TCAGCGACTACTCCGACTCGATTGTGGTGTCTGCTATCAACCGGTCCCTGTTCTTACCGGGAACGAGACCGAGCTCCAGC
TCCAGTGTAAGCCCCACAAGAAGTACCTACCTGGTGTTCAGGGCTCCCCGATCGCCGTTGTCAACCACTGCGACAACGAC
GGAGTCTGCTGAGCGGCCCTGCCAACCTTACTTTTCCACCCGAGAAGCAAGCTCCAGCTCTTCAACCTTCTCCCCGGG
ACCTATCAGTGCGTCTCAGGACCTGCCATCACACCTTCCACCTGATCCGAATACCACAGCGCCGCTCCCCGCTACTAACAACC
AACTACCCACCAACGCCACCGTCGCGACCTTCTCTGAATCTAATACCACTACCGGAGGTGGCTTCTGCTGTAGTGCTCCCC
CGTCCCGTCGACCCCGGTCCCCACTCAGTCCCCGAGGAGGTTGCAAATGCAAATCCAAGAACCTGGAAATTCCTCAAA
TGCTACCGCCAAAAATCAGACATGCATCCAGCTGGATCATGATCATTGGGATCGTGAACATTCTGGCTGCACCTCATCTCC

Fig. 24H

TTTGTGATTACCCCTGCTTTGACTTTGGTTGGAACCTCGCCAGAGGCGCTCTATCTCCCGCTGAACCTGACACACCACCACAGC
AGCAACCTCAGGCACACGCACTACCACCACCACAGCCTAGGCCACAATACATGCCCATATTAGACTATGAGGCCGAGCCACAG
CGACCATGCTCCCGCTATTAGTTACTTCAATCTAACCGGCGGAGATGACTGACCACTGGCCAATAACAACGTCAACGACCT
TCTCTGGACATGGACGGCCGCGCTCGGAGCAGCGACTCGCCCACTTCGCATTCTGTCAGCAGCAGGAGAGAGCCGTCAAG
GAGCTGCAGGACGGCATAGCCATCCACCAGTGCAAGAGAGGCATCTTCTGCCTGGTGAACAGGCCAAGATCTCTACGAGG
TCACCCAGACCGACCATCGCCTCTCTACGAGCTCTGCAGCAGCGCCAGAAGTTCACCTGCCTGGTGGAGTCAACCCCATCG
TCATCACCAGCAGTGGGGGATACCAAGGGGTGCATCCACTGCTCTGCGACTCCCCGACTGCGTCCACACTCTGATCAAGA
CCCTCTGCGGCTCCGCGACCTCTCCCATGAACATAACCCCCCTTATCCAGTGAAATAAAGATCATATTGATGATTGATTTAA
ATAAAAAAATAATCATTGATTGAAATAAAGATACAATCATATTGATGATTGAGTTTAAACAAAAATAAAGAATCACTTACTT
GAAATCTGATACCAGGTCTCTGTCCATGTTTTCTGCCAACACCACCTCACTCCCCTCTCCAGCTCTGGTACTGCAGGCCCGG
CGGGTGCAAACTTCTCCACACGCTGAAGGGGATGTCAAATTCCTCTGTCCCTCAATCTTCATTTTATCTTATCAGATGTC
CAAAAAGCGCGTCCGGGTGGATGATGACTTCGACCCCGTCTACCCCTACGATGCAGACAACGCACCGACCGTGCCTTCATCA
ACCCCTCTCGTCTCTCAGATGGATTCCAAGAGAAGCCCTGGGGGTGTTGTCCCTGCGACTGGTGCACCCGTCAACCCA
AGAACGGGGAAATCACCTCAAGCTGGGAGAGGGGGTGGACCTCGACTCGTGGGAAAACTCATCTCAACACGGCCACCA
GGCGGCGCCCTCTCAGTATTTCAAACAACACCATTTCCCTTAAACTGCTGCCCTTTCTACAACAACAATGAACTTTAAAG
CTCAATGTCTCCACAGTATAGCAGTATTTCCACATTTAACACTTTAGGCATAAGTCTTGGAAACGGTCTCAGACTTCAAATA
AGTTGTTGACTGTACAATACTCATCTCTTACATTGAGTCAAATAGCATCACAGTAAAAACAGACAAAGGGCTATATATTA
ACTCCAGTGGAACAGAGGACTTGAGGCTAATATAAGCCTAAAAAGAGGACTAGTTTTGACGGTAATGCTATTGCAACATAT
ATTGGAATGGCTTAGACTATGGATCTTATGATAGTGATGGAACAAAGACCCGTAATTACCAAAATTGGAGCAGGATTAAA
TTTTGATGCTAACAAAGCAATAGCTGTCAAATAAGGCACAGGTTTAAAGTTTGACTCCGCTGGTGCCTTGACAGCTGGAACAA
ACAGGATGACAAGCTAACCTTTGGACTACCCCTGACCAAGCCCTAATTGTCAATTACTTTCAGACAGAGATGCCAAATTTAC
TCTGTCTTACAAAATGCGTAGTCAAATACTAGGCACTGTGGCAGTGGCGGCTGTTACTGTAGGATCAGCACTAAATCCAA
TAATGACACAGTCAAAAGCGCCATAGTTTTCTTAGATTGATTCGATGGTGTACTCATGTCAAACATCATCAATGGTAGGTGA
TTACTGGAATTTAGGGAGGGACAGACCACTCAAAGTGTAGCCTATACAAATGCTGTGGGATTCATGCCAAATATAGGTGCAT
ATCAAAAACCCAAAGTAAACACCTAAAAATAGCATAGTCAGTCAGGTATATTTAACTGGAGAACTACTATGCCAATGACA
CTAACCATAACTTTCAATGGCACTGATGAAAAAGACACAACCCCAAGTTAGCACCTACTCTATGACTTTTACATGGCAGTGGACT
GGAGACTATAAGGACAAAAATATTACCTTTGCTACCAACTCATTTCTTTTCTACATCGCCAGGAATAATCCCACCCAGCAA
GCCAACCCCTTTTCCACCACCTTTGCTATATGGAACCTGAAACAGAAAAATAAAGTTCAAGTGTATTATTGAATCAACAGT
TTTACAGGACTCGAGCAGTTATTTTTCTCCACCCTCCAGGACATGGAATACACCACCCTCTCCCCCGCAGCAGCTTGAACAT
CTGAATGCCATTGGTGATGACATGCTTTTGGTCTCCAGTTCCACAGTTTCAGAGCGAGCGATCTCGGATCGGTGACGG
AGATGAAACCTCCGGGCACTCCGCTCTGCACCTCACAGCTCAACAGCTGAGGATTGTCTCGGTGGTGGGATCACGGT
ATCTGGAAGAAGCAGAAGAGCGGCGGTGGGAATCATAGTCCGCGAACGGGATCGGCGGCTGGTGTGCGATCAGGCCCGCA
GCAGTCGCTGCCGCGCGCTCCGTCAAGCTGCTGCTCAGGGGTTCCGGTCCAGGGACTCCCTCAGCATGATGCCACGGCC
CTCAGCATAGTCGTCTGGTGGCGGGCGGCGCAGCAGCGCATGCGAATCTCGCTCAGGTCACTGCAGTACGTGCAACACAGGA
CCACCAGGTTGTTCAACAGTCCATAGTTCAACACGCTCCAGCCGAACTCATCGCGGAAGGATGCTACCCACGTGGCGCTCG
TACCAGATCTCAGTAAATCAAGTGGCGTCCCTCAGAAGACGATGCCATGTACATGATCTCTTGGGCATGTCGCGGTTT
ACCACCTCCCGGTACCACATCCCTCTGGTTGAACATGCAGCCCGGATGATCCTGCGGAACACAGGGCCAGCAGCCCTC
GCCCGCATGCAGCGAAGAGACCCCGATCCCGCAATGACAATGGAGGACCCACCGCTCGTACCCGTGGATCATCTGGGAG
CTGAACAAGTCTATGTTGGCACAGCACAGGCATATGCTCATGCATCTCTCAGCACTCTCAGTCTCTCGGGGTCAAAACCAT
TCCAGGGCACGGGAACCTTTCAGGACAGCGAACCCCGCAGAACAGGGCAATCCTCGCACATAACTTACATTGTGCATGG
ACAGGGTATCGCAATCAGGCAGCACCGGGTATCTCCACCAGAGAAGCGCGGTCTCGGTCTCTCACAGCGTGGTAAGGG
GGCGGGCGGATACGGGTGATGGCGGGACGCGGCTGATCGTGTCTCGACCGTGTGATGATGCAAGTGTCTTCGCAATTTTCTG
TACTTGCTAGCAGAACTGTGTCGGGCGCTGCACACAGTATCGCGCGGCGGTCTCGGCGCTTGGAACGCTGAGTGTAA
AGTTGTAAAACAGCCACTCTCTCAGACCGTGCAGCAGTCTAGGGCTCAGGAGTGATGAAGATCCCATGCTCATGCTGATGCT
CTGATCACATCGACCACCGTGGAAATGGGCCAGGCCAGATGATGCAATTTTGTGGTTCGGTGACGGCGGGGAGG
GAAGAACAGGAAGAACCATGATTAATTTTAAATCCAACGGTCTCGGAGCACTTCAAATGAAGGTACGGAGATGGCACCTC
TCGCCCCGCTGTGTTGGTGGAAAAAATACAGCCAGGTCAAAGGTGATACGGTCTCGAGATGTTCCACGGTGGCTCCAGCAA
AGCCTCCACGCGCACATCCAGAAACAAGACAATAGCGAAAGCGGGAGGGTCTCTAATTCTCAACCATCATGTTACACTCTG
CACCATCCCCAGATAATTTTCATTTTCCAGCCTTGAATGATTCGAAGTCTCTGAGGTAATCCAAGCCAGCCATGATAAAA
AGCTCGCGCAGAGCACCTCCACCGGCTTTAAGCACACCTCATAATTTCAAAGATATTCTGCTCTGGTTACCTGCGCA
GATTGACAAGCGGAATATCAAAATCTCTGCGCGATCCCTGAGTCTCCCTCAGCAATAACTGTAAGTACTCTTTCATATCGTC
TCCGAAATTTTATGCCATAGGACCCCAAGGAATAAGAGAAGGGCAAGCCACATTACAGATAAACCGAAGTCCCCCAGTGAG
CATTGCCAATGTAAGATTGAAATAAGCATGCTGGCTAGACCCGGTGATATCTTCCAGATAACTGGACAGAAAAATCGGGTAAG
CAATTTTTAAGAAAATCAACAAAAGAAAAATCTTCCAGGTGCACGTTTAGGGCTCGGGAACAACGATGGAGTAAGTGAAG
GGGTGCGTTCAGCATGTTAGTTAGCTGATCTGTAAAAAACAATAAATCAATTAACCATGCTAGCCTGGCGAACAGG
TGGGTAAATCGTTCTCCAGCACAGGCAGGCCACGGGTCTCCGGCGCGACCTCGTAAAAATTGTGCTATGATTGAAAA
CCATCACAGAGAGAGCTTCCGGTGGCGGCGTGAATGATTGAGAAGAACATACACCCCGGAACATTTGAGTCCGTGAG
TGAAAAAAGCGGCGGAGGAAGCAATGAGGCATAACACGCTCACTCAAAGTCCAGCAAGCGATGCCATGCGGATGAAGC
ACAAAATTTTCAAGTGGTAAAAATGTAATTACTCCCTCTGCACAGGCAGCGAAGCTCCCGATCCCTCCAGATACACATAC
AAAGCCTCAGCGTCCATAGCTTACCAGCGGCGCAGCAGCGGCACACAACAGGCGCAAGAGTCAGAGAAAAGACTGAGCT
CTAACCTGTCCGCGCTCTCTGCTCAATATATAGCCCCAGATCTACACTGACGTAAAGGCCAAAGTCTAAAAATACCCGCCAA
ATAATCACACACGCCCAGCACACGCCCAGAAACCGGTGACACACTCAGAAAAATACGCGCACTTCTCAAACGGCCAACTGC
CGTCAATTTCCGGGTTCCACGCTACGTATCAAAACACGACTTTCAAATTCGTCGACCGTTAAAAACATACCCGCCCCGCC
TAACGGTCCGCGCTCCGCGAGCAATACCTTCTCCCTCCCAAAATCAAACAGCTCATTTGCATATTAACGCGCACCAAAAGT
TTGAGGTATATTATTGATGATG

Fig. 24I

AdC6 020-DU172gp160(E1620) Amino acids – SEQ ID NO: 13**The symbol “ * ” refers herein to stop codons in the non coding regions**

HHQ*YTSNFWCALICK*AV*IWGGRKVICGSGDR*GRGG*RFDDVAMRRSRFASSRGKSDVKRGVV*TRKYSIFPRSLTGNEVFL
 GGCK*KRAIFARKLNEEVKI*VISRLWQGGVFAEGRVDFDRLRGGFDYRIFHLNFRVRCQSPVFLRTISFPRKCHLTVTITVLR*RLRS
 PDPLWCTLSTICSDAA*LSQYLLPACVLEVAE*CASKI*ATTRQGLTDNCMKNLRRVRRFALLRDVRARYTR*H*LLTSMPTPIDVN
 DGKWPAPWHYAQYMTLWDFPTWQYIYVLVIAITMVMRWFQYINGRG*RFDSRGFPSLHPIDVNGSLFWHQNRDFPKCRNNSA
 PLTQMGGRRVRWEVYISRARLVNRQITRSFIADVYHS*IANAVSASDTSVNLRLLEYLIRLTIG*LRLEFDATMRVMGILRSYQQWWI
 WGILGFWMMLICNVWGNLWVTVYGVVWKEAKTTLFCASDAKAHKEEVHNIWATHACVPTDPPNPQEIIVLKNVTENFNMWK
 NDMVDQMHEDIISLWDQSLKPCVKLTPLCVTLNCSVDKIKGTATYNNATYNNNNNTISDMKNCSFNNTTEITDKKKKEYALFYKLDV
 VALDGKETNSTNSSEYRLINCNTSAVTQACPKVSFDPIPIHYCAPAGYAILKCNKTFNGTGPCNNVSTVQCTHGKPKVVSTQLLNG
 SLAEVEVIRFENLTNNAKIIIVHLNESVEINCTRPSNTRKSVRIGPGQTFATGDIIGDIRQAHCNISRKKWNTTLQRVKEKLEKEFPN
 KTIQFAPSSGGDLEITTHSFNCRGEFFCYTDLFNSTYMSNNTGGANITLQCRIKQIIRMWQGVQAMYPPIAGNITCKSNITGLL
 LTRDGGKEKNDTETFRPGGDMRDNRSELYKYKVVEIKPLGIAPDKAKRRVVEREKRAVGIGAVFLGFLGAAGSTMGAASMTLT
 VQARQLLSGIVQQSNLLRAIEAQQHMLQLTVWGIKQLQTRVLAIERLYKDDQLLGIWGCSGKLICTTAVPWNASWSNKSYYEIIW
 GNMWTWMQWDREINNYNTIYSLLEESQNQKEKNEKDLLALDSWESLWSWFNITNWLWYIRIFIIIVGGGLIGLRIIFAVLSIVNRVRQ
 GYSPLSFQTLTPSPREPDRLGRIEEEGGEQDRARSVRLVNGFLALAWEDLRSLCLFSYHRLRDLILIAARAAALLGRSSLWGLQKGWE
 ALKYLGLSVQYWGLELKKSAISLDAITVAEGTDRIINIVQRISAFYNIPRRIRQGFEATLQ*GTSRVDPPGGQTADQPRCLLVASHL
 LFAPPPCLP*PWKVPLPSFPNKMRLHRIV*VGVILFWGVGWGRTARGRIGKTIAGMLGMRWALWLLRRKEPADLQI*IHLCRVR
 RKR**NGIMGIMGLH**IGQISTYAGHRACGLAPPQDMARVRAQRHDPLQCAPGLPPRHVHALPVQHAICEGAAGARCHVQSEP
 DGGV*HECGAVENSEI**IQDQVPGLMRMRQARQASARVCGGDGGPATRSFGVVLQRDGVRLQRGRI*LE*VVFAGCEPA*GA
 E*LKSVMFCVLQQHERKRL*GRGIQPLSDGASPLLGSSASECDGIHGGPARAAARELFNPDLRDPELLVRGRSCRRSCCFRRQRAR
 NGPGRRLQLSGGQLEFHQ*SRQPERGEAAAADGPARGPDAPGRADPAGGSAAGGDAGRGCHGENQIKNESINKRRRLILTQS
 LESLDFDSRAVGPVPPVSIIEHPVDLFQDPVEVGLDVEVHGHEPVPVGEVAPLQGLVLGDGVVNHPIAGAQQVVLHDVLEEETDG
 HGQPLGVGVDEPVELGGMHAGGDEMHLGLDLEIGDVPQIPPGVHVVDQHQHGVSGALGEFVMQLGREGVKEFGDALVTAQV
 FHAIHDDGDGPVGGGLGKDVSGVGHIVVVVLGELVIGHFNEFGAEGARLGDEGALDPGGVALADLHLPGLGELGGGDHVLHGRD
 EKNGFRGGGDELGRKQVPEQLGLAATGGAVDDPDDRLQVVEGETAAVLAEEGGHLVHHLAHMHVLAHEFRQEALAPQRELL
 QRGEVFQRLESVGHGHFGEGLLQEFQTVPELGDVL*GISIQQTSSFRGLGRLE*GTRRWASSEARVRSFQGRVRVSVSVTVKGC
 APGWALARVRFRILRLVENRRSAPCASAR*QLSMSS*LSASAAWPLARSLPLEVCPQTGQRRDLRA*SLGARKTDSGA*ASAPQLA
 QTVSHSTSQVRSRGLSGKTRFPFCFLMRFLPLVSMSSCPRWVTKRLSVSP*TDFMGRSSSGVPRSSS*RNPAHSETKARVQASTKEA
 TWEG*RLSTSGSTFSRVCKHMSPTSRSKVIGL*V*AT*PGVPAGGV*KGAGPCSSSLSSGSLRSASCWGYSLSKAGMTSALRLS
 VSRNEEDLITVPLETFMSPSSIWSEKTIFLLSSLVAKEP*RALESSLAMERMVWFFSLARSALAAMLSCITYSRATHFHSKTVVSSSG
 TILTRQPRLCVRMRSTLVATSPRRGSLVQQRPPLEQKGGSGSSMSSSGSASTVKMPGRSSGSK*LMQVPRLSAACQSRTASA
 RS*GLRGVPQGMGCVSAEAYMPQMS*T*RGSSRTPM*VG*QRPPRMLART*SYSSCEGARSPVRLERCGSAR*TIWRKMAW
 ELEEMVGLWKMLKWAUWGRPTESLMKWA*ESCSLATSSAVTRTSRAQ*SRVSWMMSYLSWPFCHSSRLRRNSSRSFQYSSRGN
 PS*SAR*EPTM*NWLTAL*AQQPFSTGRA*ACAALREVWVRKVSRTMTLRNWCLKSRSSQPPCSQSWKSVRFL*AGLGKAKVT
 SLKRILPARGMKLRVMRKGWGTSAARLLMTWAARTISSKPLMLCPTM*SSTNRGRPLTWGSFLSSS*VSSAGSLSPCCSRAQSATW
 GLALRKEVQRSTARAVCKRSRY*RNCWPTAIFSGVTQ*KVRGSPCQRSHLSWRARSWASSTSGGSPESFMTSMKGTSCLPKDPQIV
 *VSTS*VRKSLSVRGCEPMGKNWISCHQLEEWLLM*WK*KCRRRAEHSCLCLYKRPQCSQRTGCTCCTSTWVPLARNFSGQW
 SAGGCISCCTTSWPSAWPSSASMVVMVLTSPRGRQVQTSARTGRRARTRARRPELSRVLRRCGVRSVSGGARLTCRSFSRARGRSR
 WYLISTAPLVATSTACRVPCPWGATTVPFRFLGAASMSVRSGGEDARRAAGAARGPEAGAAGARRRRRARAGSGTAPGEDWRERR
 RDG*RPGSDASG*RPRDP*V*T*KVRQNRQSRY*RRPAAGSLARRPSCPGRRRSR*TARSPPEGLRGRARRRWRPRGRWRCGP*
 AARRRSCRPRSRRGCRPLRRGRARA*PPGRG*ARRGA*RPRSCRAGAGRS*AWWRCAR*RRST*SSGGAASR*RRPGLPSVPW
 PRRSPRRS*KTGSCAPRRSTPPPEDG*ARRWWRAPRARRPRGAPLPSPLPPPLTSLLLPPQEAVAGEGPCVAGGARADGR*SAR
 WSPRAGDAWSR*RRARPRGAAA*RRRRASPGGRRGGLRWAGRGR*RCILSIDP*GLRART*ASRDPRDPKTAERRLRASRSKVG
 *ARFLVLRVFGREAGGCCW**S*SRRS*DGGWWRGAPGPWARLAGCADGRPCPRRGPDTRWGPCSSPA*AAPRAPPPRPRGR
 ACA*ARTAAAGRAPGRRRRAR*GWAPAGSG*GWSGSRSSRSRSGRLRC*WCRSSWP*RTS*RSGRVARARGT*GASRRACRR
 CSRCRRARGTGIRGSAAGGAAIARWRGRARRGPRA*GGGSRRCTWTSR*CRRRWWRAGTRGRGRSCAAAGSSSWWP
 RSGP*GARSRGCSRHTGKNESGQRLDSVAWRLSERVGLRVYPGNSLESWSRS*RGTGTPVSTQAC*RNLDQTEAGRFLALVAGH
 EKLVAESGRPRWLAADVWRKNRQGCVAVCPGSSLSARRRPDSAAVGVAAAPSPRPLSQPTSPVTERAPLFFSCVFARCIYCGRC
 APTLHHRNPYRSSNSRRFCPRPSSSQPLRRPP*AEPAFSMTWPWKRARGWRGWGRRRRSGTRACR*KGTLARPTCPSRTCSET

Fig. 24J

GAARSPRRCAPASTRGGSCGAAWTESGC*GTRISRRTS*RGSA PRARTWPRPTWSRRTSRP*RRRATSKNPSTTT CAR*SRARR*
PWA*CTCGTCWRPSCRTPRASR*RRSCFWWCSTVGTTRRSGRRC*ISPSRAAGSWTW*TFCRASWCRSAGCRCPRSWRPSTSR
C*VWASTTLGRSTRPTCP*TRR*STGFTCA*P*KC*P*ATIWGCTATTGCTAR*APAAGAS*ATRS*CTACSGP*PGPGPRGRAT
LTWARTCAGSPAAGPWKLPVPPTWRRWTMRRRRASTWKTDGATVFLDAAATATAAAS*SRDAGGAAEPAVRH*LLGRDLP GH
ATHHGADD PQSRL*TAASGQPALGHPGGRGALALEPHAREGAGHRERAGGEQGHPR*RGRAGVQRAAGARGPLQHQHRADE
PGPHGD RRARGGVAARAVPPRVEPGLHGGAE RLPEHAARQAPGPGGLHLHQRAAADGGRGAPERGVVPGAGLLLPDQSPGL
ADREPEPGFQELAGTVGRAGPGRGPRDGV EPADAELAPAAAAGGALHGQRQREPR LVPGLPA*PVPRGHRTGARGRADLP GDH
PREPRAGPGGPGQPGGHP ELPADQPVAEDPAPVRAEHRGGAHPALRAAERGAVPDAGGGHQAQRGARHDRAQHGAAQHV RPQP
PVHQ*ADGLLASGGRHELGLLYQRHLEPALAPAARVLHGRVRHARPQRRVPVGRRGQQRVLAASRNQCRVEERGRGPAAVLGAV
RSRGCCRGGARGRQPLPEPALFAEQRAQQRAGSADATAPAGRGGVPERLLVEARAREELPQ*RDREPGGQDEPLEDV RARAQGR
APS*QRRHP*TPAARQAAGTGVR*GFRRRQQRVGLGWEWW*PVRSPAPPYRAPDVRI*KNKRRYSRPWRPACVLLCCL**YD
EARVPGGSSSLVRERDAAGGGGGDAAPAGGALRAPAVPGAYGGAEQHSLGAGTLVRYHPVVPGGQQVGRHRLAELPERPQQLP
DHRGAEQRFHPHGGQHPDHQL*RALAVGRPAENHHAHQHAQREVRHVQQVQVQAGDGLAQDPQRGG**L*W*SGRADLRV
GGV*AARGQLLDGHDHRSDEQRHHRQLLGGGAAERGAGERHRREVRHAQLPAGLGRDRAGDAGR VHQRGLPPRHRPAARLR
RGLHREPPQQPAGHPQAAALPGGLDPVRGPGGGQHPRALGCRSLREKQGG*HRRGDRSRGHRLYRGAGR*FC*RCGSGRGG*
NRK*DSHPAGGEGQQGQELQ RARGQEKHRLPQLVPLQLRRPREGRALLDAAHHLGRHLRGASLLVAARHDARPGHLP LHASS
*QLPGGRRRAPARLLQELLQ RAGRLAAAARLHLAHLQPLPREDP RPPARAHYHRQ*KRSCSHRSRDPAAAQQYQGPSARD
RH*RQTPHLRLQGPGRSRAARPLEPHLLKNVHSLAQ**HRLGPARAQDVRRRSPTLHATPRARARALPRSLGRPQGP RALAH
HRRRRDRPGGRRALHARRRRLHRGRRHRQRGGRRAPVRPHQEPAAAHRAAPEHPRHARGASLAAQGAHQGTQGHQAQG
GQTRGLRQQRRQDPQTRGHGGGGGHRQHVP PAARQVRLGARRRHRCARARAHPPPSHLKMLTSRC*CVPAARRMSKRKYKE
EMLQVIAPEIYGPA AAVKEERKPRKLKRVKKDKKEEEDDLGVEFVREFAPRRRVQWRGRKVKPVLPGTTVVFTPGERSGSASKRSY
DEVYGGDEDILEQAVERLGEFAYGKRSRPAPLKEEAVSIPLDHGNPTPSLKPVTLQQVLPSAAPRRGFKREGGEDLYPTMQLMVPKRQ
KLEDVLEHMKVDPEVQPEVKVRPIKQVAPGLGVQTVDIKIPTMETQTEPVK PSTSTMEVQTD PWPAPASTSTRRRRKYGAASL
LMPNYALHPSIIPTPGYRGTRFYRGYTSSRRRKT TTTTTRRRRSRRSSTATSALVRRVYRSGREPLTPRARIYHPSIAI*LPPPTCRYGPHM
PPRPHYGLPRKKAAP*KADGERAASPPPAARHQAVGGRLPARADPHRRGDRGDPRHSFRGGAGLSAPLRHKKAWICNKK
KNGLTLVL*CVFLDGRHQFFVPGTATRHA AVYGHLEHRHQQPTERGLRQLEQSLERA*EFRVHAQNLWQQGVEQQHRAGAEGK
AERTELP AEGG*WPGLRHQRGG*PGQPGR AETDQPPGRGPARGVRGDAPGGGGAASPGQARRQATASRRGGDAADAHGRA
APVRGGGETGPAHHAARGASGHRSAETQQQPARDPGLASASPLHSG*APAAGRRVARPPRPPPGELAEHSEQHRGSGSAECEA
PPLLLKDTVALNLLVCVYMYVRRPEGGV*RGASPSCKMATPSMLPQWAYMHIAGQDASEYLSPLGVQFARATDTYFSLGNKFRNP
TVAPTHDVTTRDQR LTRFVPVDREDNTYSYKVRYTLAVGDNVRLDMASTYFDIRGVLDRGPSFKPYSGTAYNSLAPKGAPNSSQ
WEQAKTGNGGTMETHTYGVAPMGENITKDGLQIGTDVTANQN KPIYADKTFQPEPQVGEENWQETENFYGGRALKKDTNMK
PCYGSYARPTNEKGGQAKLKVGDGVP TKEFDIDLAFDTPGGTVNGQDEYKADIVMYTENTYLETPDTHVVYKPGKDDASSEINL
VQQSMPNRPNYIGFRDNFIGLMYYNSTGNMGVLAGQASQLNAVVDLQDRNTELSYQLLLDSLGDRTYFSMWNQAVDSYDPDV
RIIENHGVEDELPNYCFPLDGS GTNAAYQGVKVDGQDGDVESEWENDDTVAARNQLCKGNIFAMEINLQANLWRSFLYSNVALY
LPDSYKYTPNTVLTNTNTYDYMNGRVT PPSLVDAYLNIGARWSLDPMDNVNPFNHHRNAGLRYRSMLLGNGRYVPFHIQVPQ
KFFAIKSLLLPGSYTYEWNFRKDVNMILQSSLGNDLR TDGASIAFTSINLYATFFPMAHNTASTLEAMLRNDTNDQSFNDYLSAAN
MLYPIPANATNVPIPSRNWAAFRGWSFTR LKTRTPSLGSGFD PPFVYSGSIPYLDGTFYLNHTFKKVSITFDSSVSWPGNDRLLTP
NEFEIKRTVDGEGYNVAQCNMTKDWFLVQMLAHYNIQYQGFYVPEGYKDRMYSFERNFQPM SRQVVDENVYKDYQAVTLAYQH
NNSGFVGYLAPTMRQQGPYPANYPYPLIGKSAVASVTQKKFLCDRVMWRIPSSNFMSMGALTDLGQNMLYANSAHALDMNFE
VDPMDSTLLYVVFVFDVVRVHQPHRGVIEAVYL RTPFSAGNATT*AALASCKMTAGSGEQELRAILRDLGCGPCFLGTDFDKRFPG
FMAPHKLACAIVNTAGRETGGEHWLAFAWNPRSHTCYLDFPFGFSDERLQIYQFEYEGLLRRSALATEDRCVTLKSTQTVQGPSR
AACGLFCCMFLHAFVHWPDRPMDKNPTM NLLTGVPNGMLQSPQVEPTLRNQEALYRFLNAHSAYFRSHRARIEKATAFDRMN
QDM*KTGVC M*MLYS**TAHVYATFSEALTFRNRRGSAGSRHGPRAGIRCGTGTWAAT*TRGSAAWARGGRGTSRSTACA*VA
GRPAGRARRS*NRSWDPRSARESCGTRGCSTGTSPGPGASRLPAPSRR*CPPRPDPRRWPSSRGSSCRSAAPCWARSACGCNRS
AGGSASSGPARRSSCPGTWPS*KPPAGGRPAAPCRPR*RRPRRTC*RTGWWRSSRRARSSARRCWPAAAPCAPSGSG*SWPGWG
SPSARAARSRSHP SR*CAPSGSSRSRAGTAACPRLRCSRAATARSCTPSSCGRSGSASARSAPAGSGPSSRSGSCCW*RSAGCRGA
PRSHTGGRCGGTPRPARASAGRTSGRSPRG TGPSAASSLPCSPRPKR SAGSGGSSPPLSS*SPPPRS GGRSRPGSQTACRPSR*C
ARGES*SPRPAPP RPAFRPCPG*CLAKAHAWSCGVSWAAEAAA MCWESASSRPR LLLLGRPRPRGGRHASSGAEAEATG
SRGSAGGWQSPFRVRGCAPGGAALTD FLRGRPLCSPREQQQAWRLSHRRQHRHLPPPPPTRTSSRMKA*PPRRPAPPPTPRPQ
TCKRWRNPSRLTWAT*RPRSTRRSWQRA FQPRKRTTKSSQSRKQRTSRTLGTSMATT*AGQRTCSSSIWPANASSSRTRCSTAPR
CPSAWRSSAAPT SATSSRRACPPSASPTAPVSPTRASTSTRSSRCPRWPPTTSF SRTKGSPSPAAPTAPAPTPCSTWAPAPAYLISP

Fig. 24K

WKRFRSSRVWAATRLGPRTLCKEAERSMSTTAPWWSWKATTRAWRSSARSS*PTSPTRRSTCPPRS*APSWTRCSSAPRPSR
 RRRCRTPRVRTRASPWSATSSWRAGWERVAPPAWWSGASS*WPWSW*PWSWSVCAASLPTRRPCARSRRCTTSSGTGSCAR
 PARSPTWS*PTWSPTWASCTRTAWGKTCCTPPCAGRPAATTSATASTCTSATPGRRRAWACGSSAWRSRT*KSSASSCRRTSRPCG
 PGSTSVPPPTWPTSSSPSACG*RCATGCPTL*AKACCKTFALSSSNAPGSCPPAPRCPTSCR*PSASAPRRSGATATCCAWPTT
 WPTTTRT*SRTSAARVCWSATAAATSARRTAPWPATPSC*ARPRSSAPSSCKAPATARARGV*NSPRGCGPRPTCASSCPRTTIPSR
 GSTRTNPSRPRPSCRPAASSPRGPSWPNCPSRNPAPKFC*KRATGSTWTPRPERSTPASPRMPRGSSKKLVLPPEDEEDWES
 SQAEEMEDWDSTQAEEDSLQDSLEEEDVEEAEAEAAARPSSSAEKASSTDTISAPGRGRGGRHRSRWDETGRFPNPTTQTGK
 KERQGYKSWRGHKNIVSCLQACGGNISFTRRYLLFHRGVNFPRNLIHYRHLHSPYYCFQEEAETQQQKTSQSSS*KIHSGGRWT
 EDGERAGADPGAEEPDLSHPLCHLPAESGAGAGTESQEPFSALAHPLSVSQERRPTSAHSRGRGSLQQLRAHS*RVARARPH
 TEKGGNYVTTCALRPTIMSKEIPTYMWSYQPMGLAAGAAQDYSTRMNWLSAGPAMISRVDIRAHNRNQLLEQSAITATPRHH
 LNPRNWPAAALVYQEIPTTPTVLLPRDAQAEVQLTNSGVQLAGGAALCRHRPAQGIKRLVIRGRGTQLNDEVVSSSLGLRDPGVFQL
 AGSGRSSFTPRQAVLTLESSSQPRSGGIGTLQFVEEFTPSVYFNPFGSGPGHYDEFIPNFDaisesVDGYD*MSHGGAADLARLRLH
 DHCRRFRFCFARDLAEFAYFELPEEHPQGPAHGVRIVEGGDLSHLLRIFSQRPIVEREQQTLLTYCICNHPGLHESLCCLLCTEYNKS
 *DQRLRLRLWCSCYQPVVPLHRERDRAPAV*APQEVPHLAVPGLPDRRCQPLRQRSPAERPCQPYFFHPQKQAPALPTLPPRD
 LSVRLRLPSHLPPDPEYHSAAPRY*QPNYPPTPPSRPFL*I*YHYRRWLLLLVLPVDPDRSPTQSPEVRKCKFQEPWFKLCYRQK
 SDMHPSWIMIIIVNIIACTLISFVIYPCFDFGWNSPEALYLPPEPTPPQQPQAHALPPPQPRPQYMPILDYEAEPQRPMPLPAISY
 FNLTGGDD*PTGQ*QRQRSPGHGRPRLGAATRPTSHSSAAGESRQGAAGRHSPPVQERHLLPGETGQDLLRGHPDRPSPLRA
 PAAAEVHLPGRSQPHRHHPAVGRYQGVHPLLLRLPRLPHSDQDPLRPPRPPHELITPLSSEIKIILMMI*IKKII*FEIKIQSY**FEF
 NKNKESLT*NLIPGLCPCLPTPPHSPSSGTAGPGLQTSSTR*RGCIQPPVPQSSFYLLSDVQKARPGG**LRPRLPLRCRQRTDR
 ALHQPLRLFRWIPREAPGGVVPATG*PRHHQERGNHPQAGRGGRPLVGKTHLQHGHHQGRRPSQYFKQHHP*NCPCFLQQQ
 WNFKPQCLHTISSISHI*HFRHKS WKRSSDFK*VVDCTTNSSSYIQLK*HHSKNRQRAIY*LQWKQRT*G*YKPKKRTSF*R*CYCNIY
 WKWLRLWIL***WKNKTRNYQNWSRIFK*C*QSNQCQTRHRFKF*LRWCLDSWKQTG*QANTLDYP*PKP*LSITFRQRCQIYSL
 YKMR*SNTRHCGSGGCYCRISTKSN**HSQKRHSFP*I*FRWCTHVKLINGR*LLEL*GGTDHSCSLYKCCGIHAKYRCISKNP*NT
 *K*HSQSGIFNWRNYYANDTNHNFQWH**KRHNPS*HLLYDFYMAVDWRL*GQKYLYCQLILFFLHRPGIIPPSKPTPFPTTFVY
 METLKQKNKVQVFY*INSFTGLEQLFFLHPRTWNTPPSPPAQ*PTSECHW*WTCFWSRSTQFQSEPVS DRSGR*NPPGTPASA
 PHSTAEDCPRWSGSRLSGRSRAAVGIIVRERDRPVVSHQAPQQLPPLRQAAAQGVVQGLPQHDHAGPQHQS SGAAGAAA
 HANLAQTVAVRATQDQHVVQSSIVQHAPAETHRGKDATHVAVVDPQVNQVALPPEDAHHVHDLGLHVAVHHLVPVPHPLVE
 HAAPDDPAEPQGQHRPARHAARKPRIPAMTMEDPPLVPVDHLGAEQVYVGTAAQAYAHASLQHSQLLGGQNHIPGHGELLQDSE
 PRRTGQSSHITYIVHGQGIARQHRVILHQRSAGLGLTAW*GGRPIRV MAGRG*SCSRPCHDAVAFGHFRTCCSRTWSGRCTPIA
 GGGGLGAWNARC*SCKTATLSDRAADLGPOE**RSHHA*L*SHRPPWNGPGPAR*CNFVGFR*RRGREEQEELTFNPNGLGAL
 QNEGHGDGTSRPRCVGGK*QPGQR*YGSRDVPRWLPAKPPRAHPETRQ*RKREGSLIPQPSCTPAPSPDNFHFSSLE*FELVPEV
 NPSQP**KARAEHPPPAFLSTPS*FQDILLVHLQQLDKRNIKISAAIPELLPQQ*L*VLFHIVSEIFSHRTPRNKRASHITDKPKSPVSI
 AKCKIEISMLARPGDIFQITGQKIG*AIFKKINKRKIFQVHV*GLGNDGVSARGAFQHG*LADL*KNKK*NIKPC*PGEQVGSFSPA
 PGRPRGLRRDPRKNCRYD*KPSQRDVPGGRR*FEKKHTPPEHWSP*VKKSGRGSNEALQRLSSP AKRCHADEAQNFQVRKKCN
 YSPPAQAAKLPIPPDTHTKQRP*LTERQQQRHTTGARVREKTEL*PVRPLSAQYIAPDLH*RKGQSLKIPAK*SHTPSTRPETGDTLR
 KIRALPQTAKLPSPFGSHATSSKHDFQIPSTVKNITRAPNGRRRSRSQSPSSLPKFKQLICILTRTKSLRYIID

Fig. 25A

AdC6 020-DU422gp160(E1621) Nucleic Acids – SEQ ID NO: 6

CATCATCAATAATATACCTCAAACCTTTTGGTGCGGTTAATATGCAAATGAGCTGTTTGAATTTGGGGAGGGAGGAAGGTGAT
TGGCTGCGGGAGCGGCGACCGTTAGGGGCGGGGCGGGTGACGTTTTGATGACGTGGCTATGAGGCGGAGCCGGTTTGCAAG
TTCTCGTGGGAAAAGTGACGTCAAACGAGGTGTGGTTTGAACACGGAAATACTCAATTTTCCCGCGCTCTCTGACAGGAAATG
AGGTGTTTCTGGGCGGATGCAAGTGAAAACGGGCCATTTTCGCGCGAAAATGAATGAGGAAGTGAAAATCTGAGTAATTTT
GCGTTTATGGCAGGGAGGAGTATTTGCCGAGGGCCGAGTAGACTTTGACCGATTACGTGGGGGTTTCGATTACCGTATTTTTC
ACCTAAATTTCCGCGTACGGTGTCAAAGTCCGGTGTTTTACGTACGATATCATTTCCCGGAAAGTGCCACCTGACCGTAACTAT
AACGGTCCTAAGGTAGCGAAAGCTCAGATCTCCGATCCCTATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGTT
AAGCCAGTATCTGCTCCCTGCTTGTGTGTTGGAGGTCGCTGAGTAGTGCGCGAGCAAAATTTAAGCTACAACAAGGCAAGGCT
TGACCGACAATTGCATGAAGAATCTGCTTAGGGTTAGGCGTTTTGCGCTGCTTCGCGATGTACGGGCCAGATATACGCGTTGA
CATTGATTATTGACTAGTATGCCAAGTACGCCCTATTGACGTCAATGACGGTAAATGGCCCGCTGGCATTATGCCAGTAC
ATGACCTTATGGGACTTTCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCGGTTTTGGCAGTACA
TCAATGGGCGTGGATAGCGGTTTGACTCACGGGGATTTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGTTGGCACC
AAAATCAACGGGACTTTCCAATGTCTGAACAACCTCGCCCCATTGACGCAAATGGGCGGTAGGCGTGTACGGTGGGAGGT
CTATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCACTAGAAGCTTTATTGCGGTAGTTTATCACAGTTAAATTGCTAACGC
AGTCAGTGCTTCTGACACAACAGTCTGAACTTAAGGCTAGAGTTCGACGCCACCATGCGCGTGCGCGGCATCCCCGCAACT
GGCCCCAGTGGTGGATCTGGGGCATCCTGGGCTTCTGGATGATCATCATCTGCCGCGTGGTGGGCAACCTGGACCTGTGGGT
GACCGTGTAACGCGGTGCCCGTGTGGAAGGAGGCCAAGACCACCTGTTCTGCGCCTCCGACGCCAAGGCCTACGACAAG
GAGGTGCACAACGTGTGGGCCACCCACGCCTGCGTGCCACCGACCCCAACCCCAAGGAGATCGTGCTGGAGAACGTGACCG
AGAACTTCAACATGTGGAAGAACGACATGGTGGACCAGATGCACGAGGACATCATCTCCCTGTGGGACCACTCCCTGAAGCC
CTGCGTGAAGCTGACCCCCCTGTGCGTGACCCCTGAAGTGAAGAACGTGAACATCTCCGCCAACGCCAACGCCACCGCCACCC
TGAAGTCTCCATGAACGGCGAGATCAAGAACTGCTCCTTCAACACCACCCAGAGCTGCGCGACAAGAAGCAGAAGGTGTAC
GCCCTGTTCTACAAGCCCCGACGTGGTGCCCTGAACGGCGGCGAGCACAACGAGACCGGCGAGTACATCCTGATCAACTGCA
ACTCCTCCACCATCACCCAGGCTGCCCAAGGTGTCCTTCGACCCCATCCCCATCCACTACTGCGCCCCCGCGGCTACGCCAT
CCTGAAGTGCAACAACAGACCTTCAACGGCACCGGCCCTGCAACAACGTGTCCACCGTGCAAGTGACCCACGGCATCAAGC
CCGTGGTGTCCACCCAGCTGCTGCTGAACGGCTCCTGGCCGAGGAGGAGATCATCTGCGCTCCGAGAACCTGACCAACAAC
ATCAAGACCATCATCTGTCACCTGAACAAGTCCGTGGAGATCAAGTGACCCGCCCCAACACAACACCCGCAAGTCCGTGCG
CATCGGCCCGGCCAGACCTTCTACGCCACCGGCGAGATCATCGCGACATCCGCGAGGGCCACTGCAACATCTCCCGCGAGA
CCTGGAAGTCCACCCTGATCCAGGTGAAGGAGAAGCTGCGCGAGCACTACAACAAGACCATCAAGTTCGAGCCCTCCTCCGGC
GGCGACCTGGAGGTGACCACCACTCCTTCAACTGCCGCGGCGAGTTCTTCTACTGCGACACCACCAAGCTGTTCAACGAGAC
CAAGCTGTTCAACGAGTCCGAGTACGTGGACAACAAGACCATCATCCTGCCCTGCCGATCAAGCAGATCATCAACATGTGGC
AGGAGGTGGGCCGCGCCATGTACGCCCCCCCCATCGAGGGCAACATCACTGCAAGTCCAACATACCGGCCTGCTGCTGACC
TGGGACGGCGGCGAGAACTCCACCGAGGGCGTGTTCGCCCCGCGGCGGCAACATGAAGGACAAGTGGCGCTCCGAGCTG
TACAAGTACAAGGTGGTGGAGATCAAGCCCCTGGGCGTGGCCCCACCAAGAGCAAGCGCAAGGTGGTGGGCCGCGAGAAG
CGCGCCGTGGGCTGGGCGCGGTGCTGCTGGGCTTCTGGGCGCGCCGGCAGCACCATGGGCGCGCCAGCATCACCTGA
CCGTGCAGGCCCCGACGTGCTGAGCGGCATCGTGACGAGCAGAGCAACCTGCTGCGCGCATCGAGGCCAGCAGACCT
GCTGCAGCTGACCGTGTGGGGCATCAAGCAGCTGCAGACCCGCGTGTGGCCATCGAGCGCTACCTGAAGGACCAGCAGCTG
CTGGGCTGTGGGGCTGCAGCGCAAGCTGATCTGCGCCACCGCCGTGCCCTGGAACAGCAGCTGGAGCAACAAGAGCCTG
GGCGACATCTGGGACAACATGACCTGGATGCAGTGGGACCGCGAGATCAGCAACTACACCAACACCATCTCCGCTGCTGG
AGGACAGCCAGAACCAGCAGGAGAAGAACGAGAAGGACCTGCTGGCCCTGGACAGCTGGAAGAACCTGTGGAAGTGGTTCG
ACATACCAACTGGCTGTGGTACATCAAGATCTTCATCATGATCGTGGGCGGCCTGATCGGCCTGCGCATCATCTCGGCGTGC
TGGCCATCGTGAAGCGCGTGCGCCAGGGCTACAGCCCCCTGAGCTTCAGACCCTGATCCCCAACCCCCGCGGCCCGACCGC
CTGGGCCGATCGAGGAGGAGGGCGGCGAGCAGGACAAGGACCGCAGCATCCGCTGGTGAGCGGCTTCTGGCCCTGGCC
TGGGACGACCTGCGCAGCCTGTGCTGTTTACGTACCAACAGCTGCGCGACTTCATCCTGACCGCCGCCCGCGCCGAGCT
GCTGGGCCGAGCAGCCTGCGCGGCTGCAGCGCGCTGGGAGGTGCTGAAGTACCTGGGCAACCTGGTGAGTACTGGG
CCTGGAGCTGAAGCGCAGCGCCATCAACCTGTTTCGACACCATCGCCATCGCCGTGGCCGAGGGCACCAGCCGATCATCGAG
GTGATCCAGCGCATCTGCCGCGCATCCGCTACATCCCCACCCGATCCGCCAGGGCTTCGAGGGCGCCCTGCTGTAAGGTACC
TCTAGAGTCGACCCGGGCGGCCAAACCGCTGATCAGCCTCGACTGTGCCTTCTAGTTGCCAGCCATCTGTTGTTTCCCCCTCCC
CCGTGCCCTTCTTGACCCTGGAAGGTGCCACTCCCACTGTCTTTCTAATAAAATGAGGAAATTGCATCGCATTGTCTGAGTA
GGTGTCAATTCTATTCTGGGGGTGGGGTGGGGCAGGACGACAAGGGGGAGGATTGGGAAGACAATAGCAGGCATGCTGGG

Fig. 25B

GATGCGGTGGGCTCTATGGCTTCTGAGGCGGAAAGAACCAGCAGATCTGCAGATCTGAATTCATCTATGTCGGGTGCGGAGA
AAGAGGTAATGAAATGGCATTATGGGTATTATGGGTCTGCATTAATGAATCGGTGAGATATCGACATATGCTGGCCACCGTGC
ATGTGGCCTCGCACCCCCGCAAGACATGGCCGAGTTCGAGCACAACGTCATGACCCGCTGCAATGTGCACCTGGGCTCCCGC
CGAGGCATGTTTCATGCCCTACCAAGTGAACATGCAATTTGTGAAGGTGCTGCTGGAGCCCGATGCCATGTCCAGAGTGAGCCT
GACGGGGGTGTTTGACATGAATGTGGAGCTGTGGAAAATTCTGAGATATGATGAATCCAAGACCAGGTGCCGGGCTGCGAA
TGCGGAGGCAAGCACGCCAGGCTTCAGCCCGTGTGTGTGGAGGTGACGGAGGACCTGCGACCCGATCATTGGTGTGTCTCT
GCAACGGGACGGAGTTCGGCTCCAGCGGGGAAGAATCTGACTAGAGTGAGTAGTGTGGGGCTGGGTGTGAGCCTGCATG
AGGGGCAGAATGACTAAATCTGTGGTTTTCTGTGTGTTCGAGCAGCATGAGCGGAAGCGCCTCCTTTGAGGGAGGGGTATT
CAGCCCTTATCTGACGGGGCGTCTCCCTCCTGGGCGGGAGTGCGTCAGAATGTGATGGGATCCACGGTGACGGCCGGCCC
GTGACGCCCGCAACTCTCAACCTGACCTACGCGACCCTGAGCTCCTCGTCCGTGGACGCAGCTGCCCGCGAGCTGTGCT
TCCGCCGCCAGCGCGGTGCGCGGAATGGCCCTGGGCGCCGGCTACTACAGCTCTCTGGTGGCCAACTCGAGTTCACCAATAA
TCCCGCCAGCCTGAACGAGGAGAAGCTGTGCTGTGATGGCCAGCTCGAGGCCCTGACCCAGCGCCTGGGCGAGCTGACC
CAGCAGGTGGCTCAGCTGCAAGCGGAGACGCGGGCCGCGGTGCCACGGTGAACCAATAAAAAATGAATCAATAATA
AACGGAGACGGTTGTTGATTTTAACACAGAGTCTTGAATCTTTATTTGATTTTTCGCGCGCGGTAGGCCCTGGACCACCGGTCT
CGATCATTGAGCACCCGGTGGATCTTTCCAGGACCCGGTAGAGGTGGGCTTGGATGTTGAGGTACATGGGCATGAGCCCGT
CCCGGGGGTGGAGGTAGCTCCATTGACGGGCCTCGTCTCGGGGATGGTGTGTAAATCACCAGTCATAGAGGGGCGCAG
GGCGTGGTGTGACGATGTCTTGAGGAGGAGACTGATGGCCACGGGACGCCCTTGGTGTAGGTGTTGACGAACCTGTTG
AGTGGGAGGGATGCATGCGGGGGGAGATGAGATGCATCTTGGCTGGATCTTGAGATTGGCGATGTTCCCGCCAGATCCC
GCCGGGGGTTTCATGTTGTGACGAGACCACAGCACGGTGTATCCGGTCACTTGGGGAATTTGTATGCAACTTGAAGGGAA
GGCGTGAAGAATTTGGAGACGCCCTTGACCGCCAGGTTTTTCATGCACTCATCCATGATGATGGCGATGGGCCGTGGG
CGGCGCCTGGGCAAAGACGTTTCGGGGGTGCGACACATCGTAGTTGTGGTCTGGGTGAGCTCGTCATAGGCCATTTAAT
GAATTTGGGGCGGAGGGTGCCGACTGGGGGACGAAGGTGCCCTCGATCCCGGGGGCGTAGTTGCCCTCGCAGATCTGCAT
CTCCAGGCCTTGAGCTCGGAGGGGGGGATCATGTCCACCTCGGGGCGATGAAAAAACGGTTCCGGGGCGGGGGAGAT
GAGCTGGGCCGAAAGCAGGTTCCGGAGCAGCTGGGACTTGCCGCAACCGTGGGGCCGTAGATGACCCCGATGACCGGTG
CAGGTGGTAGTTGAGGGAGAGACAGCTGCCGTCTCGCGGAGGAGGGGGGCCACCTCGTTCATCATCTCGCGCACATGCATG
TTCTCGCGCACGAGTTCGCCAGGAGGCGCTCGCCCCCAGCGAGAGGAGCTCTTGACGCGAGGCGAAGTTTTTCAGCGGCTT
GAGTCCGTGCGCCATGGGCATTTTGGAGAGGGTCTGTTGCAAGAGTTCAGACGGTCCAGAGCTCGGTGATGTGCTCTAGG
GCATCTCGATCCAGCAGACCTCCTCGTTTCGCGGTTGGGGCGACTGCGGGAGTAGGGACACGAGCGATGGGCGTCCAGCGA
GGCCAGGGTCCGGTCTTCCAGGGCCGAGGGTCCGCGTCAGCGTGGTCTCGTCACGGTGAAGGGGTGCGCGCCGGGCTG
GGCGCTTGCGAGGGTGCGCTTCAGGCTCATCCGGTGGTTCGAGAACCCTCGGTCGGCGCCCTGCGCGTGGCCAGGTAG
CAATTGAGCATGAGTTCGTAGTTGAGCGCTCGGCCGCTGGCCCTGGCGCGGAGCTTACCTTTGGAAGTGTGTCCGCAGAC
GGGACAGAGGAGGGACTTGAGGGCGTAGAGCTTGGGGGCGAGGAAGACGGAAGTGGGGGCGTAGGCGTCCGCGCCGAG
CTGGCGCAGACGGTCTCGCACTCCAGAGCCAGGTGAGGTGCGGGGCGGTTGGGGTCAAAAACGAGGTTTCTCCGTGCTTTT
TGATGCGTTTCTTACCTCTGGTCTCCATGAGCTCGTGTCCCGCTGGGTGACAAAGAGGCTGTCCGTGTCCCGTAGACCGACT
TTATGGGCCGGTCTCGAGCGGGGTGCCGCGTCTCGTGTAGAGGAACCCCGCCACTCCGAGACGAAGGCCCGGTCCA
GGCCAGCACGAAGGAGGCCACGTGGGAGGGGTAGCGGTGTTGTCCACAGCGGGTCCACCTTCTCCAGGGTATGCAAGCA
CATGTCCCCCTCGTCCACATCCAGGAAGGTGATTGGCTTGAAGTGTAGGCCACGTGACCGGGGTCCCGGCCGGGGGGTA
TAAAGGGGGCGGGGCCCTGCTCGTCTCACTGTCTTCCGGATCGTGTCCAGGAGCGCCAGCTGTTGGGGTAGGTATCCCT
CTCGAAGGCGGGCATGACCTCGGCACTCAGGTTGTGAGTTCTAGAAACGAGGAGGATTTGATATTGACGGTGCCGTTGGAG
ACGCCCTTTCATGAGCCCTCGTCCATTTGGTCAGAAAAGACGATCTTTTTGTTGTCGAGCTTGGTGGCGAAGGAGCCGTAGAG
GGCGTTGGAGAGCAGCTTGGCGATGGAGCGCATGGTCTGGTCTTTTCTTGTGCGCGCGCTCCTTGGCGGCGATGTTGAGCT
GCACGTACTCGCGGCCACGCACTTCCATTGGGGGAAGACGGTGGTGAGCTCGTCGGGCACGATTCTGACCCGCCAGCCGCG
GTTGTGACGGGTGATGAGGTCCACGCTGGTGGCCACCTCGCCGCGCAGGGGCTCGTTGGTCCAGCAGAGGCGCCGCCCTTG
CGCGAGCAGAAGGGGGGCGAGCGGGTCCAGCATGAGCTCGTCGGGGGGGTGGCGTCCACGGTGAAGATGCCGGGCGAGGAG
CTCGGGGTGCAAGTAGCTGATGCAGGTGCCAGATTGTCCAGCGCCGCTTGCAGTCCGCGACGGCCAGCGCGCTCGTAG
GGGCTGAGGGGCGTGCCCCAGGGCATGGGGTGCCTGAGCGCGGAGGCGTACATGCCGAGATGTCTGAGACGTAGAGGGG
CTCCTCGAGGACGCCGATGTAGGTGGGGTAGCAGCGCCCCCGCGGATGCTGGCGCGCACGTAGTCGTACAGCTCGTGCAG
GGCGCGAGGAGCCCCGTGCCGAGTTGGAGCGTTGCGGCTTTTCGGCGCGGTAGACGATCTGGCGGAAGATGGCGTGGGAG
TTGGAGGAGATGGTGGGCCTTTGGAAGATGTTGAAGTGGGCGTGGGGCAGGCCGACCGAGTCCCTGATGAAGTGGGCGTAG
GAGTCTGACGCTTGGCGACGAGCTCGGCGGTGACGAGGACGTCCAGGGCGCAGTAGTCGAGGGTCTCTTGATGATGTCAT
ACTTGAGCTGGCCCTTCTGCTTCCACAGCTCGCGGTTGAGAAGGAACCTTTCGCGGTCTTCCAGTACTCTTCGAGGGGGAACC

Fig. 25C

GCGCTGATCGGCACGGTAAGAGGCCACCATGTAGAACTGGTTGACGGCCTTGTAGGCGCAGCAGCCCTTCTCCACGGGGAG
 GCGCTAAGCTTGC CGCGCCTTGC CGCAGGGAGGTGTGGGTGAGGGCGAAGGTGTGCGCACCATTGACCTTGAGGAACTGGTG
 CTTGAAGTCGAGGTGCTGCGACGCCCTGCTCCAGAGTTGGAAGTCCGTGCGCTTCTTGTAGGCGGGGTTAGGCAAAGCG
 AAAGTAACATCGTTGAAGAGGATCTTGCCCGCGCGGGGCATGAAGTTGCGAGTGATGCGGAAAGGCTGGGGCACCTCGGCC
 CGGTTGTTGATGACCTGGGCGGCGAGGACGATCTCGTCGAAGCCGTTGATGTTGTGCCCGACGATGTAGAGTTCCACGAATC
 GCGGGCGGCCCTTGACGTGGGGCAGCTTCTTGAGCTCGTCGTAGGTGAGCTCGGCGGGGTCGCTGAGCCCGTGCTGCTCGAG
 GGCCAGTCGCGGACGTGGGGGTTGGCGCTGAGGAAGGAAGTCCAGAGATCCACGGCCAGGGCGGTCTGCAAGCGGTCCCG
 GTAGTGACGGAAGTGTGGCCACGGCCATTTTTTCGGGGGTGACGCAGTAGAAGGTGCGGGGGTGCCGTGCCAGCGGTCC
 CACTTGAGCTGGAGGGCGAGGTGCTGGGCGAGCTCGACGAGCGGCGGGTCCCCGGAGAGTTTCATGACCAGCATGAAGGGG
 ACGAGCTGCTTGCCGAAGGACCCCATCCAGGTGTAGGTTTCCACATCGTAGGTGAGGAAGAGCCTTTCGGTGCGAGGATGCG
 AGCCGATGGGGAAGAACTGGATCTCTGCCACAGTTGGAGGAATGGCTGTTGATGTGATGGAAGTAGAAATGCCGACGGC
 GCGCCGAGCACTGCTGCTTGTTTATAACAAGCGTCCGAGTGCTCGCAACGCTGCACGGGATGCACGTGCTGCACGAGCTGT
 ACCTGGGTTCTTTGGCGAGGAATTTCACTGGGCGAGTGGAGCGCTGGCGGCTGCATCTGCTGCTGACTACGTCTTGCCATC
 GGCGTGCCATCGTCTGCCTCGATGGTGGTCATGCTGACGAGCCCGCGGGGAGGCGAGGTCCAGACCTCGGCTCGGACGGGT
 CGGAGAGCGAGGACGAGGGCGCGCAGGCCGAGCTGTCCAGGTCCTGAGACGCTGCGGAGTCAGGTGAGTGGGCGAGCGG
 CGCGCGCGGTTGACTTGACAGGAGCTTTTCCAGGGCGCGCGGGAGGTCCAGATGGTACTTGATCTCCACGGCGCCGTTGGTG
 GCTACGTCCACGGCTTGACGGGTGCCGTGCCCTGGGGCGCCACCACCGTGCCCGTTTCTTCTGGGCGCTGCTTCCATGTCG
 GTCAGAAAGCGGCGGCGAGGACGCGCGCCGGGCGGCGAGGGCGGCTCGGGGCCCGGAGGCGAGGGGCGGCGAGGGGCACGTC
 GCGCGCGCGCGCGGGCAGGTTCTGGTACTGCGCCCGGAGAAGACTGGCGTGAGCGACGACGCGACGGTTGACGTCTGGAT
 CTGACGCCTCTGGGTGAAGGCCACGGGACCCGTGAGTTTGAACCTGAAAGAGAGTTTCAGACAGAATCAATCTCGGTATCGTTG
 ACGGCGGCCTGCCGAGGATCTTTCACGTGCGCCGAGTTGTCCTGGTAGGCGATCTCGGTGATGAAGTCTCGATCTCCTCC
 TCCTGAAGGTCTCCGCGGCCGCGCGCTCGACGGTGGCCGCGAGGTGCTTGGAGATGCGGCCCATGAGCTGCGAGAAGGGC
 TTCATGCCGCGCTCGTTCCAGACGCGGCTGTAGACCACGGCTCCGTGCGGGTGC GCGCGCGCATGACCACCTGGGCGAGGT
 TGAGCTCGACGTGGCGCGTGAAGACCGCGTAGTTGACAGAGCGCTGGTAGAGGTAGTTGAGCGTGGTGGCGATGTGCTCGG
 TGACGAAGAAGTACATGATCCAGCGGCGGAGCGGCATCTCGCTGACGTGCGCCAGGGCTTCCAAGCGTTCCATGGCTCGTA
 GAAGTCCACGGCGAAGTTGAAAACTGGGAGTTGCGCGCCGAGACGCTCAACTCCTCCTCCAGAAGACGGATGAGCTCGGCG
 ATGGTGGCGCGCACCTCGCGCTCGAAGGCCCGGGGGGCTCCTCTTCATCTCCTCCTCCTCCTCCTCCTCACTAACATCTCTTCTA
 CTTCTCCTCAGGAGGCGGTGGCGGGGAGGGGCCCTGCGTGC CGCGCGGCGCACGGGCGAGCGGTGATGAAGCGCTCGA
 TGGTCTCCCCGCGCCGGCGACGATGGTCTCGGTGACGGCGCGCCCGTCTCGCGGGGCCGACGATGAAGACGCCGCCGCG
 CATCTCCAGGTGGCCGCGGGGGGGTCTCCGTTGGGCGAGGAGAGGGCGCTGACGATGCATCTTATCAATTGACCCGTAGGG
 ACTCCGCGCAAGGACCTGAGCGTCTCGAGATCCACGGGATCCGAAAACCGTGAACGAAGGCTTCGAGCCAGTCGAGTCGC
 AAGGTAGGCTGAGCCCGGTTTCTTGTTCTTCGGGTATTTGGTGGGAGGCGGGCGGGCGGCGATGCTGCTGGTGATGAAGTTGAA
 GTAGGCGGTCTGAGACGGCGGATGGTGGCGAGGAGCACAGGTCTTGGGCCCGGCTTGCTGGATGCGCAGACGGTCTGGC
 CATGCCACAGCGGTGGTCTGACACCTGGCGAGGTCTTGTAGTAGTCTGATGAGCCGCTCCACGGGCACCTCCTCCTCGCC
 CGCGCGGCCGTGCATGCGCGTGAGCCCGAACCCGCGCTGCGGCTGGACGAGCGCCAGGTGCGCGACGACGCGCTCGGTGAG
 GATGGCCTGCTGGATCTGGGTGAGGGTGGTCTGGAAGTCGTGGAAGTCGACGAAGCGGTGGTAGGCTCCGGTGTGATGGT
 GTAGGAGCAGTTGGCCATGACGGACAGTTGACGGTCTGGTGGCGGGTGCACGAGCTCGTGGTACTTGAGGCGCGAGTA
 GCGCGCGGTGTCGAAGATGTAGTCGTTGAGGCGCGCACGAGGTACTGGTATCCGACGAGGAAGTGCGGCGGCGGCTGGCG
 GTAGAGCGGCCATCGCTCGGTGGCGGGGGCGCCGGGCGGAGGTCTCGAGCATGAGGCGGTGGTAGCCGTAGATGTACCT
 GGACATCCAGGTGATGCCGGCGGCGGTTGGTGGAGGCGCGCGGGAACCTCGCGACGCGGTTCCAGATGTTGCGCAGCGGCA
 GGAAGTAGTTGATGGTGCCGCGGTCTGGCCCGTGAGGCGCGCGCAGTCGTGGATGCTCTAGACATACGGGCAAAAACGAA
 AGCGGTGAGCGGCTGACTCCGTGGCCTGGAGGCTAAGCGAACGGGTTGGGCTGCGCGTGTACCCCGTTTCAATCTCGAAT
 CAGGCTGGAGCCGACGTAACGTGGTACTGGCACTCCCGTCTCGACCAAGCCTGCTAACGAAACCTCCAGGATACGGAGGC
 GGGTCGTTTTTTGGCCTTGGTGCCTGGTCATGAAAACTAGTAAGCGCGGAAAGCGGCCGCCCGCGATGGCTCGCTGCCGTA
 GTCTGGAGAAAGAATCGCCAGGGTTGCGTTGCGGTGTGCCCCGGTTTCGAGCCTCAGCGCTCGGCGCGGCGGATTCGCGCG
 CTAACGTGGGCGTGCTGCCCGTCTGTTTCCAAGACCCCTTAGCCAGCCGACTTCTCAGTTACGGAGCGAGCCCTCTTTTTTT
 TTCTTGTTTTTTGCCAGATGCATCCCGTACTGCGGCAGATGCGCCCCACCTCCACCACAACCGCCCTACCGCAGCAGCAG
 CAACAGCCGGCGCTTCTGCCCCGCCCCAGCAGCAGCCAGCCACTACCGCGGCGGCGCGCTGAGCGGAGCCGCGCTTCACT
 ATGACCTGGCCTTGAAGAGGGCGAGGGGCTGGCGCGGCTGGGGGCGTCTGCGCGGAGCGGCACCCGCGCGTGCAGATG
 AAAAGGGACGCTCGCGAGGCCTACGTGCCAAGCAGAACCTGTTTCAGAGACAGGAGCGGCGAGGAGCCCGAGGAGATGCGC
 GCCTCCCGCTTCCACGCGGGGCGGGAGCTGCGGCGCGGCTGGACCGAAAGCGGGTGTGAGGGACGAGGATTCGAGGGC

Fig. 25D

GACGAGCTGACGGGGATCAGCCCCGCGCGCGCACGTGGCCGCGGCCAACCTGGTCACGGCGTACGAGCAGACCGTGAAG
GAGGAGAGCAACTTCAAAAAATCCTTCAACAACACGTGCGCACGCTGATCGCGCGGAGGAGGTGACCTGGGCTGATGC
ACCTGTGGGACCTGCTGGAGGCCATCGTGCAGAACCCACGAGCAAGCCGCTGACGGCGCAGCTGTTTCTGGTGGTGCAGCA
CAGTCGGGACAACGAGACGTTAGGGAGGCGCTGCTGAATATCACCGAGCCCGAGGGCCGCTGGCTCCTGGACCTGGTGAAC
ATTTTGCAGAGCATCGTGGTGCAGGAGCGCGGGCTGCCGCTGTCCGAGAAGCTGGCGGCCATCAACTTCTCGGTGCTGAGTC
TGGGCAAGTACTACGTAGGAAGATCTACAAGACCCCGTACGTGCCATAGACAAGGAGGTGAAGATCGACGGGTTTACAT
GCGCATGACCTGAAAGTCTGACCTGAGCGACGATCTGGGGGTGTACCGCAACGACAGGATGACCGCGCGGTGAGCGC
CAGCCCGCGCGCGAGCTGAGCGACAGGAGCTGATGCACAGCCTGCAGCGGGCCCTGACCGGGGCCGGGACCGAGGGGG
AGAGCTACTTTGACATGGGCGCGGACCTGCGCTGGCAGCCAGCCCGGGCCTTGGAAGCTGCCGGCGGTTCCCTACGT
GGAGGAGGTGGACGATGAGGAGGAGGAGGGCGAGTACCTGGAAGACTGATGGCGCGACCGTATTTTGTAGATGCAGCA
ACAGCCACCGCCGCGCCCTCTGATCCCGGATGCGGGCGCGCTGCAGAGCCAGCCGTCCGGCATTAACTCCTCGGACGATT
GGACCCAGGCCATGCAACGCATCATGGCGCTGACGACCCGCAATCCCGAAGCCTTAGACAGCAGCCTCAGGCCAACGGGCTC
TCGGCCATCCTGGAGGCCGTGGTGCCCTCGCGCTCGAACCCACGCACGAGAAGGTGCTGGCCATCGTGAACGCGCTGGTGG
AGAACAAGGCCATCCGCGGTGACGAGGCCGGGCTGGTGTACAACGCGCTGCTGGAGCGCTGGCCCGCTACAACAGCACCA
ACGTGCAGACGAACCTGGACCGCATGGTGACCGACGTGCGCGAGGCGGTGTGCGAGCGCGAGCGGTTCCACCGCGAGTCGA
ACCTGGGCTCCATGGTGGCGCTGAACGCCTTCTGAGCAGCAGCCCGCAACGTGCCCCGGGGCCAGGAGGACTACACCAA
CTTCATCAGCGCGCTGCGGCTGATGGTGGCCGAGGTGCCCGAGCGAGGTGTACCAGTCGGGGCCGACTACTTCTTCAG
ACCACTGCCAGGGCTTGACAGCCGTGAACCTGAGCCAGGCTTTCAAGAACTGCAGGGACTGTGGGGCGTGCAGGCCCGG
TCGGGGACCGCGCAGCGGTGTCGAGCCTGCTGACGCCGAACCTCGCGCTGCTGCTGCTGCTGGTGGCGCCCTTCAGGACAG
CGGCAGCGTGAGCCGCGACTCGTACCTGGGCTACCTGCTTAACCTGTACCGCGAGGCCATCGGACAGGCGCACGTGGACGAG
CAGACCTACCAGGAGATCACCCACGTGAGCCGCGCGCTGGGCCAGGAGGACCCGGGCAACCTGGAGGCCACCTGAATTCC
TGCTGACCAACCGGTCGAGAAGATCCCGCCCCAGTACGCGCTGAGCACCGAGGAGGAGCGCATCCTGCGCTACGTGCAGCA
GAGCGTGGGGCTGTTCTGATGCAGGAGGGGGCCACGCCAGCGCGGCGCTCGACATGACCGCGCGCAACATGGAGCCCAG
CATGTACGCCCGCAACCGCCGTTTCATCAATAAGCTGATGGACTACTTGCATCGGGCGGCCGCGCCATGAACCTCGGACTACTTTAC
CAACGCCATCTTGAACCCGCACTGGCTCCCGCCGCGGGTCTACACGGGCGAGTACGACATGCCCGACCCCAACGACGGGT
TCCTGTGGGACGACGTGGACAGCAGCGTGTCTCGCCGCGTCCAGGAACCAATGCCGTGTGGAAGAAAGAGGGGCGGGGACC
GGCGGCCGCTCCTCGGCGCTGTCGGTGCAGCGGGTGTGCGCGGGCGGTGCCGAGGCGGCCAGCCCTTCCGAGCCTGCC
CTTTTCGCTGAACAGCGTGCAGCAGCAGCTGGGTGGGCTGACGCGACCGCGCCTGCTGGGCGAGGAGGAGTACCTGAAC
GACTCCTTGTGAGGCCCCGAGCGCGAGAAGAACTTCCCAATAACGGGATAGAGAGCCTGGTGACAAGATGAGCCGCTGGA
AGACGTACGCGCACGAGCACAGGGACGAGCCCCGAGCTAGCAGCGCAGGCACCCGTAGACGCCAGCGGCACGACAGGCAGC
GGGGACTGGTGTGGGACGATGAGGATTCCGCCGACGACAGCAGCGTGTGGACTTGGGTGGGAGTGGTGGTAACCCGTTTCG
CTCACCTGCGCCCCGATCGGGCGCTGATGTAAGAACTGAAAAAATAAAAGACGGTACTACCAAGGCCATGGCGACCAG
CGTGCGTTCTTCTCTGTTGTTGTAGTAGTATGATGAGGCGCGTGTACCCGAGGGTCTCCTCCTCGTACGAGAGCGTGATG
CAGCAGGCGGTGGCGGGCGGATGCAGCCCCGCTGGAGGCGCCTTACGTGCCCCGCGGTACCTGGCGCTACGGAGGGG
CGAACAGCATTGTTACTCGGAGCTGGCACCTTGTACGATACCACCGGTTGTACCTGGTGACAACAAGTCGGCAGACAT
CGCCTCGCTGAACCTACCAGAACGACCACAGCAATTCCTGACCACCGTGGTGCAGAACAAACGATTTCACCCCCACGGAGGCCA
GCACCCAGACCATCAACTTTGACGAGCGCTCGCGGTGGGGCGGCCAGCTGAAAACCATCATGCACACCAACATGCCAACGT
GAACGAGTTCATGTACAGCAACAAGTTCAAGGCGCGGGTGTGGTCTCGCGCAAGACCCCCAACGGGGTGGATGATGATTAT
GATGGTAGTCAGGACGAGCTGACCTACGAGTGGGTGGAGTTTGTGCTGCCGAGGGCAACTTCTCGGTGACCATGACCATCG
ATCTGATGAACAACGCCATCATCGACAACCTTGGCGGTGGGGCGGCAGAACGGGGTGTGGAGAGCGACATCGGCGTGA
AGTTCGACACGCGCAACTTCCGGCTGGGCTGGGACCCCGTGACCGAGCTGGTGTGATGCCGGGCGTGTACACCAACGAGGCCCT
CCACCCCGACATCGTCTGCTGCCGGCTGCGGCGTGGACTTCACCGAGAGCCGCTCAGCAACCTGCTGGGCATCCGCAAGC
GGCAGCCCTTCAGGAGGGCTTCAGATCCTGTACGAGGACCTGGAGGGGGGCAACATCCCGCGCTCTTGATGTGGAAGC
CTACGAGAAAAGCAAGGAGGATAGCACCGCCGCGCGACCGCAGCCGTGGCCACCGCCTTACCGAGGTGCGGGGCGATAA
TTTTGCTAGCGCTGCGGCAGCGGCCGAGGCGGTGAAACCGAAAGTAAGATAGTCATCCAGCCGTTGGAGAAGGACAGCAA
GGACAGGAGCTACAACGTGCTCGCGGACAAGAAAAACACCGCCTACCGCAGCTGGTACCTGGCCTACAACCTACGGCGACCCC
GAGAAGGGCGTGCGCTCCTGGACGCTGCTACCACTCGGACGTACCTGCGGCGTGGAGCAAGTCTACTGGTGCCTGCCCG
ACATGATGCAAGACCCGTCACCTCCGCTCCACGCGTCAAGTTAGCAACTACCCGGTGGTGGGGCGCGGAGCTCCTGCCCGTC
TACTCCAAGAGCTTCTTCAACGAGCAGGCCGTCTACTCGCAGCAGCTGCGCGCCTTACCTCGCTCACGCAGCTTCAACCGC
TTCCCCGAGAACCAGATCCTCGTCCGCCCGCCGCGCCACCATACCACCGTCAGTGAACCGTTCCTGCTCTCACAGATCAC
GGGACCTGCGCGTGCAGCAGATATCCGGGGAGTCCAGCGCGTGACCGTCACTGACGCCAGACGCCGACCTGCCCCACG

Fig. 25E

TCTACAAGGCCCTGGGCGTAGTCGCGCCGCGCGTCTCTCGAGCCGCACCTTCTAAAAAATGTCCATTCTCATCTCGCCCAGTA
ATAACACCGGTTGGGGCTGCGCGCGCCAGCAAGATGTACGGAGGCGCTCGCCAACGCTCCACGCAACACCCCGTGCGCGT
GCGCGGGCACTTCCGCGTCCCTGGGGCGCCCTCAAGGGCCGCGTGCCTCGCGACCACCGTCGACGACGTGATCGACCAG
GTGGTGGCCGACGCGCGCAACTACACGCCCGCCGCGCGCCGTCTCCACCGTGACGCGGTATCGACAGCGTGGTGCCG
ACGCGCGCCGTACGCCCGACCAAGAGCCGGCGGCGCGCATCGCCGGCGGCACCGGAGCACCCCGCCATGCGCGCGG
CGCGAGCCTTGCTGCGCAGGGCCAGGCGCACGGGACGCAGGGCCATGCTCAGGGCGGCCAGACGCGCGCCTCCGGCAGCA
GCAGCGCCGGCAGGACCCGAGACGCGCGGCCACGGCGGCGGCGGCGGCCATCGCCAGCATGTCCCGCCGCGCGCGGCA
ACGTGTAAGTGGGTGCGCGACGCCGCCACCGGTGTGCGCGTGCCCGTGCACGCCCGCCCCCTCGCACTTGAAGATGCTGACTT
CGCGATGTTGATGTGTCCAGCGGCGAGGAGGATGTCCAAGCGCAAATACAAGGAAGAGATGCTCCAGGTCATCGCGCCTGA
GATCTACGGCCCCGCGGCGGCGGTGAAGGAGGAAAGAAAGCCCCGAACTGAAGCGGGTCAAAAAGGACAAAAGGAGG
AGGAAGATGACGGAAGTGGTGGAGTTTGTGCGCGAGTTCGCCCCCGCGGCGCGTGCAGTGCGCGGGCGGAAAGTGAAAC
CGGTGCTGCGGCCCGGCACACGGTGGTCTTACGCGCGCGAGCGTTCCGGCTCCGCTCCAAGCGTCTCTACGACGAGGT
GTACGGGGACGAGGACATCCTCGAGCAGGCGGTGCGAGCGTCTGGGCGAGTTTGCCTACGGCAAGCGCAGCCGCCCCGCGCC
CTTGAAAGAGGAGGCGGTGTCCATCCCGCTGGACCACGGCAACCCACGCCGAGCCTGAAGCCGGTGACCCTGCAGCAGGTG
CTACCGAGCGCGGCGCGCGCCGGGGCTTCAAGCGCGAGGGCGGCGAGGATCTGTACCCGACCATGCAGCTGATGGTGCCC
AAGCGCCAGAAGCTGGAGGACGTGCTGGAGCACATGAAGGTGACCCCGAGGTGCAGCCCGAGGTCAAGGTGCGGCCCATC
AAGCAGGTGGCCCCGGGCTGGGCGTGACACCGTGGACATCAAGATCCCCACGAGCCCATGGAACGCAGACCGAGCCC
GTGAAGCCAGCACCAGCACCATGGAGGTGCAGACGGATCCCTGGATGCCAGCACCAGCTTCCACCAGCACTCGCCGAAGAC
GCAAGTACGGCGCGGCCAGCCTGCTGATGCCAACTACGCGTGCATCCTTCCATCATCCCCACGCGGGGCTACCGCGGCACG
CGTTCTACCGCGGCTACACCAGCAGCCGCGCGCAAGACCACCCCGCGCGTCTGTCGAGCCGCGCAGCAGCACCGC
GACTTCCGCTTGGTGCGGAGAGTGTATCGCAGCGGGCGCGAGCCTCTGACCCTGCCGCGCGCGCTACACCCGAGCATC
GCCATTTAACTACCGCTCTACTTGAGATATGGCCCTCACATGCCGCTCCGCGTCCCCATTACGGGTACCGAGGAAGAAA
GCCGCGCGTAGAAGGCTGACGGGGAACGGGCTGCGTCCCATCACCACCGCGCGGCGCGCCATCAGCAAGCGGTTGGG
GGGAGGCTTCTGCCCGCGTGCATCCCATCATCGCCGCGCGATCGGGGCGATCCCCGGCATAGCTTCCGTGGCGGTGCAG
GCCTCTCAGCGCCACTGAGACACAAAAAGCATGGATTGTAAATAAAAAAATGGACTGACGCTCCTGGTCTGTGATGT
GTGTTTTAGATGGAAGACATCAATTTTTCTGCTCCCTGGCACCCGACACGGCACGCGGCCGTTTATGGGCACTGGAGCGACA
TCGGCAACAGCCAAGTGAACGGGGGCGCCTTCAATTGGAGCAGTCTCTGGAGCGGGCTTAAGAATTCGGGTCCACGCTCAA
AACCTATGGCAACAAGGCTGGAACAGCAGCACAGGGCAGGCGCTGAGGGAAAAGCTGAAAGAACAGAACTTCCAGCAGAA
GGTGGTTGATGGCCTGGCCTCAGGCATCAACGGGGTGGTTGACCTGGCCAACAGGCCGTGCAGAAACAGATCAACAGCCGC
CTGGACGCGGTCCCGCCGCGGGTCCGTGGAGATGCCCCAGGTGGAGGAGGAGCTGCCTCCCTGGACAAGCGCGGCGAC
AAGCGACCGGTCCGACGCGGAGGAGACGCTGCTGACGCACACGACGAGCGCCCCGTACGAGGAGGCGGTGAAACTG
GGCCTGCCACACGCGGCCCGTGGCGCCTCTGGCCACCGGAGTGTGAAACCCAGCAGCAGCCAGCCGCGACCCCTGGACT
TGCTCCGCTCGCCCCCTCCACAGTGGCTAAGCCCTGCCCGGTGGCCGTGCGCTGCGCGCCCCCGAGCGCCCCCAG
GCGAACTGGCAGAGCACTCTGAACAGCATCGTGGGTCTGGGAGTGACAGTGTGAAGCGCCGCGCTGCTATTTAAAGACAC
TGAGCGCTTAACTTGCTGTGTGTATGTATGTCCGCCAGCAGAAGGAGGAGTGTGAAGAGGCGCGTCCCGAGTT
GCAAGATGGCAACCCATCGATGCTGCCCCAGTGGGCGTACATGCACATCGCCGGACAGGACGCTTCGGAGTACCTGAGTCC
GGGTCTGGTGCAGTTCGCCCCGCGCCACAGACACCTACTCAGTCTGGGGAACAAGTTTAGGAACCCACGGTGGCGCCACGC
ACGATGTGACCACCGACCGCAGCCAGCGGCTGACGCTGCGCTTCGTGCCCGTGACCGCGAGGACAACACCTACTCGTACAA
AGTGCGCTACACGCTGGCCGTGGGCGACAACCGCGTGTGAGCATGGCCAGCACCTACTTTGACATCCGCGGCGTGTGGAC
CGGGGCCCTAGCTTCAAACCTACTCTGGCACCGCTACAACAGCCTAGCTCCCAAGGGAGCTCCCAATTCAGCCAGTGGGA
GCAAGCAAAAACAGGCAATGGGGGAATATGGAACACACACATATGGTGTGGCCCAATGGGCGGAGAGAATATTACAAA
AGATGGTCTTCAAATTGGAAGTACGTTACAGCGAATCAGAATAAACCAATTTATGCCGACAAAACATTTAACCCAGAACCGC
AAGTAGGAGAAGAAAATTGGCAAGAACTGAAAATTTTATGGCGGTAGAGCTCTTAAAAAAGACACAAACATGAAACCTTG
CTATGGCTCTATGCTAGACCACCAATGAAAAAGGAGGTCAAGCTAACTTAAAGTTGGAGATGATGGAGTTCAACCAAAAG
AATTCGACATAGACCTGGCTTTCTTGATACTCCCGGTGGCACCGTGAACGGTCAAGACGAGTATAAAGCAGACATTGTATGT
ATACCGAAAAACAGTATTTGGAACCTCCAGACACGCATGTGGTATACAAACAGGCAAGGATGATGCAAGTTCTGAAATTAAC
CTGGTTCAGCAGTCTATGCCAACAGACCCAACTACATTGGGTTCAGGGACAATTTATCGGTCTTATGTACTACAACAGCACT
GGCAATATGGGTGTGCTTGTGTCAGGCTCCAGCTGAATGCTGTGGTTGATTGCAAGACAGAAAACCGAGCTGTCCTA
CCAGCTCTTGCTTACTCTTTGGGTGACAGAACCCGGTATTCAGTATGTGGAACAGGCGGTGGACAGTTATGACCCCGATG
TGCGCATCATCGAAAACCATGGTGTGGAGGATGAATTGCCAACTATTGCTTCCCCTTGACGGCTCTGGCACTAACGCCGCA
TACCAAGGTGTGAAGTAAAGATGGTCAAGATGGTGTGAGAGTGAATGGGAAAATGACGATACTGTTGCAGCTCGAA

Fig. 25F

ATCAATTATGTAAAGGTAACATTTTCGCCATGGAGATTAATCTCCAGGCTAACCTGTGGAGAAGTTTCTCTACTCGAACGTGG
CCCTGTACCTGCCCCGACTCCTACAAGTACACGCCGACCAACGTACGCTGCCGACCAACACCAACACCTACGATTACATGAATG
GCAGAGTGACACCTCCCTCGCTGGTAGACGCCTACCTAACATCGGGGCGCGCTGGTCGCTGGACCCCATGGACAACGTCAAC
CCCTTCAACCACCACCGCAACGCGGGCCTGCGCTACCGCTCCATGCTCCTGGGCAACGGGCGCTACGTGCCCTTCCACATCCAG
GTGCCCCAAAAGTTTTTCGCCATCAAGAGCCTCTGCTCCTGCCGGGTCTACACCTACGAGTGGAACCTCCGCAAGGACGTC
AACATGATCCTGCAGAGCTCCCTAGGCAACGACCTGCGCAGGACGGGGCCTCCATCGCCTTACCAGCATCAACCTCTACGC
CACCTTCTCCCATGGCGCACAACACCGCCTCCACGCTCGAGGCCATGCTGCGCAACGACACCAACGACCAGTCTTCAACGA
CTACCTCTCGGCGGCCAACATGCTCTACCCCATCCCGGCCAACGCCACCAACGTGCCATCTCCATCCCCTCGCGCAACTGGGC
CGCCTTCCGCGGATGGTCCTTACGCGCCTGAAGACCCGCGAGACGCCCTCGCTCGGCTCCGGGTTCGACCCCTACTTCGTCTA
CTCGGGCTCCATCCCCTACCTAGACGGCACCTTCTACCTCAACCACACCTTCAAGAAGGTCTCCATCACCTTCGACTCCTCCGTC
AGCTGGCCCCGGCAACGACCGCCTCTGACGCCAACGAGTTCGAAATCAAGCGCACCGTCGACGGAGAGGGATACAACGTGG
CCCAGTGCAACATGACCAAGGACTGGTTCCTGGTCCAGATGCTGGCCACTACAACATCGGCTACCAGGGCTTCTACGTGCC
GAGGGCTACAAGGACCGCATGTACTCCTTCTCCGCAACTCCAGCCCATGAGCCGCCAGGTCTGGACGAGGTCAACTACAA
GGACTACCAGGCCGTACCCCTGGCCTACCAGCACAACAACTCGGGCTTCGTGGCTACCTCGCGCCACCATGCGCCAGGGCC
AGCCCTACCCCGCCAACTACCCCTACCCGCTCATCGGCAAGAGCGCCGTGCGCAGCGTCACCCAGAAAAAGTTCCTCTGCGACC
GGGTCTGTGGCGCATCCCTTCTCCAGCAACTTCATGTCCATGGGCGCGCTACCGACCTCGGCCAGAACATGCTCTACGCCA
ACTCCGCCACGCGCTAGACATGAATTCGAAGTCGACCCCATGGATGAGTCCACCCTTCTCTATGTTGTCTTGAAGTCTTGA
CGTCGTCCGAGTGACCAAGCCCCACCGCGGCGTCATCGAAGCGTCTACCTGCGCAGGCCCTTCTCGGCCGGCAACGCCACCA
CCTAAGCCGCTCTTGCTTCTTGAAGATGACGGCGGGCTCCGGCGAGCAGGAGCTCAGGGCCATCTCCGCGACCTGGGCTGC
GGGCCCTGCTTCTGGGCACCTTCGACAAGCGCTTCCCTGGATTATGCCCCGCACAAGCTGGCCTGCGCCATCGTGAACAC
GGCCGGCCGCGAGACCGGGGCGAGCACTGGCTGGCCTTCGCTGGAACCCGCGCTCCACACATGCTACCTCTTGACCCCT
TCGGGTTCCTCGGACGAGCGCCTCAAGCAGATCTACAGTTCGAGTACGAGGGCTGCTGCGTCGACGCGCCCTGGCCACCGA
GGACCGCTGCGTCACCCTGGAAGTCCACCCAGACCGTGCAGGGTCCGCGCTCGGCCGCTGCGGGCTTCTGCTGTCATGT
TCCTGCACGCTTCGTGCACTGGCCCGACCGCCCATGGACAAGAACCCACCATGAACCTACTGACGGGGTGCCCAACGGC
ATGCTCCAGTCGCCCCAGGTGGAACCCACCTGCGCCGCAACCAGGAAGCGCTTACCGCTTCTCAATGCCCACTCCGCTAC
TTTCGCTCCACCGCGCGCATCGAGAAGGCCACCGCCTTCGACCGCATGAATCAAGACATGTAAAAAACCGGTGTGTGTAT
GTGAATGCTTTATTATATAATAAACAGCACATGTTATGCCACCTTCTCTGAGGCTCTGACTTTATTAGAAATCGAAGGGTCT
GCCGGCTCTCGGCATGCCCCGCGGGCAGGGATACGTTGCGGAAGTGGTACTTGGGCAGCCACTGAACTCGGGGATCAGCAG
CTTGGGCACGGGAGGTGCGGGAACGAGTCGCTCCACAGCTTGCCTGTAGTTGCAGGGCGCCAGCAGGTGCGGCGCGGA
GATCTTGAATCGCAGTTGGGACCGCGTTCGCGCGGAGAGTTGCGGTACACGGGGTTCAGCACTGGAACACCATCAGG
GCCGGGTGCTTACGCTTGCCAGCACCGTTCGCTGCGGTGATGCCCTCCACGTCCAGATCCTCGGCGTTGGCCATCCGAAGGG
GGTCATCTTGCAAGTCTGCCGCCCATGCTGGGCACGACCGGGCTTGTGGTTGCAATCGCAGTGCAGGGGGATCAGCATC
ATCTGGGCTGCTCGGAGCTCATGCCCGGTACATGGCCTTCATGAAAGCCTCCAGCTGGCGGAAGGCTGCTGCGCCTTGGC
GCCCTCGGTGAAGAAGACCCCGCAGGACTTGCTAGAGAACTGGTGGTGGCGCAGCCGGCGTCTGTCACGCAGCAGCGCGC
GTCGTTGTTGGCAGCTGCACACGCTGCGCCCCAGCGGTTCTGGGTGATCTTGGCCGTTGGGGTCTCCTTCAGCGCGC
GCTGCCGTTCTCGCTCGCCACATCCATCTCGATAGTGTCTCCTTCTGGATCATCACGGTCCCGTGCAGGCACCGCAGCTTGC
CCTCGGCTTCGGTGCAGCCGTGCAGCCACAGCGCGCAGCCGTGCACTCCAGTTCCTGTGGGCGATCTGGGAGTGCGAGTG
CACGAAGCCCTGCAGGAAGCGGCCCATCATCGCGGTGAGGTCTTGTGCTGGTGAAGGTGAGCGGGATGCCGCGGTGCTCC
TCGTTACATACAGGTGGCAGATGCGGCGGTACACCTCGCCTGCTCGGGCATCAGCTGGAAGGCGGACTTCAGGTGCTCTC
CACGCGGTACCGGTCCATCAGCAGCGTCATCACTTCCATGCCCTTCTCCAGGCCGAAACGATCGGCAGGCTCAGGGGGTCT
TCACCGCCATTGTCATCTTAGTCGCCCGCCGAGGTGAGGGGTCGTTCTCGTCCAGGGTCTCAAACTCGCTTCCGCTCCT
TCTCGATGATGCGCACGGGGGAAAGCTGAAGCCACGCGCCAGCTCCTCCTCGGCTGCCTTTCGTCTCGCTGCTCTGG
CTGATGTCTTGAAGGCACATGCTTGGTCTTGGCGGGTTCTTTTGGGCGGAGAGGCGGCGGCGATGTGCTGGGAGAGC
GCGAGTTCGTTACACGACTATTTCTTCTTGGCGCTGTCGAGACACGCGGCGGTAGGCATGCCTTCTTGGGGCA
GAGGCGGAGGCGACGGGCTCTCGCGGTTCCGGCGGGGCTGGCAGAGCCCTTCCGCGTTCCGGGGTGGCTCCTGGCGGC
GCTGCTCTGACTGACTTCTCCGCGGCCGCGCATTTGTGTTCTCTAGGGAGCAACAACAAGCATGGAGACTCAGCCATCGTCG
CCAACATCGCCATCTGCCCCGCGCCACCGCCGACGAGAACCAGCAGCAGAATGAAAGCTTAACCGCCCCGCGCCAGCCC
CACCTCCGACGCGCGGCCCCAGACATGCAAGAGATGGAGGAATCCATCGAGATTGACCTGGGCTACGTGACGCGCGGAG
CACGAGGAGGAGCTGGCAGCGCGCTTTTACGCCCGGAAGAGAACCACCAAGAGCAGCCAGAGCAGGAAGCAGAGAACGA
GCAGAACCAGGCTGGGCAGGAGCATGGCGACTACCTGAGCGGGGAGAGGACGTGCTCATCAAGCATCTGGCCCGCAATG
CATCATCGTCAAGGACGCGCTGCTCGACCGCGCGGAGGTGCCCTCAGCGTGGCGGAGCTCAGCCGCGCTACGAGCGCAAC

Fig. 25G

CTCTTCTCGCCGCGCGTGCCCCCAAGCGCCAGCCCAACGGCACCTGTGAGCCCAACCCGCGCCTCAACTTCTACCCGGTCTTC
GCGGTGCCCCGAGGCCCCTGGCCACCTACCACCTCTTTTTCAAGAACCAAAGGATCCCCGTCTCTGCGCGCCAACCGCACCCGC
GCCGACGCCCTGCTCAACCTGGGCCCCGGCGCCCGCCTACCTGATATCACCTCCTTGGAAGAGGTTCCCAAGATCTTCGAGGG
TCTGGGCAGCGACGAGACTCGGGCCGCGAACGCTCTGCAAGGAAGCGGAGAGGAGCATGAGCACCAAGCGCCCTGGTGGA
GTTGGAAGGCGACAACGCGCGCCTGGCGGTCTCAAGCGCACGGTCGAGCTGACCCACTTCGCCTACCCGGCGCTCAACCTGC
CCCCAAGGTCATGAGCGCCGTCTGACCCAGGTGCTCATCAAGCGCGCCTCGCCCCTCTCGGAGGAGGAGATGCAGGACCC
CGAGAGTTCGGACGAGGGCAAGCCCGTGGTCAGCGACGAGCAGCTGGCGCGCTGGCTGGGAGCGAGTAGCACCCCCAGAG
CCTGGAAGAGCGGCGCAAGCTCATGATGGCCGTGGTCTGGTGACCGTGGAGCTGGAGTGTCTGCGCCGCTTCTTTGCCGAC
GCGGAGACCCTGCGCAAGGTCGAGGAGAACCTGCACTACCTCTTCAGGCACGGGTTCTGTCGCCAGGCCTGCAAGATCTCCA
ACGTGGAGCTGACCAACCTGGTCTCTACATGGGCATCCTGCACGAGAACCCTGGGGCAAAACGTGCTGCACACCACCTG
CGCGGGGAGGCCCGCGCGACTACATCCGCGACTGCGTCTACCTGTACCTTGCCACACCTGGCAGACGGGCATGGGCGTGT
GGCAGCAGTGCCTGGAGGAGCAGAACCTGAAAGAGCTCTGCAAGCTCTGCAAGAAGCTCAAGGCCCTGTGGACCGGGTT
ACTTTATGAGCCAAAGCATGTTGCAAAACTTTGCTCTTTTCATCTCGAACGCTCCGGGATCCTGCCGCCACCTGCTCCGCGT
GCCCTCGGACTTCGTGCGCTGACCTTCCGCGAGTGCCCCCGCGCTCTGGAGCCACTGCTACTTGCTGCGCCTGGCCAACTA
CCTGGCCTACCACTCGGACGTGATCGAGGACGTGAGCGGCGAGGGTCTGCTGGAGTGCCACTGCCCTGCAACCTCTGCACG
CCGACCCGCTCCCTGGCCTGCAACCCCAAGCTGCTGAGCGAGACCCAGATCATCGGCACCTTCGAGTTGCAAGGCCCCGCGCA
CGGCGAGGGCAAGGGGGGTCTGAAACTCACCCGGGGTGTGGACCTCGGCCTACTTGCGCAAGTTCGTGCCGAGGACTAC
CATCCCTTCGAGATCAGGTTCTACGAGGACCAATCCAGCCGCCCAAGGCCGAGCTGTGGCCTGCGTCATCACCCAGGGGGC
CATCTGGCCCAATTGCAAGCCATCCAGAAATCCCGCCAAGAATTTCTGCTGAAAAAGGGCCACGGGGTCTACTTGGAACCCC
AGACCGGAGAGGAGCTCAACCCAGCTTCCCCAGGATGCCCGAGGAAGCAGCAAGAAGCTGAAAGTGAGCTGCCGCCG
CCGGAGGATTTGGAGGAAGACTGGGAGAGCAGTCAGGCAGAGGAGGAGGAGATGGAAGACTGGGACAGCACTCAGGCAG
AGGAGGACAGCCTGCAAGACAGTCTGGAGGAGGAAGACGAGGTGGAGGAGGCAGAGGAAGAAGCAGCCGCCGCGCAGACC
GTCGTCTCGGCGGAGAAAGCAAGCAGCACGGATACCATCTCGCTCCGGGTCCGGGTCGCGGCGGCCGGGCCACAGTAG
GTGGGACGAGACCGGGCGCTTCCCGAACCCACCACCCAGACCGGTAAGAAGGAGCGGCAGGGATACAAGTCTGGCGGGG
GCACAAAAACGCCATCGTCTCTGCTTGAAGCCTGCGGGGGCAACATCTCTTCACCCGCGCTACCTGCTCTTCCACCGCGG
GGTGAACCTCCCCGCAACATCTTGCACTTACTACCGTCACTCCACAGCCCTACTACTGTTTCAAGAAGAGGCAGAAACCCA
GCAGCAGCAGAAAACAGCGGCAGCAGCAGCTAGAAAATCCACAGCGGCGGCAGGTGGACTGAGGATCGCGGCGAACGAG
CCGGCGCAGACCCGGGAGCTGAGGAACCGGATCTTTCCACCCTCTATGCCATCTTCAGCAGAGTCGGGGGCGAGGAGCAGG
AACTGAAAGTCAAGAACCCTTCTGCGCTCGCTACCCGCGAGTTGTCTGTATCACAAGAGCGAAGACCAACTTCAGCGCACTC
TCGAGGACGCGGAGGCTCTCTTCAACAAGTACTGCGCGCTCACTCTTAAAGAGTAGCCCGCGCCCGCCACACACGGAAG
GCGGGAATTACGTACCACTGCGCCCTTCGCCGACCATCATGAGCAAAGAGATTCCACGCCTTACATGTGGAGCTACCAG
CCCCAGATGGGCTGGCCGCGCGCGCCGAGGACTACTCCACCCGATGAAGTGGCTCAGTGCCGGGCGCGCGATGATCTC
ACGGGTGAATGACATCCGCGCCACCGAAACAGATACTCTAGAACAGTCAGCGATCACCGCCACGCCCCGCCATCACCTTA
ATCCGCGTAATTGGCCCGCGCCCTGGTGTACCAGGAAATTTCCAGCCACGACCGTACTACTTCCGCGAGACGCCAGGCC
GAAGTCCAGCTGACTAACTCAGGTGTCCAGCTGGCCGGCGGCGCCGCCCTGTGTGTCACCGCCCCGCTCAGGGTATAAAGCG
GCTGGTGATCCGAGGCAGAGGCACACAGCTCAACGACGAGGTGGTGAGCTCTTCGCTGGGTCTGCGACCTGACGGAGTCTTC
CAACTCGCCGATCGGGGAGATCTTCTTCACGCCTCGTCAGGCCGTCTGACTTTGGAGAGTTCGTCTCGACGCCCGCTCG
GGCGGCATCGGCACTCTCAGTTCTGGAGGAGTTCATCCCTCGGTCTACTTCAACCCCTTCTCCGGTCCCCGGCCACTAC
CCGGACGAGTTCATCCGAACCTTCGACGCCATCAGCGAGTCGGTGGACGGCTACGATTGAATGTCCCATGGTGGCGCAGCTG
ACCTAGCTCGGCTTCGACACCTGGACCACTGCCGCCGCTTCCGCTGCTTCGCTCGGGATCTCGCCGAGTTTGCCTACTTTGAGC
TGCCCCGAGGAGCACCTCAGGGCCAGCCACGGAGTGCGGATCATCGTCGAAGGGGGCCTCGACTCCACCTGCTTCGGAT
CTTCAGCCAGCGACCGATCCTGGTCGAGCGCGAACAAGGACAGACCCTTCTACTTTGTACTGCATCTGCAACCACCCGGCCT
GCATGAAAGTCTTTGTTGTCTGCTGTGTAAGTATAAAGCTGAGATCAGCGACTACTCCGACTCGATTGTGGTGTTC
CTGCTATCAACCGGTCCCTGTTCTTACCAGGGAACGAGACCGAGCTCCAGCTCCAGTGTAAAGCCCCACAAGAAGTACCTACCT
GGCTGTTCCAGGGTCCCCGATCGCGTGTCAACCACTGCGACAACGACGGAGTCTGCTGAGCGGCCCTGCCAACCTTACTT
TTTCCACCCGAGAAGCAAGCTCCAGCTCTTCAACCCCTTCTCCCGGGACCTATCAGTGCGTCTCAGGACCCTGCCATCACAC
CTTCCACCTGATCCGAATACCACAGCGCCGCTCCCCGCTACTAACAACCAAACTACCCACCAACGCCACCGTCGCGACCTTTCC
TCTGAATCTAATAACCACTACCGGAGGTGGCTTCTGCTGTTAGTGCTCCCCGTCCGTCGACCCCCGGTCCCCCACTCAGTCCCC
CGAGGAGGTTTCGCAAATGCAAAATCCAAGAACCCTGGAATTCCTCAAATGCTACCGCCAAAAATCAGACATGCATCCAGCT
GGATCATGATCATTGGGATCGTGAACATTCTGGCCTGCACCTCATCTCCTTTGTGATTACCCCTGCTTTGACTTTGGTTGGAA
CTCGCCAGAGGCGCTATCTCCGCTGAACCTGACACACCACACAGCAGCAACCTCAGGCACACGCACTACCAACACCACA
GCCTAGGCCACAATACATGCCATATTAGACTATGAGGCCGAGCCACAGCGACCCATGCTCCCCGCTATTAGTTACTTCAATCT
AACCGGCGGAGATGACTGACCACTGGCCAATAACAACGTCAACGACCTTCTCCTGGACATGGACGGCCGCGCCTCGGAGCA
GCGACTCGCCCACTTCGATTCTGTCAGCAGCAGGAGAGAGCCGTCAAGGAGCTGCAGGACGGCATAGCCATCCACCAAGTGC
AAGAGAGGCATCTTCTGCCTGGTGAACAGGCCAAGATCTCTACGAGGTACCCAGACCGACCATCGCCTCTCTACGAGCT
CCTGCAGCAGCGCCAGAAGTTCACCTGCCTGGTGGAGTCAACCCATCGTCATACCCAGCAGTCGGGCGATACCAAGGGGT

Fig. 25H

GCATCCAAGTCTGCTGCGACTCCCCGACTGCGTCCACACTCTGATCAAGACCCTCTGCGGCCTCCGCGACCTCCTCCCATGAA
CTAATCACCCCTTATCCAGTGAAATAAAGATCATATTGATGATGATTTAAATAAAAAAATAATCATTTGATTTGAAATAAAGA
TACAATCATATTGATGATTTGAGTTTAAACAAAAATAAGAATCACTTACTTGAAATCTGATACCAGGTCTCTGTCCATGTTTTCT
GCCAACACCACCTCACTCCCTCTTCCAGCTCTGGTACTGACGGCCCCGGCGGGCTGCAAATCTCTCCACACGCTGAAGGGG
ATGTCAAATCTCTGCTCCCTCAATCTTATTTTATCTTCTATCAGATGTCCAAAAAGCGCGTCCGGGTGGATGATGACTTCGA
CCCCGTCTACCCCTACGATGCAGACAACGCACCGACCGTGCCCTCATCAACCCCCCTTCGTCTCTCAGATGGATTCCAAGAG
AAGCCCTGGGGGTGTTGTCCTGCGACTGGCTGACCCCGTCAACCAAGAACGGGGAAATCACCTCAAGCTGGGAGAGG
GGGTGGACCTCGACTCGTGGGAAAACTCATCTCAACACGGCCACCAAGGCCGCCGCCCTCTCAGTATTTCAAACAACACC
ATTTCCCTTAAACTGCTGCCCTTTCTACAACAACATGGAATTTAAGCCTCAATGTCTCCACACCATTAGCAGTATTTCCAC
ATTTAACACTTTAGGCATAAGTCTTGAAACGGTCTTCACTTCAAATAAGTTGTTGACTGTACAATAACTCATCTCTTACA
TTCAGCTCAAATAGCATCACAGTAAAAACAGACAAAGGGCTATATATTAAGTCCAGTGGAACAGAGGACTTGAGGCTAATAT
AAGCCTAAAAAGAGGACTAGTTTTTGACGGTAATGCTATTGCAACATATATTGAAATGGCTTAGACTATGGATCTTATGATAG
TGATGGAAAAACAAGACCGTAATTACCAAAATTGGAGCAGGATTAATTTTGATGCTAACAAAGCAATAGCTGTCAAAGTAG
GCACAGGTTAAGTTTTGACTCCGCTGGTGCCTTGACAGCTGGAAACAAACAGGATGACAAGCTAACACTTTGGACTACCCCT
GACCAAGCCCTAATTGTCAATTACTTTAGACAGAGATGCCAAATTTACTCTCTGTCTTACAAATGCGGTAGTCAAATACTAG
GCACTGTGGCAGTGGCGGTGTTACTGTAGGATCAGCACTAAATCCAATTAATGACACAGTCAAAAGCGCCATAGTTTTCTTA
GATTTGATTCGATGGTGTACTCATGTCAAATCATCAATGGTAGGTGATTACTGGAATTTAGGGAGGGACAGACCACTCAA
AGTGATAGCCTATACAAATGCTGTGGGATTCATGCCAAATATAGGTGCATATCCAAAAACCAAGTAAACACCTAAAAATAG
CATAGTCAGTCAGGTATATTTAACTGGAGAACTACTATGCCAATGACACTAACCTAATTTCAATGGCACTGATGAAAAAGA
CACAACCCAGTTAGCACCTACTCTATGACTTTTACATGGCAGTGGACTGGAGACTATAAGGACAAAAATATTACCTTTGCTAC
CAACTCATTTCTTTTTCTACATCGCCAGGAATAATCCACCCAGCAAGCCAAACCCCTTTTCCACACCTTTTGTCTATATGGA
AACTCTGAAACAGAAAAATAAGTTCAAGTGTTTTATTGATCAACAGTTTTTACAGGACTCGAGCAGTTATTTTCTCCACCT
CCCAGGACATGGAATACACCACCTCTCCCCCGCACAGCCTTGAACATCTGAATGCCATTGGTGATGGACATGCTTTTGGTCT
CCACGTTCCACACAGTTTCAGAGCGAGCCAGTCTCGGATCGGTGAGGAGATGAAACCTCCGGGCACTCCCGCATCTGCACC
TCACAGCTCAACAGCTGAGGATTGCTCGGTGGTGGGATCACGGTTATCTGGAAGAAGCAGAAGAGCGGCGGTGGGAATC
ATAGTCCGCGAACGGGATCGGCCGGTGGTGTGCATCAGGCCCGCAGCAGTCGCTGCCGCCGCCGCTCCGTCAAGCTGCTG
CTCAGGGGGTTCGGGTCCAGGGACTCCCTCAGCATGATGCCACGGCCCTCAGCATCAGTCGTCTGGTGCGGCGGGCGCAGC
AGCGCATGCGAATCTCGCTCAGGTCACTGCAGTACGTGCAACACAGGACCACAGGTTGTTCAACAGTCCATAGTTCAACACG
CTCCAGCCGAAACTCATCGCGGAAGGATGCTACCCACGTGGCCGTCGTACCAGATCCTCAGGTAAATCAAGTGGCGCTCCCT
CCAGAAGACGCTGCCATGTACATGATCTCTTGGGCATGTGGCGGTTACCACTCCCGGTACCACATCACCTCTGGTTGAA
CATGCAGCCCCGGATGATCTGCGGAACACAGGGCCAGCACCGCCCCGCCCATGCAGCGAAGAGACCCCGGATCCCGG
CAATGACAATGGAGGACCCACCGCTCGTACCCGTGGATCATCTGGGAGCTGAACAAGTCTATGTTGGCACAGCACAGGCATAT
GCTCATGCATCTCTCAGCACTCTCAGCTCCTCGGGGTCAAACCATATCCAGGGCACGGGGAATCTTGACAGGACAGCGA
ACCCCGCAGAACAGGGGAATCTCGCACATAACTTACATTGTGCATGGACAGGGTATCGCAATCAGGCAGCACCGGGTGATCC
TCCACCAGAGAAGCGCGGGTCTCGGTCTCTCACAGCGTGGAAGGGGGCCGGCGGATACGGGTGATGGCGGGACCGGGCT
GATCGTGTTCTCGACCGTGTCTGATGATGAGTGTCTTTCGGACATTTTCTGACTTGCTGTAGCAGAACCTGGTCCGGGCGCTGCA
CACCGATCGCCGGCGGGTCTCGGCGCTTGAACGCTCGGTGTTAAAGTTGTAACACAGCCACTCTCTCAGACCGTGCAGCA
GATCTAGGGCCTCAGGAGTGATGAAGATCCCATCATGCCTGATAGCTCTGATCACATCGACCACCGTGGAATGGGCCAGGCCC
AGCCAGATGATGCAATTTTGTGGGTTTCGGTGACGGCGGGGAGGGAAGAACAGGAAGAACCATGATTAACCTTTAATCCA
AACGGTCTCGGAGCACTTCAAAATGAAGTACGGAGATGGCACCTCTCGCCCCGCTGTGTTGGTGGAAAAACAGCCAG
GTCAAAGGTGATACGGTCTCGAGATGTTCCACGGTGGCTTCCAGCAAAGCCTCCACGCGACATCCAGAAACAAGACAATAG
CGAAAGCGGGAGGGTCTCTAATCTCAACCATCATGTTACACTCTGCACCATCCCAAGATAATTTTCATTTTCCAGCCTTG
AATGATTGAACTAGTTCCTGAGGTAAATCCAAGCCAGCCATGATAAAAAAGCTCGCGCAGAGCACCTCCACCGGCATTCTTA
GCACACCTCATAATTCCAAGATATTCTGCTCTGGTTCACCTGCAGCAGATTGACAAGCGGAATATCAAAATCTCTGCCGCGA
TCCCTGAGCTCCTCCCTCAGCAATAACTGTAAGTACTCTTTCATATCGTCTCCGAAATTTTAGCCATAGGACCCCAAGGAATAA
GAGAAGGGCAAGCCACATTACAGATAAACCGAAGTCCCCCAGTGAGCATTGCCAATGTAAGATTGAAATAAGCATGCTG
GCTAGACCCGGTGATATCTTCCAGATAACTGGACAGAAAAATCGGGTAAGCAATTTTAAAGAAATCAACAAAAGAAAAATCTT
CCAGGTGCACGTTTAGGGCTCGGGAACAACGATGGAGTAAGTGCAAGGGGTGCGTTCCAGCATGGTTAGTTAGCTGATCTG
TAAAAAACAACAAATAAAACATTAAACCATGCTAGCCTGGCGAACAGGTGGGTAAATCGTTCTCTCCAGCACAGGCAGGCC
ACGGGGTCTCCGGCGCGACCTCGTAAAAATGTGCTATGATTGAAAACCATCACAGAGAGACGTTCCCGGTGGCCGGCGT
GAATGATTGAGAAGAAGCATACCCCCGGAACATTGGAGTCCGTGAGTGAAAAAAGCGGCCGAGGAAGCAATGAGGCA
CTACAACGCTCACTCTCAAGTCCAGCAAAGCGATGCCATGCGGATGAAGCACAAAATTTTCAAGTGCCTAAAAATGTAATTA
CTCCCTCTGTCACAGGCAGCGAAGCTCCGATCCCTCCAGATACACATACAAAGCCTCAGCGTCCATAGCTTACCGAGCGGCA
GCAGCAGCGGCACACAACAGGCGCAAGAGTCAGAGAAAAGACTGAGCTTAACCTGTCCGCCGCTCTCTGCTCAATATATAG
CCCCAGATCTACACTGACGTAAAGGCCAAAGTCTAAAAATACCCGCCAAATAATCACACACGCCAGCACAGCCAGAAACC
GGTGACACACTCAGAAAAATACGCGCACTTCTCAAACGGCCAAACTGCCGTATTTCCGGGTTCACAGCTACGTATCAAAA
CACGACTTTCAAATCCGTGACCGTTAAAAACATCACCCGCCCGCCCTAACGGTCCGCGTCCCGCAGCCAATCACCTTCT
CCCTCCCAAAATTCAAACAGCTCATTTGATATTAACGCGCACCAAAAGTTTGAGGTATATTATTGATGATG

Fig. 25I

AdC6 020-DU422gp160(E1621) Amino acids – SEQ ID NO: 14**The symbol “ * ” refers herein to stop codons in the non coding regions**

HHQ*YTSNFWCALICK*AV*IWGGRKVI GCGSGDR*GRGG*RFDDVAMRRSRFASSRGKSDVKRGVV*TRKYSIFPRSLTGNEVFL
GGCK*KRAIFARKLNEEVKI*VISRLWQGGVFAEGRVDFDRLRGGFDYRIFHLNFRVRCQSPVFLRTISFPRKCHLTVTITVLR*RLRS
PDPLWCTLSTICSDAA*LSQYLLPACVLEVAE*CASKI*ATTRQGLTDNCMKNLLRVRRFALLRDVRARYTR*H*LLTSMPSTPPIDVN
DGKWPAPWHYAQYMTLWDFPTWQYIYVLVIAITMVMRWFQYINGRG*RFDSRGFPSPHPIVDVNGSLFWHQNRDQDFPKCRNNSA
PLTQMGGRRVRWEVYISRARLVNRQITRSFIADVYHS*IANAVSASDITVSNLRLEFDATMRVRGIPRNWPQWWIWGILGFWMIH
CRVVGNDLWVTVYVGVVWKEAKTTLFCASDAKAYDKEVHNWATHACVPTDNPQEIENVTFENFMWKNDMVDQMHE
DIISLWDQSLKPCVKLTPLCVTLNCKNVNISANANATATLNSSMNGEIKNCSFNTTTEL RDKKQKVYALFYKPDVVP LINGGEHNETGE
YILINCNSSTITQACPKVSFDPIPIHYCAPAGYAILKCNKTFNGTGPCNNVSTVQCTHGIKPVVSTQLLNGSLAEEEEIVRSENLTNNIK
TIIVHLNKSVEIKTRPNNNTRKSVRIGPGQTFYATGEIIGDIREAHCNISRETWNSTLIQVKEKLREHYNKTIFEPSSGGDLEVTTHSF
NCRGEFFYCDTTKLFNETKLFNESEYVDNKTIILPCRIKQIINMWQEVGRAMYAPPIEGNITCKSNITGLLTWDGGENSTEGVFRPG
GGNMKDNWRSELYKYKVVEIKPLGVAPTSKRKVVGREKRAVGLGAVLLGFLGAAGSTMGAASITLVQARQLLSGIVQQSNLLR
AIEAQHLLQLTVWGKQLQTRVLAIERYLKDDQLLGLWGCSGLICATAVPWNSSWSNKS LGDIWDNMTWMQWDREISNYTN
TIFRLLED SQNQKEKEDLLALDSWKNLWNWFDITNWLWYIKIFIMVGGIIGLRIIFGVLAIVKRV RQGYSPLSFQTLIPNPRGPDR
LGRIEEEGGEQDKDRSIRLVSGFLALAWDDLRSLCLFSYHQLRDFILTAARAAELLGRSSLRGLRQGW EVLKYLGNLVQYWGLELKRS
AINLFDITIAIAVAEGTDRIIEVIQRICRAIRYIPTRIRQGF EAALL*GTSRVDPGGQTADQPRCLLVASHLLFAPPPCLP*PWKVPLPLSF
PNKMRKLHRIV*VGILFWGVGWGRTARGRIGKTIAGMLGMRWALWLLRRKEPADLQI*IHLCRVRRKR**NGIMGIMGLH**IG
QISTYAGHRACGLAPPQDMARVRAQRHDPLQCAPGLPRRHVHALPVQHAICEGAAGARCHVQSEPDGGV*HECGAVENSEI**I
QDQVPGLRMRRQARQASARVCGGDDGGPATRSFGVVLQRDGVRLQRGRI*LE*VVFAGCEPA*GAE*LKSVVFCVLQQHERKRL
L*GRGIQLSDGASPLLGSSASECDGIHGGRPARAARELFNPDRLDPELLVRGRSCRRSCCFRRQRRARNGPGRRLQLSGGQLEFH
Q*SRQPERGEAAAADGPARGDPAPGRADPAGGSAAGGDAGRGCHGENQIKNESINKRRRLILTQSLES LDFDSRAVGP GPVPVSII
EHPVDLFQDPVEVGLDVEVHGHEPVPVGEVAPLQGLVLGDGVVNHPIAGAQGVVLHDVLEEETDGHGQPLGVGVDEPELVGG
MHAGGDEMHLGLDLEIGDVPQAIPPGVHVVDHQHGVSGALGEFVMQLGREGVKEFGDALVTAQVFHALIHDDGDGPVGGGL
GKDVSGVGHIVVVVLGELVIGHFNEFGAEGARLGDEGALDPGGVALADLHLPGLLELGGGDHVLRGDEKNGFRGGGDELGRKQ
VPEQLGLAATGGAVDDPDRQLQVVVEGETAAVLAEEGGHLVHHLAHMHVLAHEFRQEALAPQREELLQRGEVFQRLESVGHGHF
GEGLLQEFQTVPELGDVL*GISIQQTSSFRGLRLRE*GTRRWASSEARVRSFQGRRVRSVSVTVKGCAPGWALARVFRILRLV
ENRSRSAPCASAR*QLSMSS*LSASAAWPLARSLPLEVCPQTGQRRDLRA*SLGARKTDSGA*ASAPQLAQTVSHSTSQVRSRGLGS
KTRFPFCLMRFLPLVSMSSCPRWVTKRLSVSP*TDFMGRSSSGVPRSSS*RNPAHSETKARVQASTKEATWEG*RLSTSGSTFSR
VCKHMSPSSTSRKVIGL*V*AT*PGVPAGGV*KGAGPCSSLSGSLRSASCWGRYLSKAGMTSALRLSVSRNEEDLILTVPLETF
MSPSSIWSEKTIFLLSSLVAKEP*RALESSLAMERMVWFFLSARSLAAMLSCYTSRATHFHSKGKTVVSSSGTILTRQPRLCRVMRSTL
VATSPRRGSLVQQRPLREKQGGSGSSMSSSGGSASTVKMPGRSSGSK*LMQVPRLSAACSRTASARS*GLRGVPQGMGCV
SAEAYMPQMS*T*RGSSRTPM*VG*QRPPRMLART*SYSSCEGARSPVPRLERCGFSAR*TIWRKMAWELEEMVGLWKMLKWA
WGRPTESLMKWA*ESCLATSSAVTRTSRAQ*SRVSWMMSYLSWPFCHSSRLRRNSSRSFQYSSRGNPS*SAR*EPTM*NWLTA
L*AQQPFSTGRA*ACAALREEVWVRKVSRMTLRNWCLKSRSSQPPCSQSWSKSVRFL*AGLGKAKVTSKRLPARGMKLRVMR
KGWGTSARLLMTWAARTISSKPLMLCPTM*SSTNRGRPLTWGSFLSSS*VSSAGSLSPCCSRAQSATWGLALRKEVQRSTARAVCK
RSRY*RNCWPTAIFSGVTQ*KVRGSPCQRSHLSWRARSWASSTSGSPESFMTSMKGTSCLPKDPIQV*VSTS*VRKSLSVRGCEP
MGKNWISCHQLEEWLLM*WK*KCRRRAEHSCLCLYKRPQCSQRCTGCTCCTCTWVPLARNFSGQWSAGGCISCCTTSWPSAW
PSSASMVVMILTSPRGRQVQTSARTGRRARTRARRPELSRLRRCGVRSVSGSGGARLTCSRFSRARGRSRWYLISTAPLVATSTACRV
PCPWGATTVPFFLGAASMSVRS GGEDARRAAGAARGPEAGAAGARRRRARAGSGTAPGEDWRERRRDG*RPGSDASG*RP
DP*V*T*KRV RQNQSYR*RRPAAGSLARRPSCPGRRSRS*TARSPPEGLRGRARRRWRPGRWRGCP*AARRRSCRPRSRRGCR
PRLRRGRARA*PPGRG*ARRGA*RPRSCRAGAGRS*AWWRCAR*RRST*SSGGAASR*RRPGLPSVPWPRRSPRRS*KTGSCAPR
RSTPPPEDG*ARRWWRAPRRARRPRGAPLPSPLPPPLTSLLLPPQEAVAGEPCVAGGARADGR*SARWSPRAGDAWSR*RRAR
PRGAAA*RRRASPGGRRGGLRWAGRGR*RCILSIDP*GLRART*ASRDPRDPKTAERRLRASRSRKVG*ARFLVLRVFGREAGGRC
CW*S*SRRS*DGGWWRGAPGPWARLAGCADGRPCPRRGPDWTRGPCSSPA*AAPRAPPPRPRGRACA*ARTRAAAGRAPGR
RRRAR*GWPAAGSG*GWSGSRSSRRSGRLRC*WCRSSWP*RTS*RS GGRVARARGT*GASRRACRRCRRCRRARGTGIRRGSA
AAGGRAAIARWRGRRARGPRA*GGGSRRCTWTSR*CRRRWWRRAGTRGRGRSCAAAGSSWWPRSGP*GARSRGCSRHTG
KNESGQRLDSVAWRLSERVGLRVYPGSNLESGWSRS*RG TGTPVSTQAC*RNLDQTEAGRFLALVAGHEKLVS AESGRPRWLA
VVRKNRQGCVA VCPGSSLSARRRPDS AANVGVAAPSFRPLSQPTSPVTERAPLFFSCVFARCIPIYCGRCAPTLLHNRPYRSSNSR
RFCPRPSSSQPLPRRP*AEPAFSMTWPWK RARGWRGWGRRRRSGTRACR*KGTLARPTCPSRTCSETGAARS PRRCAPPASTRG

Fig. 25J

GSCGAAWTESGC*GTRISRRTS*RGSA PRARTWPRPTWSRRTSRP*RRRATSKNPSTTTTCAR*SRARR*PWA*CTCGTCWRPSCR
 TPRASR*RRSCFWWCSTVGTTRRSGRRC*ISPSRAAGSWTW*TFCRASWCERSAGCRCPRSWRPSTSRC*VWASTTLGRSTRPRT
 CP*TRR*RSTGFTCA*P*KC*P*ATIWGCTATTGCTAR*APAAGAS*ATRS*CTACSGP*PGPGPRGRATLTWARTCAGSPAAGPW
 KLPAPVPTWRRWTMRRRRASTWKTDGATVFLDDAATAAAS*SRDAGGAAEPAVRH*LLGRLDPGHATHHGADDPQSRSL*TA
 ASGQPALGHPGGRGALALEPHAREGAGHRERAGGEQGHPR*RGRAGVQRAAGARGPLQQHQRADDEPGPHGDRRARGGVAAR
 AVPPRVEPGLHGGAERLPEHAARQRAPGPGGLHQLHQRADGGRGAPERGVPGAGLLPDQSPGLADREPEPGFQELAGTVG
 RAGPGRGPRDGVEPADAELAPAAAAGGALHGQRQREPLVPLPA*PVPRGHRTGARGRADLPGDHPREPRAGPGGPGQPGG
 HPELPADQPVAEDPAPVRAEHRGGAHPALRAAERGAVPDAGGGHAQRGARHDRAQHGAAQHVPRQPPVHQ*ADGLLASGGRH
 ELGLLYQRHLEPALAPAARVLHGRVVRHARPQRRVPVGRRGQQRVLAASRNQCRVEERGRGPAAVLGAVRSRGCCRGGARGRQPL
 PEPALFAEQRAQQRAGSADATAPAGRGGVPERLLVEARAREELPQ*RDREPGGQDEPLEDVRARAQGRAPS*QRRHP*TPAARQ
 AAGTVGVR*GFRRRQQRVGLGWEWW*PVRSPAPPYRAPDVRI*KNKRRYSRPPWRPACVLLCCL**YDEARVPGSSSLVRERD
 AAGGGGGDAAPAGGALRAPAVPGAYGGAEQHSLLGAGTLVRYHPVVPVGGQVGRHRLAELPERPQQLPDHRGAEQRFHPHGG
 QHPDHQL*RALAVGRPAENHHAHQHAQREVRHVQQVQAGDGLAQDPQRG**L*W*SGRADLRVGGV*AARGQLLDH
 DHRSDEQRHHRQLLGGGAAERGAGERHRRREVRAQLPAGLGRPRDRAGDAGRVHQRLPVRHRAARLRRLHREPPQPPAGH
 PQAAALPGGLPDVVRGPGGGQHPRALGCRSLREKQGG*HRRGDRSRGHRLYRGAGR*FC*RCGSGRG*NRK*DSHPAGGEGQ
 QGQELQARARGQEKHRLPQLVPLQLRRPREGRALLDAAHHLGRHLRGGASLLVAARHDARPGHLPLHASS*QLPGGGRRAPARLL
 QELLQRAGRLLAAAARLHLAARLQLPREPDRPPARAHHYHRQ*KRSCSHRSRDPAAAQYQPGSPARDRH*RQTPLPLRLQG
 PGRSRAARPLEPHLLKNVHSHLAQ**HRLGPARAQDDVRRRSPTLHATPRARARALPRSLGRPQGRALAHRRRRDRPGGGRRRA
 QLHARRRRARLHRRRRHQRGRRAPVRPHQEPAAAHRAAPEHPRHARGASLAAQQAHTQGHAGGGQTRGLRQQRRQD
 PQTRGHGGGGGHRQHVPAAARQVRVGARRRHRCARARAHPPPSHLKMLT SRC*CVPAARRMSKRKYKEMLQVIAPEIYGAAA
 VKEERKPRKLKRVKDKKEEDDGLVEFVREFAPRRRVQWRGRKVKVLRPGTTVVFTGERSGSASKRSYDEVYGEDILEQAVR
 LGEFAYGKRSRAPLKEEAVSIPLDHGNPTSLKPVTLQQLVPSAAPRRGFKREGGEDLYPTMQLMVPKRQKLEDVLEHMKVDPEV
 QPEVKVRPIKQVAPGLGVQTVDIKIPTMETQTEPVKPSTSTMEVQTDWPMPAPASTSTRRRRKYGAASLLMPNYALHPSIIPG
 YRGTFRYRGYTSSRRRKTTRRRRRSRRSSTATSALVRRVYRSGREPLTLPRARYHPSIAI*LPPPTCRYGPHMPPPRPHYGLPRKKAAP
 *KADGERAASPPAAARHQAVGGRLPARADPHHRRGDRGDRHSFRGGAGLSAPLRHKKAWICNKKKNGLTLLVL*CVFLDGR
 HQFFVPGTATRAHAAYVGHLEHRHQPTERGLQLEQSLERA*EFRVHAQNLWQQGVEQQHRAAGAEGAERTELPAEGG*WPGL
 RHQRRG*PGQPGRAETDQPPGRGPARGVRGDAPGGGGAASPGQARRQATASRRGGDAADAHGRAAPVRGGGETGPAHHA
 ARGASGHRSAETQQQPARDPGLASASPLHSG*APAAGGRRVARPPRPPGELAHESEQHRGSGSAECEAPLLKDTVALNLLVCV
 YMYVRRPEGGV*RGASPSCKMATPSMLPQWAYMHIAGQDASEYLSPLGVQFARATDTYFSLGNKFRNPTVAPTHDVTDRSQR
 TLRFPVDREDNTYSYKVRYTLAVGDNRVLDMASTYFDIRGVLDRGPSFKPYSGTAYNSLAPKGAPNSSQWEQAKTGNGGTMETH
 TYGVAPMGENITKDLQIGTDVTANQNKPIYADKTFQPEPQVGEENWQETENFYGGRAKKDTNMKPCYGSYARPTNEKGGQ
 AKLKVGDDGVPTKEFDIDLAFFDTPGGTVNGQDEYKADIVMYTENTYLETPDTHVVYKPGKDDASSEINLVQSQMPNRPNYIGFRD
 NFIGLMYYNSTGNMGVLAGQASQLNAVVDLQDRNTELSYQLLDSLDRTRYFSMWNQAVDSYDPDVRIIENHGVEDELPNYCFP
 LDGSGTNAAYQGVKVDGQDGDVESEWENDDTVAARNQLCKGNIFAMEINLQANLWRSFLYSNVALYLPDSYKYPTNVTLPNTN
 TNYDYMNVRTPPSLVDAYLNGARWSDPMDNVNPNFHHRNAGLRYSMLLNGRYVPFHIQVPQKFFAIKSLLLPGSYTYE
 WNFRKDVNMILQSSLGNDLRTDGASIAFTSINLYATFFPMAHNTASTLEAMLRNDTNDQSFNDYLSAANMLYPIPANATNPISIPS
 RNWAAFRGWSFTRLKTRETPSLGSGFDYFVYSGSIPYLDGTFYLNHTFKKVSITFDSSVSWPGNDRLLTPNEFEIKRTVDGEGYNVA
 QCNMTKDWFLVQMLAHYNIGYQGIFYVPEGYKDRMYSFFRNFPMSRQVDEVNYKDYQAVTLAYQHNSGFGVGLAPTMRQ
 GQPYPANYPYPLIGKSAVASVTQKFLCDRVMWRIPFSSNFMSMGALDGLQNMILYANSAHALDMNFEVDPMDESTLLVVFV
 FDVVRVHQPHRGVIEAVYLRTPFSAAGNATT*AALASCKMTAGSGEQELRAILRDLGCGPCFLGTDFDKRFPFGMAPHLKACIVNTA
 GRETGGEHWLAFAWNPRSHTCYLFDPFGFSDERLKQIYQFEYEGLLRRSALATEDRCVTLEKSTQTVQGPRSAACGLFCCMFHAFV
 HWPDRPMDKNPTMNLTLGVPNGMLQSPQVEPTLRRNQEALYRFLNAHSAYFRSHRARIKATAFDRMNQDM*KTGVCM*MLY
 S**TAHVYATFEALTFRNRRGSAGSRHGPRAGIRCCTGTWAAAT*TRGSAAWARGGRGTSRSTACA*VAGRPAAGRARS*NRS
 WDPRSARESCGTRGCTGTPSGPGASRLPAPSRR*CPRPDPRRWPSRRGSSCRSAAPCWARSACGCNRSAGGSASSGPARRSSC
 PGTWPS*KPPAGGRPAAPCRPR*RRPRRTC*RTGWWSRRRARSSARRCWPAAPRCAPSGSG*SWPGWGSPPSARAARSRPH
 SR*CAPSGSSRSRAGTAACPRLRCSAATARSRCTPSSCGRSGSASARSAPSGSPSSRSGSCW*RSAGCRGAPRSHTGGRCGGTP
 RPARASAGRRTSGRSPRGTPSAASSLPCSPRPRKRSAGSGGSSPLSS*SPPRSRRSRPGSQTACRPSR*CARGES*SPRPPAPP
 RPAFRPRCPG*CLAKAHAWSCGVSWFAAEAAAAMCWESASSRPRFLLLGRRPRPRGRHASSGAEAEATGSRGSAGGWQSPFR
 VRGCAPGGAALTDFLRGRPLCSPREQQQAWRLSHRRQHRHLPPPPPTRTSSRMKA*PPRRPAPPPTPRPQTCKRWRNPSRLTW
 AT*RPRSTRRSWQRAFPQRKRTTKSSQSRKQRTSRTRLGTSMAIT*AGQRTCSSIWPANASSSRTRCSTAPRCPSAWRSSAPTS
 ATSSRRACPPSASPTAPVSPTRASTSTRSSRCPRWPPTTSFRTKGSPPAAPTAPAPTCTWAPAPAYLISPPWKFRPSSRVWA

Fig. 25K

ATRLGPRTLCKEAERSMSTTAPWWSWKATTRAWRSSARSS*PTSPTRRSTCPPRS*APSWTRCSSAPRPSRRRRRCRTPRVRTRA
SPWSATSSWRAGWERVAPPRAWKSGASS*WPWSW*PWSWSVCAASLPTRRPCARSRTCTTSSGTGSCARPASPTWS*PTW
SPTWASCTRTAWGKTCTPPCAGRPAATTSATASTCTSATPGRRWACGSSAWRSRT*KSSASSCRRTSRPCGPGSTSVPPRTW
PTSSSPSACG*RCATGCPTL*AKACCKTFALSSSNAPGSCPPAPRCRPTSCR*PSASAPRRSGATATCCAWPTTWPTTRT*SRTSAA
RVCWSATAAATSARRTAPWPATPSC*ARPRSSAPSSCKAPATARARGV*NSPRGCGPRPTCASSCPRTTIPSRSGSTRTNPSRPRPS
CRPASSPRGSPWPNCCKPSRNPKNFC*KRATGSTWTPRPERSTPASPRMPRGSSKKLKVLPPEDEEDWESSQAEEMEDW
DSTQAEEDSLQDSLEEEDEVEEAEEEEAAARPSSSAEKASSTDTISAPGRGRGGRASRWDETGRFPNPTTQTGKKERQGYKSWRG
HKNAIVSCLQACGGNISFTRRYLLFHRGVNFPNRLHYRHLHSPYCFQEEAETQQQKTSGSSS*KIHSGGRWTEDRGERAGADP
GAEEPDLSHPLCHLPAESGAGAGTESQEPFSALAHPLQSVSQERRPTSASHRGRRGSLQQVLRAHS*RVARARPHTEKGGNYVTTT
ALRPTIMSKEIPTPYMWSYQPMGLAAGAAQDYSTRMNWLSAGPAMISRVNDIRAHNRQILLEQSATATPRHHLNPRNWPAAL
VYQEIPQPTTVLLPRDAQAEVQLTNSGVQLAGGAALCRHRAQGIKRLVIRGRGTQLNDEVVSSSLGLRPDGVFQLAGSGRSSFTPR
QAVLTLESSSSQPRSGGIGTLQFVEEFTPSVYFNPFSGSPGHYPDEFIPNFDaisesVDGYD*MSHGGAADLARLRHLDHCRFRCA
RDIAEFAYFELPEEHPQGAHGVRIIEGGLDShLLRIFSQRPLVEREQGQTLTLYCICNHPGLHESLCCLLCTEYNKS*DQRLRLTRL
WCSCYQVPVPLHRRERDRAPAPV*APQEVPHLAVPGLPDRRCQPLRQRSPAERPCQPYFFHPQKQAPALPTLPPRDLVRLRLPS
HLPPDPEYHSAAPRY*QPNYPPTPPSRPFL*I*YHYRRWLLLLVLRPVDPRSPTQSPPEVRKCKFQEPWFKLCYRQKSDMHPSWI
MIIGIVNILACTLISFVIYPCDFGWNspeALYPPEPDTPPQQQQAHALPPQPRPQYMPILDYEAEPQRMPLAISYFNLTGGDD
*PTGQ*QRQRPSPGHGRPRLGAATRPTSHSSAAGESRQGAAGRSHPPVQERHLLPGETGQDLLRGHPDRPSPLRAPAAAEVH
LPGRSQPHRHHPAVGRYQGVHPLLLRLRLPHSDQDPLRPPRPPHELITPLSSEIKIILMMI*IKKIII*FEIKIQSY**FEFNKNKESLT
*NLIPGLCPCFLPTPPHSPLSSGTAGPGLQTSSTR*RGCIQPPVQSSFYLLSDVQKARPGG**LRPRLPLRCRQRTDRALHQPLR
LFRWIPREAPGGVVPATG*PRHHQERGNHPQAGRGGGPRLVGKTHLQHGHHQRRPSQYFKQHFFP*NCCPFLQQQWNFKPQC
LHTISSISHI*HFRHKSWKRSSDFK*VVDCTTNSSSYQLK*HHSKNRQRAIY*LQWKQRT*G*YKPKKRTSF*R*CYCNIYWKWLRL
WIL***WKNKTRNYQNWRIKF*C*QNSCQTRHRKF*LRWCLDSWKQTG*QANTLDYP*PKP*LSITFRQRCQIYSLYKMR*S
NTRHCGSGGCYCRISTKSN**HSQKRHSFP*I*FRWCTHVKLINGR*LLEL*GGTDHSCSLYKCCGIHAKYRCISKNP*NT*K*HSQ
SGIFNWRNYYANDTNHNFQWH**KRHNPS*HLLYDFYMAVDWRL*GQKYLYCYQLILFFLHRPGIIPPSKPTFPPTTFVYMETLKQK
NKVQVfy*INSFTGLEQLFFLHPPRTWNTPPSPPAQ*P*TSECHW*WTCFWSRSTQFQSEPVSRSRGR*NPPGTPASAPHSSTAED
CPRWGSRLSGRSRAAVGIIVRERDRPVVSHQAPQQLPPLRQAAAQGVVRVQGLPQHDAHGPQHQSAGAAAGAAHANLAQV
TAVRATQDHQVQVQSIQVQHAPAETHRGKDATHVAVVPDPQVNVQVALPPEDAHHVHDLGHVAVHHLVPVPHPLVEHAAPDDP
AEPQGGHRRPARHAAKRPRIPAMTMEDPPLVPVDHLGAEQVYVGTAAQAYAHASLQHSQLLGGQNHIPGHGELLQDSEPRRTGQSS
HITYIVHGGQIAIRQHRVILHQRSAGLGLLTAW*GGRPIRVMAGRG*SCSRPCHDAVAFGHFRTCCSRTWSGRCTPIAGGGGLGAW
NARC*SCKTATLSdraadLGPQE**RSHHA**L*SHRPPWNGPGPAR*CNFVGFR*RRGREEQEPP*LTfNPNGLGALQNEGHGD
GTSRPRCVGGK*QPGQR*YGRDVPRLWPAKPPRAHPETRQ*RKREGSLIPQPCYTPAPSPDNFHFSSLE*FELVPEVNPSQP**K
ARAEHPPPAFLSTPS*FQDILLVHLQQIDKRNIKISAAIPELLPQQ*L*VLFHIVSEIFSHRTPRNKRASHITDKPKSPVSIKCKIEIS
MLARPGDIFQITGQKIG*AIFKKINKRKIFQVHV*GLGNNDGVSARGAFQHG*LADL*KNKK*NIKPC*PGEQVGKSFSPAPGRPRG
LRRDPRKNCRYD*KPSQRDVPGGRR*FEKKHTPPEHWS*VKKSGRGSNEALQSLSSPAKRCHADEAQNFQVRKKCNYSPPAQ
AAKLPIPPDTHTKPQRP*LTERQQQRHTTGARVREKTEL*PVRPLSAQYIAPDLH*RKQSLKIPAK*SHTPSTRPETGDTLRKIRALP
QTAKLPSFPGSHATSSKHDFQIPSTVKNITRPAPNGRRSRSQSPSSLPKFKQLICILTRTKSLRYIID

Fig. 26A

AdC7 010-DU172gp160(E1622) Nucleic Acids – SEQ ID NO: 7

CATCATCAATAATATACCTCAAACCTTTTGGTGCGGTTAATATGCAAATGAGCTGTTTGAATTTGGGGAGGGAGGAAGGTGAT
TGGCCGAGAGACGGGCGACCGTTAGGGGCGGGCGGGTGACGTTTTGATGACGTGGCCGTGAGGCGGAGCCGGTTTGCAA
GTTCTCGTGGGAAAAGTGACGTCAAACGAGGTGTGGTTTGAACACGGAAATACTCAATTTTCCCGCGCTCTCTGACAGGAAAT
GAGGTGTTTCTGGGCGGATGCAAGTGAAAACGGGCCATTTTCGCGCGAAAACCTGAATGAGGAAGTAAAAATCTGAGTAATTT
CGCGTTTATGGCAGGGAGGAGTATTTGCCGAGGGCCGAGTAGACTTTGACCGATTACGTGGGGGTTTCGATTACCGTATTTTT
CACCTAAATTTCCGCGTACGGTGTCAAAGTCCGGTGTTCCTACGTACGATATCATTTCCCGAAAGTGCCACCTGACCGTAACTA
TAACGGTCCTAAGGTAGCGAAAGCTCAGATCTCCCGATCCCTATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGT
TAAGCCAGTATCTGCTCCCTGCTTGTGTGTTGGAGGTGCTGAGTAGTGCGCGAGCAAAATTAAGCTACAACAAGGCAAGGC
TTGACCGACAATTGCATGAAGAATCTGCTTAGGGTTAGGCGTTTTGCGCTGCTTCGCGATGTACGGGCCAGATATACGCGTTG
ACATTGATTATTGACTAGTATGCCAAGTACGCCCCATTGACGTCAATGACGGTAAATGGCCCCGCTGGCATTATGCCCAGTA
CATGACCTTATGGGACTTTCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGTATGCGGTTTTGGCAGTAC
ATCAATGGGCGTGGATAGCGGTTTGACTCACGGGGATTTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTTCGCA
CCAAAATCAACGGGACTTTCCAAAATGTCGTAACAACCTCCGCCCATTGACGCAAAATGGGCGGTAGGCGTGTACGGTGGGAG
GTCTATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCACTAGAAGCTTTATTGCGGTAGTTTATCACAGTTAAATTGCTAAC
GCAGTCAGTGCTTCTGACACAACAGTCTGAACTTAAGGCTAGAGTACTTAATACGACTCACTATAGGCTAGTTAAGGCTAGA
GTTGACGCCACCATGCGCGTGTATGGGCATCCTGCGCTCTACCAGCAGTGGTGGATCTGGGGCATCCTGGGCTTCTGGATGC
TGATGATCTGCAACGTGTGGGGCAACCTGTGGGTGACCGTGTACTACGGCGTGCCCGTGTGGAAGGAGGCCAAGACCACCT
GTTCTGCGCCTCCGACGCCAAGGCCCAAGGAGGAGGTGCACAACATCTGGGCCACCCACGCTGCGTGCCACCCGACCCCA
ACCCCGAGGAGATCGTGCTGAAGAACGTGACCGAGAACTTCAACATGTGGAAGAACGACATGGTGGACCATGTCACGAGG
ACATCATCTCCCTGTGGGACCATGCTTGAAGCCCTGCGTGAAGCTGACCCCTGTGCGTGACCTGAACTGCTCCGACGTGA
AGATCAAGGGCACCAACGCCACCTACAACAACGCCACCTACAACAACAACACCATCTCCGACATGAAGAACTGCTCCTTCA
ACACCACACCGAGATCACCGACAAGAAGAAGGAGTACGCCCTGTTCTACAAGCTGGACGTGGTGGCCCTGGACGGCAA
GGAGACCAACTCCACCAACTCCTCCGAGTACCGCCTGATCAACTGCAACACCTCCGCCGTGACCCAGGCGTGGCCCAAGGTGTC
CTTCGACCCCATCCCATCCACTACTGCGCCCCCGCCGGTACGCCATCCTGAAGTGCAACAACAAGACCTTCAACGGCACCGG
CCCCTGCAACAACGTGTCCACCGTGCAGTGCACCCACGGCATCAAGCCCGTGGTGTCCACCCAGCTGCTGTGAACGGCTCCCT
GGCCGAGGAGGAGGTGGTGTATCCGCTTCGAGAACCTGACCAACAACGCCAAGATCATCATCGTGACCTGAACGAGTCCGTG
GAGATCAACTGCACCCGCCCCTCCAACAACACCCGCAAGTCCGTGCGCATCGGCCCGGCCAGACCTTCTTCGCCACCGGCGA
CATCATCGGCGACATCCGCCAGGCCACTGCAACATCTCCGCAAGAAGTGGAACACCACCTGCGAGCGGTGAAGGAGAAG
CTGAAGGAGAAGTTCCCCAACAAGACCATCCAGTTCGCCCCCTCCTCCGGCGGCGACCTGGAGATCACACCCACTCCTTCAAC
TGCCGCGGCGAGTTCTTCTACTGCTACACCTCCGACCTGTTCAACTCCACCTACATGTCCAACAACACCGGCGGCGCAACATC
ACCCTGCAGTGCCGCATCAAGCAGATCATCCGCATGTGGCAGGGCGTGGGCCAGGCCATGTACGCCCCCCCCATCGCCGCA
ACATCACCTGCAAGTCCAACATCACCGCCTGCTGCTGACCCGCGACGGCGGCAAGGAGAAGAACGACACCGAGACCTTCCG
CCCCGGCGGCGGCGACATGCGCGACAACCTGGCGCTCCGAGCTGTACAAGTACAAGGTGGTGGAGATCAAGCCCTGGGCATC
GCCCCGACAAGGCCAAGCGCCGCGTGGTGGAGCGCGAGAAGCGCGCCGTGGGCATCGGCGCCGTGTTCTGGGCTTCTCTG
GGCGCCCGGCGAGCACCATGGGCGCCGCCAGCATGACCCTGACCGTGCAAGGCCCGCCAGCTGCTGAGCGGCATCGTGCAAGC
AGCAGAGCAACCTGCTGCGCGCCATCGAGGCCAGCAGCACATGCTGCAGCTGACCGTGTGGGGCATCAAGCAGCTGCAGAC
CCGCGTGCTGGCCATCGAGCGCTACCTGAAGGACCAGCAGCTGCTGGGCATCTGGGGCTGCAGCGGCAAGCTGATCTGCACC
ACCGCCGTGCCCTGGAACGCCAGCTGGAGCAACAAGAGCTACGAGGAGATCTGGGGCAACATGACCTGGATGCAGTGGGAC
CGCGAGATCAACAACCTACCAACACCATCTACAGCTGCTGGAGGAGAGCCAGAACCAGCAGGAGAAGAACGAGAAGGAC
CTGCTGGCCCTGGACAGCTGGGAGAGCCTGTGGAGCTGGTTCAACATCAACAACTGGCTGTGGTACATCCGCATCTTCATCAT
CATCGTGGGCGGCTGATCGGCCTGCGCATCATCTTCGCCGTGCTGAGCATCGTGAACCGCGTGCGCCAGGGCTACAGCCCCC
TGAGCTTCCAGACCTGACCCCCAGCCCCGCGAGCCCGACCGCCTGGGCCGATCGAGGAGGAGGGCGGCGAGCAGGACC
GCGCCCGCAGCGTGCGCCTGGTGAACGGCTTCTGGCCCTGGCCTGGGAGGACCTGCGCAGCCTGTGCTGTTTACGCTACCAC
CGCTGCGCGACCTGATCCTGATCGCCGCCGCGCCGCCCTGCTGGGCCGAGCAGCCTGTGGGGCTGCAGAAGGGCT
GGGAGGCCCTGAAGTACCTGGGACGCTGGTGCAGTACTGGGGCTGGAGCTGAAGAAGAGCGCCATCAGCCTGTTTCGACG
CCATCGCCATCACCGTGGCCGAGGGCACCGACCGCATCATCAACATCGTGACGCGCATCAGCCGCGCCTTCTACAACATCCCCC
GCCGCATCCGCCAGGGCTTCGAGGGCACCTGCAAGTAAGGTACCTTAGAGTCGACCCGGGCGGCCAAACCGCTGATCAGCCT
CGACTGTGCCTTCTAGTTGCCAGCCATCTGTTGTTTGCCCTCCCCGTGCTTCCTTGACCTGGAAGGTGCCACTCCCACTGT
CCTTCTCAATAAAATGAGGAAATTGCATCGCATTGTCTGAGTAGGTGTCATTCTATTCTGGGGGTGGGGTGGGGCAGGACA

Fig. 26B

GCAAGGGGGAGGATTGGGAAGACAATAGCAGGCATGCTGGGGATGCGGTGGGCTCTATGGCTTCTGAGGCGGAAAGAACC
AGCAGATCTGCAGATCTGAATTCATCTATGTCGGGTGCGGAGAAAGAGGTAATGAAATGGCATTATGGGTATTATGGGTCTGC
ATTAATGAATCGGCCAGATATCGATATGCTGGCCACCGTGATGTGACCTCGCACCCCGCAAGACATGGCCCGAGTTTCGAGC
ACAACGTCATGACCCGATGCAATGTGCACCTGGGGTCCCGCCGAGGCATGTTTCATGCCCTACCAAGTGAACATGCAATTTGTG
AAGGTGCTGCTGGAGCCCGATGCCATGTCCAGAGTGAGCCTGACGGGGGTGTTTGACATGAATGTGGAGCTGTGGAAAATTC
TGAGATATGATGAATCCAAGACCAGGTGCCGGGCTGCGAATGCGGAGGCAAGCACGCCAGGCTTCAGCCCGTGTGTGTGGA
GGTGACGGAGGACCTGCGACCCGATCATTGGTGTGTCTGCAACGGGACGGAGTTCGGCTCCAGCGGGGAAGAATCTGAC
TAGAGTGAGTAGTGTTTGGGGGAGGTGGAGGGCTGTATGAGGGGCAGAATGACTAAAATCTGTGTTTTCTGTGTGTTGCA
GCAGCATGAGCGGAAGCGCCTCCTTGAGGGAGGGGTATTAGCCCTTATCTGACGGGGCGTCTCCCTCCTGGGCGGGAGT
GCGTCAGAATGTGATGGGATCCACGTGGACGGCCGGCCGTGACGCCCGGAACTCTCAACCTGACCTACGCGACCCTG
AGCTCCTCGTCCGTGGACGCGAGCTGCCGCCGAGCTGCTGCTCCGCCGCCAGCGCCGTGCGCGGAATGGCCCTGGGCGCCG
GCTACTACAGCTCTCTGGTGGCCAACTCGACTTCCACCAATAATCCCGCCAGCCTGAACGAGGAGAAGCTGCTGCTGCTGATG
GCCAGCTCGAGGCCCTGACCCAGCGCTGGGCGAGCTGACCCAGCAGGTGGCTCAGCTGCAGGCGGAGACGCGGGCCGCG
GTTGCCACGGTGAAAACCAATAAAAAATGAATCAATAAATAACGGAGACGGTTGTTGATTTTAACACAGAGTCTTGAATCT
TTATTTGATTTTTCGCGCGCGGTAGGCCCTGGACCACCGGTCTCGATCATTGAGCACCCGGTGGATTTTTCCAGGACCCGGTA
GAGGTGGGCTTGATGTTGAGGTACATGGGCATGAGCCCGTCCCGGGGGTGGAGGTAGCTCCATTGCAGGGCCTCGTGCTC
GGGGGTGGTGTGTAAATCACCCAGTCATAGCAGGGGCGCAGGGCGTGGTGCTGCACGATGTCCTTGAGGAGGAGACTGAT
GGCCACGGGCGAGCCCTTGTTGTAGGTGTTGACGAACCTGTTGAGCTGGGAGGGATGCATGCGGGGGGAGATGAGATGCAT
CTTGGCCTGGATCTTGAGATTGGCGATGTTCCGCCAGATCCGCCGGGGTTCATGTTGTGCAGGACCACCAGCACGGTGT
ATCCGGCGCACTTGGGAATTTGTCATGCAACTTGAAGGGAAGGCGTGAAAGAATTTGGAGACGCCCTGTGACCGCCAG
GTTTTCCATGCACTCATCCATGATGATGGCGATGGGCCGTGGGCGGCGGCTGGGCAAAGACGTTTCGGGGGTGCGACACA
TCGTAGTTGTGGTCTGGGTGAGCTCGTCATAGGCCATTTAATGAATTTGGGGCGGAGGGTGCCGACTGGGGGACGAAGG
TGCCCTCGATCCCGGGGGCGTAGTTGCCCTCGCAGATCTGCATCTCCAGGCCCTGAGCTCGGAGGGGGGGATCATGTCCACC
TGCGGGGCGATGAAAAAACGGTTTCCGGGGCGGGGGAGATGAGCTGGGCCGAAAGCAGGTTCCGGAGCAGCTGGGACTT
GCCGACGCCGTGGGGCCGTAGATGACCCCGATGACCGGCTGCAGGTGGTAGTTGAGGGAGAGACAGCTGCCGTCCTCGCG
GAGGAGGGGGGCCACCTCGTTCATCATCTCGCGCATGTCATGTTCTCGCGCAGAGTTCGCCAGGAGGCGCTCGCCCCCA
GCGAGAGGAGCTTTGCAGCGAGGCGAAGTTTTTCAGCGGCTTGAGYCCGTGCGCCATGGGCATTTTGGAGAGGGTCTGTTG
CAAGAGTTCCAGACGGTCCCAGAGCTCGGTGATGTGCTCTAGGGCATCTCGATCCAGCAGACCTCTCGTTTCGCGGGTGGG
GCGACTGCGGGAGTAGGGACACAGGCGATGGGCGTCCAGCGAGGCCAGGGTCCGGTCTTCCAGGGTGCAGGGTCCGCGT
CAGCGTGGTCTCCGTACGGTGAAGGGGTGCGCGCCGGGCTGGGCGCTTGCGAGGGTGCGCTTACGGCTCATCCGGCTGGTC
GAGAACCGTCCCGGTGCGGCCCTGCGCGTCCGCCAGGTAGCAATTGAGCATGAGTTCGTAGTTGAGCGCCTCGGCCGCGT
GGCCCTTGCGCGGAGCTTACCTTTGGAAGTGTGTCCGCAGACGGGACAGAGGAGGGACTTGAGGGCGTAGAGCTTGGGGG
CGAGGAAGACGGACTCGGGGGCGTAGGCGTCCGCGCCGAGCTGGCGCAGACGGTCTCGCACTCCACGAGCCAGGTGAGGT
CGGGCCGGTTGGGGTCAAAAACGAGGTTTCTCCGTGCTTTTGATGCGTTTCTTACCTCTGGTCTCCATGAGCTCGTGCCCC
GCTGGGTGACAAAGAGGCTGTCCGTGTCCCGTAGACCGACTTATGGGCCGGTCTCGAGCGGGGTGCGCGGTCTCTCGTC
GTAGAGGAACCCCGCCACTCCGAGACGAAGGCCCGGTCCAGGCCAGCACGAAGGAGGCCACGTGGGAGGGGTAGCGGT
CGTTGTCCACGAGCGGTCCACCTTCTCAGGGTATGCAAGCACATGTCCCCCTCGTCCACATCCAGGAAGGTGATTGGCTTGT
AAGTGTAGGCCACGTGACCGGGGGTCCCGGCCGGGGGGGTATAAAGGGGGCGGGCCCTGCTCGTCTCACTGTCTTCCG
GATCGCTGTCCAGGAGCGCCAGCTGTTGGGGTAGGTATCCCTCTCGAAGGCTGGCATAACCTCGGCACTCAGGTTGTAGTT
TCTAGAAACGAGGAGGATTTGATATTGACGGTGCCGTTGGAGACGCTTTCATGAGCCCTCGTCCATCTGGTCAGAAAAGAC
GATCTTTTGTGTCGAGCTTGGTGGCGAAGGAGCCGTAGAGGGCGTTGGAGAGGAGCTTGGCGATGGAGCGCATGGTCTG
GTTCTTTTCTTGTGCGCGCGCTCCTTGGCGGCGATGTTGAGCTGCACGTA CTGCGCGCCACGCACTTCCATTCCGGGAAGAC
GGTGGTGAGCTCGTCGGGCACGATTCTGACCCGCCAGCCGCGGTTGTGCAGGGTGATGAGGTCCACGCTGGTGGCCACCTCG
CCGCGCAGGGGCTCGTTGGTCCAGCAGAGGCGCCCGCCCTTGC GCGAGCAGAAGGGGGGACGCGGTCCAGCATGAGCTCG
TCGGGGGGGTGCGCGTCCACGGTGAAGATGCCGGGCAGAAGCTCGGGGTGCAAGTAGCTGATGCAGGTGTCCAGATCGTCC
AGCGCCGCTTGCCAGTCGCGCACGGCCAGCGCGCTCGTAGGGGCTGAGGGGCGTGCCCGAGGGCATGGGGTGCGTGAGC
GCGGAGGCGTACATGCCGAGATGTCGTAGACGTAGAGGGGCTCTCGAGGACGCCGATGTAGGTGGGGTAGCAGCGCCCC
CCGCGGATGCTGGCGCGACGTAGTCGTACAGCTCGTGCGAGGGGCGGAGGAGCCCGTGCCAGGTTGGAGCGTTGCGGC
TTTTCGGCGCGGTAGACGATCTGGCGGAAGATGGCGTGGGAGTTGGAGGAGATGGTGGGCTCTGGAAGATGTTGAAGTGG
GCGTGGGGCAGGCCGACCGAGTCCCTGATGAAGTGGGCGTAGGAGTCTGCAGCTTGGCGACGAGCTCGGCGGTGACGAGG
ACGTCCAGGGCGCAGTAGTCGAGGGTCTCTGGATGATGTCGTA CTGAGCTGGCCCTTCTGTTCCACAGCTCGCGGTTGAG

Fig. 26C

AAGGAACTCTTCGCGGTCTTCCAGTACTCTTCGAGGGGGAACCCGTCCTGATCGGCACGGTAAGAGCCCACCATGTAGAACT
GGTTGACGGCCTTGATAGGCGCAGCAGCCCTTCTCCACGGGGAGGGCGTAAGCTTGTGCGGCCTTGCGCAGGGAGGTGTGGG
TGAGGGCGAAGGTGTGCGGCACCATGACCTTGAGGAACTGGTGCTTGAAGTCGAGGTGTCGCGAGCCGCCCTGCTCCAGAG
CTGGAAGTCCGTGCGCTTCTGTAGGCGGGGTGGGCAAAGCGAAAGTAACATCGTTGAAGAGGATCTTGCCCGCGCGGGG
ATGAAGTTGCGAGTGATGCGGAAAGGCTGGGGCACCTCGGCCCGGTTGTTGATGACCTGGGCGGCGAGGACGATCTCGTCG
AAGCCGTTGATGTTGTGCCCCACGATGTAGAGTTCCACGAATCGCGGGCGGCCCTTAACGTGGGGCAGCTTCTTGAGCTCGTC
GTAGGTGAGCTCGGCGGGGTGCTGAGCCCGTGTCTGCTGAGGGGCCAGTCGGCGACGTGGGGGTTGGCGCTGAGGAAGG
AAGTCCAGAGATCCACGGCCAGGGCGGTCTGCAAGCGGTCCCGGTACTGACGGAAGTCTGGCCACGGCCATTTTTTCGGG
GGTGACGCGAGTAGAAGGTGCGGGGTGCGCGTGCCAGCGGTCCCACTTGAGCTGGAGGGCGAGGTCTGGGCGAGCTCGAC
GAGCGGCGGGTCCCCGAGAGTTTCATGACCAGCATGAAGGGGACGAGCTGCTTGCCGAAGGACCCCATCCAGGTGTAGGTT
TCCACATCGTAGGTGAGGAAGAGCCTTTCGGTGCGAGGATGCGAGCCGATGGGGAAGAACTGGATCTCTGCCACCACTTGG
AGGAATGGCTGTTGATGTGATGGAAGTAGAAATGCCGACGGCGCGCCGAGCACTCGTGCTTGTGTTTATACAAGCGTCCGCA
GTGCTCGCAACGCTGCACGGGATGCACGTGTGCACGAGCTGTACCTGGGTTCTTTGACGAGGAATTCAGTGGGCAGTGG
AGCGCTGGCGGCTGCATCTGGTGCTGTACTACGTCTGGCCATCGGCGTGGCCATCGTCTGCCTCGATGGTGGTCATGCTGAC
GAGCCCGCGCGGGAGGCAGGTCCAGACTTCGGCTCGGACGGGTGCGAGAGCGAGGACGAGGGCGCGCAGGCCGAGCTGT
CCAGGGTCTGAGACGCTGCGGAGTCAGGTCACTGGGTCAGTGGGACGCGGCGCGCGGTTGACTTGACAGGAGCTTTCCAGGGCGC
GCGGGAGGTCCAGATGGTACTTGATCTCCACGGCGCCGTTGGTGGCGACGTCCACGGCTTGAGGGTCCCGTGGCCCTGGGG
CGCCACCACCGTGGCCGTTTCTTCTGGGCGCTGCTTCCATGCCGTCAGAAGCGGCGGCGAGGACGCGCGCCGGGCGGCA
GGGGCGGCTCGGACCCGAGGCGAGGGCGGCGAGGGGCACGTGCGCGCCGCGCGCGGGCAGGTTCTGGTACTGCGCCCG
AGAAGACTGGCGTGAGCGACGACGCGACGTTGACGTCTGGATCTGACGCCTTGGGTGAAGGCCACGGGACCCGTGAGT
TTGAACCTGAAAGAGAGTTGACAGAAATCAATCTCGGTATCGTTGACGGCGGCCTGCCGAGGATCTCTGACGTCGCCCCGA
GTTGCTCTGGTAGGCGATCTCGGTGATGAAGTCTCGATCTCTCTCTCTGAAGGTCTCCGCGGCGGCGCGCTCGACGGTGG
CCGCGAGGTCTGGAGATGCGGCCCATGAGCTGCGAGAAGGCGTTTATGCCGCGCTCGTTCCAGACGCGGCTGTAGACCAC
GGCTCCGTGCGGGTGCAGCGCGCGCATGACCACCTGGGCGAGGTTGAGCTCGACGTGGCGGTGAAGACCGCGTAGTTGCA
GAGGCGCTGGTAGAGGTAGTTGAGCGTGGTGGCGATGTGCTCGGTGACGAAGAAGTACATGATCCAGCGCGGAGCGGCAT
CTCGCTGACGTGCGCCAGGGCTTCAAGCGCTCCATGGCCTCGTAGAAGTCCACGGCGAAGTTGAAAACTGGGAGTTGCGC
GCCGAGACGGTCAACTCTCTCCAGAAGACGGATGAGCTCAGCGATGGTGGCGCGCACCTCGCGCTCGAAGGCCCCGGGG
GCTCTCTTCTTCCATCTTCTCTCTCCACTAACATCTTCTACTTCTCTCAGGAGGCGGCGGCGGGGAGGGGCCCTGCG
TCGCCGCGGCGCACGGGACAGCGGTGATGAAGCGCTCGATGGTCTCCCCGCGCGGCGACGCATGGTCTCGGTGACGGC
GCGCCGCTCTCGCGGGGCGCAGCGTGAAGACGCGCGCGCATCTCCAGGTGGCCGCGGGGGGGTCTCCGTTGGGCGAG
GGAGAGGGCGCTGACGATGCATCTTATCAATTGGCCGTAGGGACTCCGCGCAAGGACCTGAGCGTCTCGAGATCCACGGGA
TCCGAAAACCGCTGAACGAAGGCTTCGAGCCAGTCGAGTCGCAAGGTAGGCTGAGCCCGTTTCTGTTCTTCGGGGATTTC
GGGAGGCGGGCGGGCGATGCTGCTGGTGTGAAGTTGAAGTAGGCGGTCTGAGACGGCGGATGGTGGCGAGGAGCACCA
GGTCTTGGGCCGGCTTGTGATGCGCAGACGGTGGCCATGCCAGGCGTGGTCTGACACCTGGCGAGGTCTTGTGA
GTAGTCTGATGAGCCGCTCCACGGGACCTCTCTCTCGCCGCGCGGCGGTGATGCGCGTGAGCCGAACCCGCGCTGGG
GCTGGACGAGCGCCAGGTGCGCGACGACGCGCTCGGCGAGGATGGCTGCTGTATCTGGGTGAGGGTGGTCTGGAAGTCGT
CGAAGTCGACGAAGCGGTGGTAGGCTCCGGTGTGATGGTATAGGAGCAGTTGGCCATGACGGACCACTGACGGTCTGGT
GGCCGGTGCACGAGCTCGTGGTACTTGAGGCGGAGTAGGCGCGCGTGTGCAAGATGTAGTCGTTGACGGTGCACGA
GGTACTGGTATCCGACGAGGAAGTGCGGCGGCGGCTGGCGGTAGAGCGGCCATCGCTCGGTGGCGGGGCGCGCGGCGC
AGGTCTCGAGCATGAGGCGGTGGTAGCCGTAGATGTACCTGGACATCCAGGTGATGCCGCGGCGGTGGTGGAGGCGCGC
GGGAACTCGCGGACGCGGTTCCAGATGTTGCGCAGCGGCAGGAAGTAGTTATGGTGGCCGCGGTCTGGCCCGTAGGGCGC
GCGCAGTCGTGGATGCTCTAGACATACGGGCAAAAACGAAAGCGGTGACGGCTCGACTCCGTGGCCTGGAGGCTAAGCGA
ACGGGTTGGGCTGCGCGTGTACCCCGTTTCAATCTCAATCAGGCTGGAGCCGAGCTAACGTGGTACTGGCACTCCCGTCT
CGACCAAGCCTGTAACGAAACCTCCAGGATACGGAGGCGGGTCTTTTTTGGCCTTGGTCTGCTGGTATGAAAACTAGTA
AGCGCGGAAAGCGACCGCCCGCATGGCTCGCTGCCGTAGTCTGGAGAAAGAATCGCCAGGGTTCGTTGCGGTGTGCCCCG
GTTGAGCCTCAGCGCTCGGCGCGGCGGATTCCGCGGCTAACGTGGGCGTGGTCTGCCCCGTCTTCCAGACCCCTTAGC
CAGCCGACTTCTCAGTTACGGAGCGAGCCCTCTTTTCTGTGTTTTTGCAGATGCATCCCGTACTGCGGCAGATGCGCCCC
CACCCTCCACCTCAACCGCCCTACCGCCGACGAGCAGCAACAGCCGGCGCTTCTGCCCCGCCCCAGCAGCAGCCAGCCACT
ACCGCGGCGGCGCGCGTGGAGCGGAGCCGCGGCTTCAATGACCTGGCCTTGAAGAGGGCGAGGGGCTGGCGCGGCTGGG
GGCGTCTGCGCGGAGCGGCACCCGCGCGTGCAGATGAAAAGGACGCTCGCGAGGCCTACGTGCCAAGCAGAACCTGTT
CAGAGACAGGAGCGGCGAGGAGCCCGAGGAGATGCGCGCCTCCCGCTTCCACGCGGGCGGGAGCTGCGGCGCGGCTGG

Fig. 26D

ACCGAAAGCGGGTGCTGAGGGACGAGGATTCGAGGCGGACGAGCTGACGGGGATCAGCCCCGCGCGCGCACGTGGCC
 GCGGCCAACCTGGTCACGGCGTACGAGCAGACCGTGAAGGAGGAGAGCAACTTCCAAAAATCCTTCAACAACCACGTGCGCA
 CGCTGATCGCGCGGAGGAGGTGACCCTGGGCCTGATGCACCTGTGGGACCTGCTGGAGGCCATCGTGCAAGACCCACGAG
 CAAGCCGCTGACGGCGCAGCTGTTTCTGGTGGTGACGACAGTCGGGACAACGAGACGTTAGGGAGGCGCTGCTGAATATC
 ACCGAGCCCCGAGGGCCGCTGGCTCCTGGACCTGGTGAACATTCTGCAGAGCATCGTGGTGCAGGAGCGCGGGCTGCCGCTGT
 CCGAGAAGCTGGCGGCTATCAACTTCTCGGTGCTGAGCCTGGGCAAGTACTACGCTAGGAAGATCTACAAGACCCCGTACGTG
 CCCATAGACAAGGAGGTGAAGATCGACGGGTTTACATGCGCATGACCCTGAAAGTGCTGACCCTGAGCGACGATCTGGGGG
 TGTACCGCAACGACAGGATGCACCGCGCGGTGAGCGCCAGCCGCGGCGGAGCTGAGCGACCGAGGAGCTGATGCACAGCC
 TGCAGCGGGCCCTGACCGGGGCGGGACCGAGGGGGAGAGCTACTTTGACATGGGCGCGGACCTGCGCTGGCAGCCAGCC
 GCCGGGCTTGAAGCTGCCGGCGGTTCCCCCTACGTGGAGGAGGTGGACGATGAGGAGGAGGAGGGCGAGTACCTGGAA
 GACTGATGGCGCGACCGTATTTTTGCTAGATGCAGCAACAGCCACCGCCTCCTGATCCCGGATGCGGGCGGCGCTGCAGAGC
 CAGCCGTCCGGCATTAACTCCTCGGACGATTGGACCCAGGCCATGCAACGCATCATGGCGCTGACGACCCGCAATCCCGAAGC
 CTTTAGACAGCAGCCTCAGGCCAACCGGCTCTCGGCCATCCTGGAGGCCGTGGTGCCCTCGCGCTCGAACCCACGCACGAGA
 AGGTGCTGGCCATCGTGAACGCGCTGGTGGAGAACAAGGCCATCCGCGGCGACGAGGCCGGGCTGGTGTACAACGCGCTGC
 TGGAGCGCGTGGCCCGCTACAACAGCACCAACGTGCAGACGAACCTGGACCGCATGGTGACCGACGTGCGCGAGGCGGTGT
 CGCAGCGGAGCGGTTCCACCGCGAGTCGAACCTGGGCTCCATGGTGGCGCTGAACGCCTTCTGAGCACGCAGCCCGCAA
 CGTGCCCCGGGGCCAGGAGGACTACACCAACTTCATCAGCGCGCTGCGGCTGATGGTGGCCGAGGTGCCCCAGAGCGAGGT
 GTACCAGTCGGGGCCGGACTIONTTCTCCAGACCAGTCGCCAGGGCTTGACAGACCGTGAACCTGAGCCAGGCTTTCAAGAACT
 TGCAGGGACTGTGGGGCGTGACGCCCCGGTGGGGACCGCGCGACGGTGTGAGCCTGCTGACGCCGAACCTGCGCCTGC
 TGCTGCTGCTGGTGGCGCCCTCACGGACAGCGGACGCTGAGCCGCGACTCGTACCTGGGCTACCTGCTTAACCTGTACCGC
 GAGGCCATCGGGCAGGCGCACGTGGACGAGCAGACCTACCAGGAGATCACCCACGTGAGCCGCGCGCTGGGCCAGGAGGAC
 CCGGGCAACCTGGAGGCCACCTGAACCTCTGCTGACCAACCGGTGCGAGAAGATCCCGCCCCAGTACGCGCTGAGCACCGA
 GGAGGAGCGCATCCTGCGCTACGTGCAGCAGAGCGTGGGGTGTTCTGATGCAGGAGGGGGCCACGCCACGCGCGCT
 CGACATGACCGCGCGCAACATGGAGCCCAGCATGTACGCTCGCAACCGCCGTTTCATCAATAAGCTGATGGACTACTTGCATC
 GGGCGGCCGCCATGAACCTCGGACTACTTTACCAACGCCATCTTGAACCCGCACTGGCTCCCGCCCGCGGGTTCTACACGGGC
 GAGTACGACATGCCGACCCCAACGACGGGTTCTGTGGGACGACGTGGACAGCAGCGTGTCTCGCCGCGCCCCGCCACCA
 CCGTGTGGAAGAAAGAGGGCGGGGACCGGCGGCCGCTCTCGGCGCTGTCCGGTTCGCGCGGGTGCTGCCGCGCGGTGCTG
 AGGCCGCCAGCCCCCTCCCGAGCCTGCCCTTTTCGCTGAACAGCGTGCGCAGCAGCGAGCTGGGTGCGCTGACGCGGCCGCG
 CCTGCTGGGCGAGGAGGAGTACCTGAACGACTCCTTGTGAGGCCCGAGCGCGAGAAGAACTTCCCAATAACGGGATAGAG
 AGCCTGGTGGACAAGATGAGCCGCTGGAAGACGTACGCGCACGAGCACAGGGACGAGCCCCGAGCTAGCAGCAGCGCAGGC
 ACCCGTAGACGCCAGCGACACGACAGGCAGCGGGTCTGGTGTGGGACGATGAGGATCCGCGGACGACAGCAGCGTGTG
 GACTTGGGTGGGAGTGGTGGTGGTAACCCGTTCTGCTCACTTGCGCCCGTATCGGGCGCTGATGTAAGAATCTGAAAAAT
 AAAAAACGGTACTACCAAGGCCATGGCGACCAGCGTGCGTTCTCTGTTGTTTGTAGTAGTATGATGAGGCGCGTGTACC
 CGGAGGGTCTCTCCCTCGTACGAGAGCGTGATGCAGCAGGCGGTGGCGGCGGCGATGCAGCCCCGCTGGAGGCGCCTTA
 CGTGCCCCCGCGGTACCTGGCGCTACGGAGGGGCGGAACAGCATTGTTACTCGGAGCTGGCACCTTGTACGATACACCC
 GGTGTACCTGGTGGACAACAAGTCGGCGGACATCGCCTCGCTGAACTACCAGAACGACCACAGCAACTTCTGACCACCGTG
 GTGCAGAAACAGATTTCACCCCCACGGAGGCCAGCACCCAGACCATCAACTTTGACGAGCGCTCGCGGTGGGGCGGCCAGC
 TGAAAACCATCATGCACACCAACATGCCAACGTGAACGAGTTCATGTACAGCAACAAGTTCAAGGCGCGGGTGTGGTCTCG
 CGCAAGACCCCCAATGGGGTCGCGGTGGATGAGAATTATGATGGTAGTCAGGACGAGCTGACTTACGAGTGGGTGGAGTTG
 AGCTGCCCCGAGGGCAACTTCTCGGTGACCATGACCATCGATCTGATGAACAACGCCATCATCGACAACCTTGGCGGTGGGG
 CGTCAGAACGGGGTGCTGGAGAGCGACATCGGCGTGAAGTTCGACACGCGCAACTTCCGGCTGGGGTGGGACCCCGTGACC
 GAGCTGGTGATGCCGGGCGTGTACACCAACGAGGCCTTCCACCCGACATCGTCTGCTGCCGGCTGCGGCGTGGACTTCAC
 CGAGAGCCGCTCAGCAACTGCTGGGCATCCGCAAGCGGCAGCCCTTCCAGGAGGGCTTCCAGATCCTGTACGAGGACCTG
 GAGGGGGGCAACATCCCCGCGCTCTGGATGTGCAAGCCTATGAGAAAAGCAAGGAGGAGGCCGCGCAGCGCGACCGCA
 GCCGTGGCCACCGCTTACCGAGGTGCGGGGCGATAATTTTGTAGCGCCGCGGCGAGTGCCGAGGCGGCTGAAACCGAAA
 GTAAGATAGTCATCCAGCCGGTGGAGAAGGACAGCAAGGACAGGAGCTACAACGTGCTGCGGACAAGAAAAACACCGCCT
 ACCGCAGCTGGTACCTGGCTACAACCTACGGCGACCCGAGAAGGGCGTGCGCTCCTGGACGCTGCTACCACTCGGACGTC
 ACCTGCGGCGTGGAGCAAGTCTACTGGTCTGCCCCGACATGATGCAAGACCCGGTCACCTTCCGCTCCACGCGTCAAGTTAG
 CAACTACCCGGTGGTGGGCGCCGAGCTCCTGCCGCTACTCCAAGAGCTTCTTCAACGAGCAGGCCGTCTACTCGCAGCAGC
 TCGCGCCTTCACTCGCTCACGCAGCTTCAACCGCTTCCCCGAGAACCAGATCCTCGTCCGCCCGCCGCGCCACCATTAC
 CACCGTCAGTGAACCGTTCTGCTCTACAGATCACGGGACCTGCCGCTGCGCAGCAGTATCCGGGGAGTCCAGCGCGTGA

Fig. 26E

CCGTACTGACGCCAGACGCCGACCTGCCCCTACGTCTACAAGGCCCTGGGCGTAGTCGCGCCGCGCGTCTCTCGAGCCGC
ACTTCTAAAAAATGTCCATTCTCATCTCGCCAGTAATAACACCGGTTGGGGCCTGCGCGCGCCAGCAAGATGTACGGAGG
CGCTCGCAACGCTCCACGCAACACCCCGTGC GCGTGC GCGGGCACTTCCGCGCTCCCTGGGGCGCCCTCAAGGGCCGCGTGC
GCTCGCGCACCACGTCGACGACGTGATCGACCAGGTGGTGGCCGACGCGCGCAACTACACGCCCGCCGCGCGCCCGCCTC
CACCGTGACGCCGTATCGACAGCGTGGTGGCCGATGCGCGCCGGTACGCCCGCGCCAAGAGCCGCGCGCGGCGCATCGC
CCGGCGGCACCGGAGCACCCCGCCATGCGCGCGGCGCGAGCCTTGCTGCGCAGGGCCAGGCGCACGGGACGCAGGGCCAT
GCTCAGGGCGGCCAGACGCGCGGCTCCGGCAGCAGCAGCGCCGGCAGGACCCGACAGCGCGGCCACGGCGGCGGCGG
CGGCCATCGCCAGCATGTCCCGCCCGCGCGCGCAACGTGTACTGGGTGCGCGACGCCGCCACCGGTGTGCGCGTGCCTGT
GCGCACCCGCCCCCTCGCACTTGAAGATGCTGACTTCGCGATGTTGATGTGTCCAGCGCGGAGGAGGATGTCCAAGCGCAA
ATACAAGGAAGAGATGCTCCAGGTATCGCGCTGAGATCTACGGCCCCGCGGTGAAGGAGGAAAAGAAAGCCCGCAAAT
GAAGCGGGTCAAAAAGGACAAAAGGAGGAGGAAGATGTGGACGGACTGGTGGAGTTTGTGCGGAGTTCGCCCCCGGC
GGCGCGTGCACTGGCGCGGGCGGAAAGTAAACCGGTGCTGCGGCCCGCACACCGTGGTCTTACGCCCGCGAGCGTT
CCGGCTCCGCTCAAGCGCTCTACGACGAGGTGTACGGGGACGAGGACATCCTCGAGCAGGCGGTGAGCGTCTGGGCGA
GTTTGCTTACGGCAAGCGCAGCCGCCCCGCGCCCTTGAAAGAGGAGGCGGTGTCCATCCCGCTGGACCACGGCAACCCACG
CCGAGCCTGAAGCCGTGACCTGCAGCAGGTGCTGCCGAGCGCGCGCCGCGCGCGGGGCTTCAAGCGCGAGGGCGGCGAG
GATCTGTACCCGACCATGCAGCTGATGGTGCCCAAGCGCCAGAAGCTGGAGGACGTGCTGGAGCACATGAAGGTGGACCCG
AGGTGCAGCCCGAGGTCAAGGTGCGGCCCATCAAGCAGGTGGCCCCGGGCTGGGCGTGACAGCCGTGGACATCAAGATCC
CCACGGAGCCCATGGAACGCAGACCGAGCCCGTGAAGCCAGCACCAGCACCATGGAGGTGCAGACGGATCCCTGGATGCC
GGCGCCGGCTTCCACCACTCGCGAAGACGCAAGTACGGCGCGGCCAGCCTGCTGATGCCAACTACGCGTGCATCCTTCCA
TCATCCCCACGCCGGGCTACCGCGGCACGCGCTTACCGCGGCTACACCAGCAGCCGCCGCAAGACCACCACCCGCCCGC
CGTCGTCGACCCGCCGAGCAGCACCAGCGACTTCCGCCCGCGCCCTGGTGCGGAGAGTGTACCGCAGCGGGCGCGAGCCTC
TGACCCTGCGCGCGCGCGCTACCACCGAGCATCGCCATTAACTCTGCCGTGCGCTCCTACTTGAGATATGGCCCTACAT
GCCGCTCCGCGTCCCCATTACGGGCTACCGAGGAAGAAAGCCGCGCCGTAGAAGGCTGACGGGGAACGGGCTGCGTCGCC
ATCACACCGCGCGGCGCGGCCATCAGCAAGCGTTGGGGGAGGCTTCTGCCCGCGCTGATCCCCATCATCGCCGCGGC
GATCGGGGCGATCCCCGGCATAGCTTCCGTGGCGGTGCAGGCCTCTCAGCGCACTGAGACACAGCTTGAAAAATTTGTAATA
AAAAATGGAAGTACGCTCCTGGTCTGTGATGTGTGTTTTAGATGGAAGACATCAATTTTCGTCCCTGGCACCAGCGACAG
GCACGCGGCCGTTTATGGGACCTGGAGCGACATCGGCAACAGCCAACTGAACGGGGGCGCCTCAATTGGAGCAGTCTCTG
GAGCGGGCTTAAGAATTCGGGTCCACGCTCAAAACCTATGGCAACAAGGCGTGGAACAGCAGCAGGGCAGGCGCTGAG
GGAAGGCTGAAAGAGCAGAACTTCCAGCAGAAGGTGGTGCATGGCCTGGCCTCGGGCATCAACGGGGTGGTGGACCTGGC
CAACCAGGCCGTGCAGAAACAGATCAACAGCCGCTGGACGCGGTCCCGCCCGCGGGGTCCGTGGAGATGCCCCAGGTGGA
GGAGGAGTGCCTCCCCTGGACAAGCGCGGCGACAAGCGACCGGTCCCGACGCGGAGGAGACGCTGCTGACGACACGGA
CGAGCCGCCCCGTACGAGGAGGCGGTGAAACTGGGTCTGCCACCACGCGGCCGCTGGCGCCTCTGGCCACCGGGGTGCTG
AAACCAGCAGCAGCAGCCAGCCGCGACCTGGACTTGCCTCCGCTGCTTCCGCCCTCCACAGTGCTAAGCCCTGCCG
CCGGTGGCGTGCCTGCGCGCGCCCCCGAGGCCGCCCGAGGCGAACTGGCAGAGCACTCTGAACAGCATCGTGGGTCTGG
GAGTGCAGAGTGTGAAGCGCGCGCTGCTATTAAGAGACACTGTAGCGCTTAAGTGTCTGTGTATATGTATGTCC
GCCGACCAGAAGGAGGAAGAGGCGCGTGCAGGAGTTGCAAGATGGCCACCCATCGATGCTGCCCACTGGGCGTACATGC
ACATCGCCGACAGGACGCTTCGGAGTACCTGAGTCCGGGTCTGGTGCAGTTCGCCCGCGCCACAGACACCTACTTCACTG
GGGAACAAGTTTAGGAACCCACGGTGGCGCCACGCACGATGTGACCACCGACCGCAGCCAGCGGTGACGCTGCGTTCG
TGCCCGTGGACCGGAGGACAACACCTACTCGTACAAAGTGCCTACACGCTGGCCGTGGGCGACAACCGCGTGTGGACAT
GGCCAGCACCTACTTTGACATCCGCGGCGTGTGGATCGGGGGCCAGCTTCAAACCTACTCCGGCACCGCCTACAACAGCC
TGGCTCCCAAGGGAGCGCCAAACACTTGGCAGTGGACATATAAGCTGGTGATACTGATACAGAAAAACCTATACATATGGA
AATGCACCTGTGCAAGGCATTAGCATTACAAAGGATGGTATTCAACTTGGAAGTACAGCGATGGTCAGGCAATCTATGCAGA
CGAAACTTATCAACCAGAGCCTCAAGTGGGTGATGCTGAATGGCATGACATCACTGGTACTGATGAAAAATATGGAGGCAGA
GCTCTTAAGCCTGACACCAAAATGAAGCCTTGCTATGTTCTTTGCAAGCCTACCAATAAAGAAGGAGGCCAGGCAAATGT
GAAAACCGAAACAGGCGGTACCAAGAATATGACATTGACATGGCATTCTTCGATAATCGAAGTGCAGCTGCCGCCGCGCTA
GCCCCAGAAATTGTTTGTATACTGAGAATGTGGATCTGGAACTCCAGATACCCATATTGTATACAAGGCAGGTACAGATGA
CAGTAGCTCTTCTATCAATTTGGGTGAGCAGTCCATGCCAACAGACCAACTACATTGGCTTCAGAGACAACCTTATCGGTCT
GATGTACTACAACAGCACTGGCAATATGGGTGTAAGTGGTGGACAGGCTCCAGCTGAATGCTGTGGTGGACTTGACAGGAC
AGAAACACCGAACTGTCTACCAGCTCTTGTGACTCTCTGGGTGACAGAACCAGGTATTTAGTATGTGGAATCAGGCGGT
GGACAGTTATGACCCCGATGTGCGCATTATTGAAAATCACGGTGTGGAGGATGAACTTCTAACTATTGCTTCCCCCTGGATGC
TGTGGGTAGAAGTATACTTACCAGGGAATTAAGGCCAATGGTGATAATCAAACCACTGGACCAAGATGATACTGTTAATG

Fig. 26F

ATGCTAATGAATTGGGCAAGGGCAATCCTTCGCCATGGAGATCAACATCCAGGCCAACCTGTGGCGAACTTCCTCTACGCG
AACGTGGCGCTGTACTGCCCCGACTCCTACAAGTACACGCCGGCCAACATCACGCTGCCACCAACACCAACACCTACGATTAC
ATGAACGGCCGCTGGTGGCGCCCTCGCTGGTGACGCCTACATCAACATCGGGGCGCGCTGGTGCCTGGACCCCATGGACA
ACGTCAACCCCTTCAACCACACCGCAACGCGGGCCTGCGATACCGTCCATGCTCCTGGGCAACGGGCGCTACGTGCCCTTCC
ACATCCAGGTGCCCCAAAAGTTTTTCGCCATCAAGAGCCTCCTGCTCCTGCCGGGTCTACACCTACGAGTGGAACCTTCGCA
AGGACGTCAACATGATCCTGCAGAGCTCCCTCGGCAACGACCTGCGCACGGACGGGGCCTCCATCGCCTTCACCAGCATCAAC
CTCTACGCCACCTTCTCCCCATGGCGCACAACACCGCCTCCACGCTCGAGGCCATGCTGCGCAACGACACCAACGACCAGTCC
TTCAACGACTACCTCTCGGCGGCCAACATGCTCTACCCCATCCCGGCCAACGCCACCAACGTGCCATCTCCATCCCCTCGCGCA
ACTGGGCGCGCTTCGCGGCTGGTCTTCACGCGCCTCAAGACCCGCGAGACGCCCTCGCTCGGCTCCGGGTTGACCCCTACT
TCGTCTACTCGGGCTCCATCCCCTACCTCGACGGCACCTTCTACCTCAACCACACCTTCAAGAAGGTCTCCATCACCTTCGACTCC
TCCGTCAGCTGGCCCGGCAACGACCGCCTCTGACGCCAACGAGTTCGAAATCAAGCGCACCGTCGACGGAGAGGGGTACA
ACGTGGCCCAAGTGCAACATGACCAAGGACTGGTTCCTGGTCCAGATGCTGGCCCACTACAACATCGGCTACCAGGGCTTCTAC
GTGCCCGAGGGCTACAAGACCGCATGTACTCCTTCTCCGCAACTCCAGCCCATGAGCCGCCAGGTCTGGACGAGGTCAA
CTACAAGGACTACCAGGCCGTACCCCTGGCCTACCAGCACAACAACCTCGGGCTTCGTCCGCTACCTCGCGCCACCATGCGCC
AGGGCCAGCCCTACCCCGCAACTACCCCTACCCGCTCATCGGCAAGAGCGCGTCCGACAGCGTCAACCAGAAAAAGTTCTC
TGCGACCGGGTCATGTGGCGCATCCCCTTCTCCAGCAACTTATGTCCATGGGCGCGCTACCGACCTCGGCCAGAACATGCTC
TACGCCAACTCCGCCACGCGCTAGACATGAATTCGAAGTCGACCCCATGGATGAGTCCACCTTCTCTATGTTGCTTCGAA
GTCTTCGACGTCTCGAGTGCACAGCCCCACCGCGGCTCATCGAGGCCGTCTACCTGCGCACGCCCTTCTCGGCCGGCAA
CGCCACCACCTAAGCCTCTTGCTTCTTGCAAGATGACGGCCTGCGCGGGCTCCGGCGAGCAGGAGCTCAGGGCCATCCTCCGC
GACCTGGGCTGCGGGCCCTGCTTCTGGGCACCTTCGACAAGCGCTTCCGGGATTATGCCCCGACAAGCTGGCCTGCGC
CATCGTCAACACGGCCGGCGCGAGACCGGGGGCGAGCACTGGCTGGCCTTCGCTGGAACCCGCGCTCCACACCTGCTAC
CTCTTCGACCCCTTCGGGTTCTCGGACGAGCGCCTCAAGCAGATCTACCAGTTCGAGTACGAGGGCCTGCTGCGTCGACGCGC
CCTGGCCACCGAGGACCGTGCCTGACCTGAAAAAGTCCACCCAGACCGTGCAGGGTCCGCGCTCGGCCGCTGCGGGCTC
TTCTGCTGCATGTTCTGACGCCTTCGTGCACTGGCCGACCGCCCCATGGACAAGAACCCACCATGAACCTGCTGACGGGG
GTGCCAACGGCATGCTCCAGTCGCCCCAGGTGGAACCCACCCTGCGCCGCAACCAGGAGGCGCTCTACCGCTTCTCAACGC
CCACTCCGCCTACTTTCGCTCCACCGCGCGCATCGAGAAGGCCACCGCCTTCGACCGCATGAATCAAGACATGTAATCCGG
TGTGTGATGTGAATGCTTTATTCATATAATAAACAGCACATGTTTATGCCACCTTCTCTGAGGCTCTGACTTTATTTAGAAATC
GAAGGGTCTGCGGCTCTCGGCATGGCCCGCGGGCAGGGATACGTTGCGGAACCTGGTACTTGGGCAGCCACTTGAACCTG
GGGATCAGCAGCTTCGGCACGGGGAGGTGCGGGAACGAGTCGCTCCACAGCTTGCAGGTGAGTTGACGGGGTTCAGCAGG
TCGGGCGCGGAGATCTTGAAATCGCAGTTGGGACCCGCGTTCGCGCGGAGAGTTACGGTACACGGGGTTCAGCACTGGA
ACACCATCAGGGCCGGGTGCTTACGCTCGCCAGCACCGTCGCGTCGGTGATGCCCTCCACGTCAGATCCTCGCGTTGGCC
ATCCCGAAGGGGGTCACTTTCAGGTCTGCCGCCCATGCTGGGCACGCAGCCGGGCTTGTTGTTGCAATCGCAGTGCAGGG
GGATCAGCATCATCTGGGCTGCTCGGAGCTCATGCCGGGTACATGGCCTTCATGAAAGCCTCCAGCTGGCGGAAGGCCTGC
TGCCTTTCGCCCTCGGTGAAGAAGACCCCGCAGGACTTGCTAGAGAAGTGGTTGGTGGCGCAGCCAGCGTCTGTCACGC
AGCAGCGCGCTGCTTGTGGCCAGCTGCACACGCTGCGCCCCAGCGGTTCTGGGTGATCTTGGCCCGGTGCGGGTCTCC
TTCAGCGCGCTGCCGTTCTCGCTCGCCACATCCATCTCGATCGTGTGCTCCTTCTGGATCATACCGTCCCCTGCAGGCACC
GCAGTTGCCCTCGGCTCGGTGCACCCGTGCAGCCACAGCGCGCAGCCGGTGTCTCCAGTTCTTGTGGGCGATCTGGGAG
TGCGAGTGCACGAAGCCCTGCAGGAAGCGGCCCATCATCGTGGTCAGGGTCTTGTGCTGGTGAAGGTACGCGGAATGCCGC
GGTGTCTCTCGTTCACATACAGGTGGCAGATACGGCGGTACACCTCGCCCTGCTCGGGCATCAGCTGGAAGGCGGACTTCAG
GTCGCTCTCCACGCGGTACCGGTCCATCAGCAGCGTCATCACTTCCATGCCCTTCTCCAGGCCGAAACGATCGGCAGGCTCAG
GGGGTTCTTACCGTTGTCTTAGTCGCCGCCGCCGAAGTCAGGGGGTCTGTTCTCGTCCAGGGTCTCAAACACTCGCTTGC
GTCTTCTCGGTGATGCGCACGGGGGAAAGCTGAAGCCACGGCCGCGAGCTCCTCCTCGGCTGCCCTTTCGTCTCGCTGT
CCTGGCTGATGTCTTGAAAGGCACATGCTTGGTCTTGGGGGTTTCTTTTGGGCGCAGAGGCGGCGGGGAGACGTGCT
GGGCGAGCGGAGTTCTCGCTACACGACTATTTCTTCTCTTGGCGTCTCGGAGACCACGCGGGGTAGGCATGCCTCTT
CTGGGGCAGAGGCGGAGGCGACGGGCTCTCGCGTTGCGGGGGCGGCTGGCAGAGCCCTTCCGCGTTGCGGGGTGCGCTC
CTGGCGGCGCTGCTGACTGACTTCTCCGCGGCCGGCCATTGTGTTCTCTAGGGAGCAAGCATGGAGACTCAGCCATCGT
CGCCAACATCGCCATCTGCCCCCGCGCCGACGAGAACCAGCAGCAGCAGAATGAAAGCTTAACCGCCCCGCGCCAGC
CCCACCTCCGACGCCGAGCCCCAGACATGCAAGAGATGGAGGAATCCATCGAGATTGACCTGGGCTACGTGACGCCCGCGG
AGCACGAGGAGGAGCTGGCAGCGCGCTTTTCAGCCCCGAAGAGAACCACCAAGAGCAGCCAGAGCAGGAAGCAGAGAGC
GAGCAGAACCAGGCTGGGCTCGAGCATGGCGACTACCTGAGCGGGCAGAGGACGTGCTCATCAAGCATCTGGCCGCCAA
TGATCATCGTCAAGGACGCGCTGCTGACCGCGCCGAGGTGCCCTCAGCGTGGCGGAGCTCAGCCGCGCTACGAGCGCA

Fig. 26G

ACCTCTTCTCGCCGCGCTGCCCCCAAGCGCCAGCCCAACGGCACCTGCGAGCCCAACCCGCGCCTCAACTTCTACCCGGTCT
TCGCGGTGCCCCAGGCCCTGGCCACCTACCACCTTTTTCAAGAACCAAGGATCCCCGTCTCTGCCGCGCCAAACCGCACCC
GCGCCGACGCCCTGCTCAACCTGGGCCCCGGCGCCCGCTACCTGATATCGCCTCCTTGGAAGAGGTTCCCAAGATCTTCGAG
GGTCTGGGACGACGAGACTCGGGCCGCAACGCTCTGCAAGGAAGCGGAGAGGAGCATGAGCACCACAGCGCCCTGGTG
GAGTTGGAAGGCGACAACGCGCGCCTGGCGGTCTCAAGCGCACGGTCGAGCTGACCCACTTCGCCTACCCGGCGCTCAACC
TGCCCCCAAGGTCATGAGCGCCGTATGGACCAGGTGCTCATCAAGCGCGCCTCGCCCTCTCGGAGGAGGAGATGCAGGA
CCCCGAGAGCTCGGACGAGGGCAAGCCCGTGGTCAGCGACGAGCAGCTGGCGCGCTGGCTGGGAGCGAGTAGCACCCCCCA
GAGCTGGAAGAGCGGCGCAAGCTCATGATGGCCGTGGTCTGGTACCCTGGAGCTGGAGTGTCTGCGCCGCTTCTTCGCC
GACGCGGAGACCTGCGCAAGGTCGAGGAGAACCTGCACTACCTCTTCAGACACGGGTTCTGCGCCAGGCTGCAAGATCT
CCAACGTGGAGCTGACCAACCTGGTCTCTACATGGGCATCTGCACGAGAACCGCTGGGGCAGAAGTGTCTGCACACCACC
CTGCGCGGGGAGGCCCGCCGCGACTACATCCGCGACTGCGTCTACCTGTACCTCTGCCACACCTGGCAGACGGGCATGGGCG
TGTGGCAGCAGTGCCTGGAGGAGCAGAACCTGAAAGAGCTCTGCAAGCTCCTGCAGAAGAACCTCAAGGCCCTGTGGACCGG
GTTGACGAGCGCACACCACCGCCGCGGACCTGGCCGACCTCATCTTCCCCGAGCGCCTGCGGTGACGCTGCGCAACGGGCTGC
CCGACTTTATGAGCCAAAGCATGTTGCAAACTTTGCTCTTTTCATCTCGAACGCTCCGGGATCCTGCCCGCCACCTGCTCCGC
GCTGCCCTCGGACTTCGTGCCGTGACCTCCGCGAGTGCCCCCGCGCTCTGGAGCCACTGCTACCTGCTGCGCTGGCCAA
CTACCTGGCCTACCACTCGGACGTGATCGAGGACGTACGCGCGAGGGCTGCTCGAGTGCCACTGCCGTGCAACCTTGCA
CGCCGACCGCTCCCTGGCTGCAACCCCCAGCTGCTGAGCGAGACCCAGATCATCGGCACCTTCGAGTTGCAAGGCCCCGGC
GAGGGCAAGGGGGGTCTGAAACTACCCCGGGGCTGTGGACCTCGGCCTACTTGCGCAAGTTCGTGCCCGAGGACTACCATC
CCTTCGAGATCAGTTCTACGAGGACCAATCCAGCCGCCAAGGCCGAGCTGTCGGCTGCGTCATACCCAGGGGGCCATC
CTGGCCCAATTGCAAGCCATCCAGAAATCCCGCCAAGAATTTCTGCTGAAAAAGGGCCACGGGGTCTACTTGACCCCCAGAC
CGGAGAGGAGCTCAACCCAGCTTCCCCAGGATGCCCGAGGAAGCAGCAAGAAGCTGAAAGTGGAGTGCCGCGCGCGC
CGGAGGATTGGAGGAAGACTGGGAGAGCAGTCAGGCAGAGGAGGAGGAGATGGAAGACTGGGACAGCACTCAGGCAGA
GGAGGACAGCTGCAAGACAGTCTGGAGGAGGAAGACGAGGTGGAGGAGGCAGAGGAAGAAGCAGCCGCCGAGACCG
TCGTCTCGGCGGAGGAGGAGAAAGCAAGCAGCACGGATACCATCTCCGCTCCGGGTGCGGGTTCGCGCGCGCCGGCCAC
AGTAGATGGGACGAGACCGGGCGCTTCCGAACCCACCACCAGACCGGTAAGAAGGAGCGGCAGGGATACAAGTCTGG
CGGGGGCAGAAAAACGCCATCGTCTCTGCTTGAAGCCTGCGGGGGCAACATCTCCTTACCCGGCGCTACCTGCTCTTCAC
CGCGGGTGAACTTCCCCGCAACATTTGCACTTACTACCGTCACCTCCACAGCCCCTACTACTGTTTCAAGAAGAGGCAGAA
ACCCAGCAGCAGCAGCAGCAGCAAAAAACAGCGGCAGCAGCTAGAAAAATCCACAGCGGCGGCAGGTGGACTGAGGATCGC
GGCGAACGAGCCGGCGCAGACCCGGGAGCTGAGGAACCGGATCTTTCCACCTCTATGCCATCTTCCAGCAGAGTCGGGGG
CAAGAGCAGGAACTGAAAGTCAAGAACCCTTCTGCGCTCGCTCACCCGAGTTGTCTGTATCACAAGAGCGAAGACCAACT
TCAGCGCACTCTCGAGGACGCCGAGGCTCTCTTCAACAAGTACTGCGCGCTCACTCTTAAAGAGTAGCCCGCGCCCGCCACA
CACGGAAGGCGGGAATTACGTACACCTGCGCCCTCGCCGACCATCATCATGAGCAAAGAGATTCCACGCCTTACA
TGTGGAGCTACCAGCCCCAGATGGGCTGGCCGCGCGCGCCAGGACTACTCCACCCGATGAACTGGCTCAGTGCCGG
GCCCGCATGATCTCACGGGTGAATGACATCCGCGCCACCGAAACAGATACTCCTAGAACAGTCAGCGATCACCGCCACGC
CCCCCATCACCTTAATCCGCGTAATTGGCCCGCCGCCCTGGTGTACCAGGAAATCCCCAGCCACGACCGTACTACTTCCGC
GAGACGCCAGGCCGAAGTCCAGCTGACTAAGTCAAGTGTCCAGCTGGCCGCGCGCGCCGCTGTGTCTACCGCCCCGCT
CAGGGTATAAAGCGGCTGGTGATCCGAGGCAGAGGCACACAGCTCAACGACGAGGTGGTGAGCTCTTCGCTGGGTCTGCGA
CCTGACGGAGTCTTCAAACCTGCGCGGATCGGGGAGATCTTCTTACGCCTCGTCAGGCCGTCTGACTTTGGAGAGTTCGTCC
TCGAGCCCCGCTCGGGTGGCATCGGCACTCTCAGTTCGTGGAGGAGTTCACTCCCTCGGTCTACTTCAACCCCTTCTCCGGC
TCCCCCGGCACTACCCGACGAGTTCATCCGAACTTCGACGCCATCAGCGAGTCGGTGGACGGCTACGATTGAATGTCCA
TGGTGGCGCGGCTGACCTAGCTCGGCTTCGACACCTGGACCACTGCCGCGCTTCCGCTGCTTCGCTCGGGATCTCGCCGAGT
TTGCTACTTTGAGCTGCCGAGGAGCACCTCAGGGCCCCGCCACGGAGTGCGGATCGTCGTGAAGGGGTCTCGACTC
CCACCTGCTTCGGATCTTACGCCAGCGTCCGATCCTGGCCGAGCGCGAGCAAGGACAGACCCTTCTGACCTGTACTGCATCTG
CAACCACCCCGGCTGCATGAAAGTCTTTGTTGTCTGCTGTGACTGAGTATAATAAAGCTGAGATCAGCGACTACTCCGGAC
TTCCGTGTGTTCTGCTATCAACCAGTCCCTGTTCTTACCGGGAACGAGACCGAGCTCCAGTCCAGTGTAAAGCCCCACAAGA
AGTACCTCACCTGGCTGTTCCAGGGCTCTCCGATCGCGTTGTCAACCACTGCGACAACGACGGAGTCTGCTGAGCGGCCCT
GCCAACCTTACTTTTTCAACCCGAGAAGCAAGCTCCAGCTTCCAACCTTCTCCCCGGGACCTATCAGTGCGTCTCGGGAC
CCTGCCATCACACCTTCCACCTGATCCGAATACCACAGCGTCGCTCCCCGCTACTAACAACCAAACTACCCACCAACGCCACCG
TCGCGACCGCGGACATGTACAGAGCTCGAGAAGTACTAGGCCACAATACATGCCATATTAGACTATGAGGCCGAGCCACAG
CGACCCATGCTCCCCGCTATTAGTTACTTCAATCTAACCGGCGGAGATGACTGACCCACTGGCCAACAACAACGTCAACGACCT
TCTCTGGACATGGACGGCCGCGCCTCGGAGCAGCGACTCGCCAACTTCGCATTGCGCAGCAGCAGGAGAGAGCCGTCAAG

Fig. 26H

GAGCTGCAGGACGGCATAGCCATCCACCAGTGCAAGAAAGGCATCTTCTGCCTGGTGAAACAGGCCAAGATCTCTACGAGG
TCACCCCGACCGACCATCGCTCTCTACGAGCTCCTGCAGCAGCGCCAGAAGTTCACCTGCCTGGTCGGAGTCAACCCCATCG
TCATCACCCAGCAGTCGGGCGATACCAAGGGGTGCATCCACTGCTCCTGCGACTCCCCGACTGCGTCCACACTCTGATCAAGA
CCCTCTGCGGCCTCCGCGACCTCCTCCCATGAACTAATCACCCCTTATCCAGTGAAATAAATATCATATTGATGATGATTTAA
ATAAAAAATAATCATTTGATTGAAATAAAGATACAATCATATTGATGATTTGAGTTTTAAAAATAAAGAATCACTTACTTGAA
ATCTGATACCAGGTCTCTGTCCATGTTTTCTGCCAACACCACCTCACTCCCCTCTCCAGCTCTGGTACTGCAGACCCCGGG
GCTGCAAACTTCTCCACACGCTGAAGGGGATGTCAAATTCCTCTGTCCCTCAATCTTCATTTTATCTTCTATCAGATGTCCAAA
AAGCGCTCCGGGTGGATGATGACTTCGACCCCGTCTACCCCTACGATGCAGACAACGCACCGACCGTGCCCTTCATCAACCC
CCCCTTCGTCTCTTCAGATGGATTCCAAGAGAAGCCCTGGGGGTGCTGCCCTGCGACTGGCTGACCCCGTCACCCACCAAGAA
CGGGGAAATCACCTCAAGCTGGGAGAGGGGTGGACCTCGACTCCTCGGGAATACTCATCTCCAACACGGCCACCAAGGCC
GCCGCCCTCTCAGTTTTTCCAACAACACCATTTCCCTTAACATGGATAACCCCTCTTTATACCAAGATGGAAAATTATCTTTACA
AGTTTCTCCACCGTTAAACATATTAATAAACAACCATTTCTGAACACATTAGCTGTAGCTTATGGATCAGGTTTAGGACTGAGTGG
TGGCACTGCTCTTGCAGTACAGTTGGCTCTCCACTCACTTTTGATGAAAAAGGAAATATTAATAAATTAACCTAGCCAGTGGTCC
ATTAACAGTTGATGCAAGTCGACTTAGTATCAACTGCAAAAGAGGGGTCACTGTCACTACCTCAGGAGATGCAATTGAAAGCA
ACATAAGCTGGCCTAAAGGTATAAGATTTGAAGGTAATGGCATAGCTGCAACATTGGCAGAGGATTGGAATTTGGAACCCAC
TAGTACAGAGACTGATGTACAGATGCATACCCAATTCAAGTTAAATTGGGTACTGGCCTTACCTTTGACAGTACAGGCGCCAT
TGTTGCTTGGAACAAAAGAGGATGATAAATTACATTATGGACCACAGCCGACCCCTCGCCAAATTGCAAAATATACTTGAAAA
AGATGCCAACTCACACTTTGCTTGACAAAGTGTGGAAGTCAAATTTCTGGGTACTGTGACTGTATTGGCAGTGAATAATGGAA
GTCTCAACCCCAATCAAAACAGTAAGCACTGCTCCTCCCTCAAGTTTGATGCAAGTGGAGTTTTGCTAAGCAGCTCCA
CATTAGACAAAGAATATTGGAACCTCAGAAAGGGAGATGTTACACCTGCTGAGCCCTATACTAATGCTATAGGTTTTATGCCTA
ACATAAAGGCCTATCTAAAAACACATCTGCAGCTTCAAAAAGCCATATTGTCACTCAAGTTTATCTCAATGGGGATGAGGCCA
AACCCTGATGCTGATTATTACTTTTAAAGAACTGAGGATGCAACTTGACCTACAGTATCACTTTTCAATGGAAATGGGATA
GTACTAAGTACACAGGTGAAACACTTGCTACCAGCTCCTTACCTTCTCTACATCGCCCAAGAATGAACACTGTATCCCACCT
GCATGCCAACCCCTCCACCCCACTCTGTCTATGGAAAAAATCTGAAGCACAAAATAAAATAAAGTTCAAGTGTTTTATTGATT
CAACAGTTTTACAGGATTCGAGCAGTTATTTTTCTCCACCTCCAGGACATGGAATACACCACCTCTCCCCCGCACAGCCT
TGAACATCTGAATGCCATTGGTGATGGACATGCTTTTGGTCTCCACGTTCCACACAGTTTCAGAGCGAGCCAGTCTCGGGTCCG
TCAGGGAGATGAAACCTCCGGGCACTCCCGCATCTGCACCTCACAGCTCAACAGCTGAGGATTGTCTCGGTGGTCCGGGATC
ACGTTTATCTGGAAGAAGCAGAAGAGCGGGCGGTGGGAATCATAGTCCGCGAACGGGATCGGCCGGTGGTGTGCGCATCAGGC
CCCGCAGCAGTCGCTCGCCGCGCGCTCCGTCAAGTGCTGCTCAGGGGTCCGGGTCCAGGACTCCCTCAGCATGATGCC
ACGGCCCTCAGCATAGTCGTCTGGTGCGGGCGGCGCAGCGCATGCGGATCTCGCTCAGGTCGTGCTGACGTACGTGCAAC
ACAGGACCACAGGTTGTTCAACAGTCCATAGTTCAACACGCTCCAGCCGAAACTCATCGCGGAAGGATGCTACCCACGTGG
CCGTCTGATCAGATCCTCAGGTAATCAAGTGGCGCTCCCTCCAGAACAGCTGCCACGTACATGATCTCCTTGGGCATGTGG
CGGTTACACCTCCCGGTACCACATACCCCTCTGGTTGAACATGCAGCCCCGATGATCCTGCGGAACCACAGGGCCAGCAC
CGCCCCGCCCGCATGCAGCGAAGAGACCCCGGTCCCGGCAATGGCAATGGAGGACCCACCGCTCGTACCCGTGGATCATC
TGGGAGCTGAACAAGTCTATGTTGGCACAGCACAGGCATATGCTCATGCATCTTTCAGCACTCTCAGTCTCTCGGGGTCAA
AACATATCCAGGGCACGGGGAATCTTGACAGGACAGCGAACCCCGCAGAACAGGGCAATCCTCGCACATAACTTACATTGT
GCATGGACAGGGTATCGCAATCAGGCAGCACCGGGTGATCCTCCACCAGAGAAGCGCGGGTCTCGGTCTCTCACAGCGTGG
TAAGGGGGCCGGCCGATACGGGTGATGGCGGGACGCGGTGATCGTGTTCGCGACCGTGTGATGATGCAAGTGTCTTTCGGAC
ATTTTCTACTTGCTGTAGCAGAACCTGGTCCGGGCGCTGCACACCGATCGCCGCGCGGGTCCCGCGCTTGGAAACGCTCGG
TGTTGAAATTGTAACACAGCACTCTCAGACCGTGCAGCAGCTTAGGGCTCAGGAGTGATGAAGATCCCATGCTGCTG
ATAGCTCTGATCACATCGACCACCGTGAATGGGCCAGACCCAGCCAGATGATGCAATTTTGTGGGTTTCGGTGACGGCGGG
GGAGGGAAGAACAGGAAGAACCATGATTAACCTTTAATCAAACGGTCTCGGAGCACTTCAAAATGAAGGTGCGGGAGATGG
CACCTCTCGCCCCGCTGTGTTGGTGGAAAATAACAGCCAGGTCAAAGGTGATACGGTCTCGAGATGTTCCACGGTGGCTTC
CAGCAAAGCCTCCACGCGCATCCAGAAACAAGACAATAGCGAAAGCGGAGGGTCTCTAATTCCTCAATCATCATGTTAC
ACTCCTGCACCATCCCCAGATAATTTTCAATTTTCCAGCCTTGAATGATTGAACTAGTTCTGAGGTAAATCCAAGCCAGCCAT
GATAAAGAGCTCGCGCAGAGCGCCTCCACCGGCACTTCTAAGCACACCCCTCATAATCCAAGATATTCTGCTCCTGGTTCACC
TGACAGCAGATTGACAAGCGGAATATCAAATCTCTGCCGCGATCCCTAAGTCTCCTCCTCAGCAATAACTGTAAGTACTCTTTC
ATATCCTCTCCGAAATTTTAGCCATAGGACCACAGGAATAAGATTAGGGCAAGCCACAGTACAGATAAACCGAAGTCTCTCC
CAGTGAGCATTGCCAAATGCAAGACTGCTATAAGCATGTCTGGCTAGACCCGGTGATATCTCCAGATAACTGGACAGAAAATC
ACCCAGCAATTTTTAAGAAAAATCAACAAAAGAAAAATCTCTCAGGTGACCGTTTAGAGCCTCGGGAACAACGATGAAGTAAA
TGCAAGCGGTGCGTTCCAGCATGGTTAGTTAGCTGATCTGTAATAAACAATAAATAAATTAACCATGCTAGCCTGGCGA
ACAGGTGGGTAAATCGTTCTCTCCAGCACAGGACAGGCCACGGGTCTCCGGCGCGACCTCGTAAAAATTGTCGCTATGATT
GAAAACCATCACAGAGAGACGTTCCCGGTGGCCGGCGTGAATGATTGACAAGATGAATACACCCCGGAACATTGGCGTCC
GCGAGTGAAAAAAGCGCCGAGGAAGCAATAAGGCACTACAATGCTCAGTCTCAAGTCCAGCAAAGCGATGCCATGCGGAT
GAAGCACAAAATCCTCAGGTGCGTACAAAATGTAATTACTCCCTCTGCACAGGCAGCGAAGCCCCGATCCCTCCAGATACA
CATACAAAGCCTCAGCGTCCATAGCTTACCGAGCAGCAGCACACAACAGGCGCAAGAGTCAGAGAAAGGCTGAGCTCTAACC
TGTCACCCGCTCTCTGCTCAATATATAGCCAGATCTACACTGACGTAAAGGCCAAAGTCTAAAAATACCCGCCAAATAATCA
CACACGCCCAGCACACGCCCAGAAACCGGTGACACACTCAAAAAATACGCGCACTTCTCAAACGCCCAAATGCCGTCAATT
CCGGGTTCCACGTACGTATCGGAATTCGACTTTCAAATTCGTGACCGTTAAAAACGTACCCCGCCCCGCCCTAACGGT
CGCCGCTCTCTCGGCCAATCACCTTCTCCCTCCCAAATTCAAACAGCTCATTTGCATATTAACGCGCACCAAAAGTTGAGGT
ATATTATTGATGATG

Fig. 26I

AdC7 010-DU172gp160(E1622) Amino acids – SEQ ID NO: 15**The symbol “ * ” refers herein to stop codons in the non coding regions**

HHQ*YTSNFWCALICK*AV*IWGGRKVGRETGDR*GRGG*RFDDVAVRRSRFASSRGKSDVKRGVV*TRKYSIFPRSLTGNEVFLG
 GCK*KRAIFARKLNEEVKI*VISRLWQGGVFAEGRVDFDLRGGFDIRIFHLNFRVRCQSPVFLRTISFPRKCHLTVTITVLR*RKLRS
 DPLWCTLSTICSDAA*LSQYLLPACVLEVAE*CASKI*ATTRQGLTDNCMKNLLRVRRFALLRDVRARYTR*H*LLTSMPTPPIDVND
 GKWPAWHYAQYMTLWDFPTWQYIYVLVIAITMVMRFWQYINGRG*RFDSRGFSPSLHPIDVNGSLFWHQNRDQFPCRNNSAP
 LTQMGGRRVRWEVVISRARLVNRQITRSFIADVYHS*IANAVSASDTSVSNLRLEYLRLTIG*LRLEFDATMRVMGILRSYQQWWI
 WGILGFWMMLMNCVWGNLWVTVYGVVWKEAKTTLFCASDAKAHKEEVHNIWATHACVPTDPNPQEIVLKNVTENFNMWK
 NDMVDQMHEDIISLWDQSLKPCVKLTPLCVTLNCSVDKIKGTATYNNATYNNNNNTISDMKNCSFNNTTEITDKKKKEYALFYKLDV
 VALDGKETNSTNSSEYRLINCNTSAVTQACPKVSFDPIPIHYCAPAGYAILKCNKTFNGTGPCNNVSTVQCTHGKIPVSTQLLNG
 SLAEVEEVIRFENLTNNAKIIIVHLNESVEINCTRPSNTRKSVRIGPGQTFATGDIIGDIRQAHCNISRKKWNTTLQRVKEKLEKFPN
 KTIQFAPSSGGDLEITTHSFNCRGEFFCYTDLFNSTYMSNNTGGANITLQCRIKQIIRMWQGVQAMYPPIAGNITCKSNITGLL
 LTRDGGKEKNDTETFRPGGDMRDNRSELYKYKVVEIKPLGIAPDAKARRVVEREKRAVGIGAVFLGFLGAAGSTMGAASMTLT
 VQARQLLSGIVQQSNLLRAIEAQQHMLQLTVWGIKQLQTRVLAIERLYKDDQLLGIWGCSGKLICTTAVPNASWSNKSYYEIIW
 GNMWTMOWDREINNYNTIYSLLEESQSQKEKNEKDLALDSWESLWSWFNITNWLWYIRIFIIIVGGGLIGLRIIFAVLSIVNRVRQ
 GYSPLSFQTLTPSPREPDLRGRIEEEGGEQDRARSVRLVNGFLALAWEDLRSCLFSYHRLRDLILIAARAAALLGRSSLWGLQKGWE
 ALKYLGLSLVQYWGLELKKSAISLDAITVAEGTDRIINIVQRISAFYNIPRRIRQGFEATLQ*GTSRVDPPGGQTADQPRCLLVASHL
 LFAPPPCLP*PWKVPLPSFPNKMRLHRIV*VGVILFWGVGWGRTARGRIGKTIAGMLGMRWALWLLRRKEPADLQI*IHLCRVR
 RKR**NGIMGIMGLH**IGQISICWPPCM*PRTPARHGPSSSTTS*PDAMCTWGPAEACSCPTSATCNL*RCCWSPMPCPE*A*R
 GCLT*MWSCGKF*DMMNPRPGAGPANAEASTPGFSPCVWR*RTCDPIIWCCPATGRSSAPAGKNLTRVSSVWGRWRACMRG
 RMTKICVFLCVA***AEAPPLREGYSALI*RGVSPPGRECVRM*WDPRWTAGPCSPRTLQ*PTRP*APRPWTQLPPQLLPPAP
 CAEWPWAPATTALWWPTRLPIIPA*TRRSCC*WPSRP*PSAWAS*PSRWLSCRRRRGPRLPR*KPNKK*INK*TETVDFNT
 ES*IFI*FFARGRPWTTGLDH*APGGFFPGPRGGLGC*GTWA*ARPGGGSSAGPRARGWCKSPSHSRGAGRGAARCP*GG
 D*WPRAAPWCRC*RTC*AGRDACGR*DASWPGS*DWRCRPDPAGGSCCAGPPARCIRRTWGICHATWKGRRERIWRPCD
 RPFPGCTHP**WRWARRPGQRFFGGRTHRSCGP*ARHRPF**IWGGGCTGGRCPRSRGRSCPRRSASPR*ARRGGSC
 PAGR*KKRFPGRGR*AGPKAGSGAAGTCRSRWGR*PR*PAAGGS*GRDSCRPGGGGPPRSSRAHACSRARVPPGARPPAR
 GALAARRSFSA*XRPPWAFWRGVARVPDGPARR*CALGHLDPADLLSVRGATAGVGHQAMGVQRGQGPVLPGSQGPQR
 GLRHGEGVRAGLGACEGALQAHAGREPLVPGALRVGQVAIEHEFVVERLGRVALGAELTFGSVSADGTEEGLEGVELGGEEDGLG
 GVGVRAAAGADGLALHEPGEVGPVGKNEVSSVLFDAFLTSLGHELVSPLDKEAVRVPVDRLYGPVLERGA AVLVEEPRPLRDE
 GPGPGQHEGGHVGGVAVVVHQRVHLLQGMQAHVPLVHIQEGDWLVSVGHVTGGPGRGGIKGGGPLLVTVFRIAVQERQLLG*
 VFPLEGWHLNLTQVVSF*KRGGFIDGAVGDAFHEPLVHLVRKDDLFFVELGGEGAVEGVGEELGDGAHGLVLFLVGALLGGDVE
 LHVLRHALPFGEDGGELVGHDSPPAAVVQGDDEVHAGGHAAQGLVGPAEAPALARAEGGQRVQHELVGGVGVHGEDAGQK
 LGVEVADAGVQIVQRRLPVAGHQRALVGAEGRAPGHGVRERGGVHAADVVDVEGLLEDADVGGVAAPPADAGAHVVVQLVRG
 REEPRAEVGALRLFGAVDDLAEDGVGVGGDGGPLEDVEVGVGQADRVDPDEVGVLQLGDELGGDEDVQGA VVEGLDDVLE
 LALLPQLAVEKELFAVLPVLFEGEPVLIGTVRAHHVELVDGLVGAAALLHGEVSLCGLAQGGVGEGEVGAHHDLEELVEVEVVA
 AALLPELEVRALLVGGVGQSESNIVEEDLARAGHEVASDAERLGHLPVDDLGGEDDLVEAVDVVPDDVEFHESRAALNVGQLE
 LVVGELGGVAEPVLEGPVGDVGVAEEGSPEIHGQGGQLQAVPVLTELAHGHFFGGDAVEGAGVAVPAVPLEGEVVGELDER
 RVPGEFHDQHEGDELLAEGPHPGVGFHIVGEEEPFGARMRADGEELDLLPVGGMADVMEVEMPTARRALVLFIQASAVLATL
 HGMHVLHELVLGSFDEEFQWAVERWRLHLVLYVLAIGVAIVCLDGGHADEPAREAGPDFGSDGSESEDEGAQAGAVQGPETLRS
 QVSGQRRRAVDLQELFQGAREVQMVLDLHGA VGGDVHGLQGPVPLGRHHRAPFLGRCFHAGQKRRRGRAPGGRGSGPGGR
 GGRGTSAPRAGRFWYCARRRLA*ATTRRLTSWI*RLVWKATGPVSLNLKESSTESISVSLTAACRRISCTSPESLW*AISVMNCSISS
 *RSPRPARSTVAARSLEMRPMSCEKAFMPASFQTRL*TTAPSGSRARMITTWARLSSTWRVKTA*LQRRW*R*LSVAMCSVTKKY
 MIQRRSGISLTSRASKRSMAS*KSTAKLKNWELRAETVNSSRRRMSSAMVARTSRSKAPGGSSSSSSSTNISSTSSSGGGGGGG
 ALRRRRRTGRRSMKRMVSPRRRMVSVTARPSSRGRSVKTPPRISRWPPEGSPGRLGRERALTMLHINWPVGTTPRKDLSVSRSTGSE
 NR*TKASSQSQSGRLSPVSCSSGISGGGRAMLLVMKLK*AVLRRRMVARSTRSLGPACWMRRRSAMPQAWS*HLARSL**SCM
 SRSTGTSSSPARPCMRVSPNPRWGWSARSATTRSARMACCIWVRVWVWKSSTKRW*APVLMV*EQLAMTDQLTVWWPGRT
 SSWYLRE*ARVSKM*SLQVTRYWYPTKCGGGWR*SGHRSVAGAPGARSSSMRRW*P*MYLDIQVMPAAVVEARGNSRTRF
 QMLRSGRK*FMVAAVWPVRRASQSWML*TYGQKRKRSARLRGLEAKRTGWAARVPRFESRIRLEPQLTWYWHSLRDPSSLTKPP
 GYGGGSFFGLGRWS*KTSKRGKRPPAMARCRSLEKESPLRCGVPRFEPQRSAPAGFRG*RGRGCPVVS KTP*PADFSSYGASPSF
 SCVFARCIPIYCGRCAPTLHLNRPYRRSSNSRRFCPRPSSQPLPRPP*AEPAFSMTWPWKRARGWRGWGRRRRSGTRACR*KG

Fig. 26J

TLARPTCPSRTCSETGAARSPRRCAPPASTRGGSCGAAWTESGC*GTRISRRTS*RGSA PRARTWPRPTWSRRTSRP*RRRATSKNP
STTTCAR*SRARR*PWA*CTCGTCWRPSCRTPRASR*RRSCFWWCSTVGTTRRSGRRC*ISPSRAAGSWTW*TFCRASWCRSAG
CRCPRSWRLSTSRC*AWASTTLGRSTRPRTCP*TRR*RSTGFTCA*P*KC*P*ATIWGCTATTGCTAR*APAAGAS*ATRS*CTACS
GP*PGPGPRGRATLTWARTCAGSPAAGPWKLPAVPPTWRRWTMRRRRASTWKTDGATVFLDAAATATAS*SRDAGGAAEPAV
RH*LLGRLDPGHATHHGAADDPQSRL*TAASGQPALGHPGGRGALALEPHAREGAGHRERAGGEQGHPRRRGRAGVQRAAGAR
GPLQQHQRADEPGPHGDRRARGGVAARAVPPRVEPLHGGAERLPEHAARQRAPGPGGLHQLHQRAAADGGRGAPERGVV
GAGLLPDQSPGLADREPEPGFQELAGTVGRAGPGRGPRDGVPEADAELAPAAAAGGALHGQRQREPRLVPLPA*PVPRGHRA
GARGRADLPGDHPREPRAGPGGPGQPGGHPADQPAEDPAPVRAEHRGGAHPALRAAERGAVPDAGGGHAQRRARHDR
AQHGAQHVRSPVPHQ*ADGLLASGGRHELGLLYQRHLEPALAPARVLHGRVRHARPQRRVPVGRRGQQRVLAAPRHHRVEE
RGRGPAAVLGAVRSRGCCRGGA*GRQPLPEPALFAEQRAQQRAGSADAAAPAGRGGVPERLLVEARAREELPQ*RDREPGQDE
PLEDVRARAQGRAPS*QQRHRP*TPATRQAAGSGVGR*GFRRRQQRVGLGWEEWWW*PVRSLAPPYRAPDVRI*KNKKRYSRPR
WRPACVLLCCL**YDEARVPGSSSLVRERDAAGGGGGDAAPAGGALRAPAVPGAYGGAEQHSLLGAGTLVRYHPVVPGGQQV
GGHRLAELPERPQQLPDHRGAEQRFHPHGGQHPDHQL*RALAVGRPAENHHAHQHAQREVRHVQQVQAGDGLAQDPQW
GRGG*EL*W*SGRADLRVGGV*AARGQLLDHHRSDQRHHRQLLGGGASERGAGERHREVRHAQLPAGLGPRDRAGDAG
RVHQRLPPRHRPAARLRRGLHREPPQQPAGHPQAAALPGGLPDPVRGPGGGQHPRALGCRSL*EKQGGRRSGDRSRGHRLY
RGAGR*FC*RRSGRGG*NRK*DSHPAGGEGQQQQLQRRARGQEKHRLPQLVPLQLRRPREGRALLDAAHHLGRHLRRGASLL
VAARHDARPGHPLHASS*QLPGGGRRAPARLLQELLQRRAGRLAAAAARLHLAARLQPLPREPDPRPPARAHYHRQ*KRSCSHR
SRDPAQAQQYPGSPARDRH*RQTPHLRLQGPGRSRAARPLEPHLLKNVHSHLAQ**HRLGPARAQDVRRRSPTLHATPRARA
RALPRSLGRPGPRALAHRRRRDRPGGGRRALHARRRARLHRGRHRQRGGRCAPVRPRQEPAAAHRAPEHPRHARGAS
LAAQQAHTGTQHAQGGQTRGLRQQRRQDPQTRGHGGGGGHRQHVPAAARQVRLGARRRHRCARARAHPPSHLKMITS
RC*CVPAARRMSKRKYKEMLQVIAPEIYGPVKEERKPRKLKRVKKDKKEEDVDGLVEFVREFAPRRRVQWRGRKVKPVLPGT
TVVFTPGERSGSASKRSYDEVYGEDILEQAVERLGEFAYGKRSRPAPLKEEAVSIPLDHGNPTSLKPVTLQQLVPSAAPRRGFKREG
GEDLYPTMQLMVPKRQKLEDVLEHMKVDPEVQPEVKVRPIKQVAPGLGVQTVDIKIPTMETQTPEVPKSTSTMEVQTDPMWP
APASTTRRRRKYGAASLLMPNYALHPSIIPYGRGTRFYRGYTSSRRKTTTTRRRRRRTRRSSTATSAAALVRRVYRSGREPLTLPRARY
HPSIAI*LCRRLLADMALTCRLRPITGYRGRKPRRRRLTGNGLRHHHRRRRRAISKRLGGGLPALIPIIAAIGAIPGIASVAVQASQ
RH*DTAWKICNKKMD*RSWSCDVCF*MEDINFSSLA PRHGTRPFMGTSWSDIGNSQLNGGAFNWSSLWSGLKNFGSTLKTYGNK
AWNSTGQALREKLKEQNFQKQVVDGLASGINGVVDLANQAVQKQINSRLDAVPPAGSVEMPQVEELPLDKRGDKRPRDAE
ETLLHTDEPPPYEEAVKLGLPTTRPVAPLATGVLPKSSSSQPATLDLPPASRPSTVAKPLPPVAVASRAPRGRPQANWQSTLNSIV
GLGVQSVKRRRCY*KTL*RLTCLSVICMSADQKEEEARRRVARWPPHRCPSGRCTCTSPDRTLST*VRVWCSSPAPQTPTS VWG
TSLGTPRWRPRTM*PPTAASG*RCASCPTWARTTPTRTKCATRWPWATTACWTWPAPTLSAACWIGGPASNPPTAPPTAWL
PRERPTLASGHIKLVILIKKPIHMEMHLCKALALQRMVFNLELTAMVRQSMQTKLINQSLKWVMLNGMTSLVLMKNMEAEALLSL
TPK*SLAMVLLPSLPIKKEARQM*KPKQAVPKNMTLTHSSIEVQLPPA*PQKLCILRMWIIWKLQIPILYTRQVQMTVALLSIWVS
SPCPTDPTTLASETTLSV*CTTTALAIWVYWLDRPPS*MLWWTCTETPNCPTSSCLTLWVTEPGISVCGIRRWTVMTPMCALKIT
VWRMNFILTIA SPWMLWVELILTREL RPMVIKPPGPKMILLMMLMNWARAILSPWRSTSRPTCGGTSSTRTWRCTCPTPTSTRP
TSRCPPTPTTIT*TAAWWRPRWWTPTSTSGRAGRWTPTTSTPTTTATRACDTAPCSWATGATCPTSRCPKSFSPSRASCSCP
GPTPTSGTSARTST*SCRAPSATTCARTGPPSPSPASTSTPPSSPWRTTTPPSPRPPCATTPTTSTPTTSSRPTCSTPSRPTPTCPSPS
PRATGPPSAAGPSRASRPARRPR SAPGSTPTSSTRAPSPTSTAPSTSTTPSRRSPSPSTPPSAGPATTAS*RPTSSKSAPSTERGTTWP
SAT*PRTGWSRCWPPTTSATRASTCPRATRTACTPSSATSP*AARSWTRSTTRTRPSPWPTSTTTASSATSRPPCARASPTPPT
TPTRSSARAPSPASPRKSSSATGSCGASPSATSCPWARSPSARTCSTPTPPTR*T*ISKSTPWMSPPFMSLSSKSSSTSSECTSPTAAS
SRPSTCARPSRPATPPPPLASCKMTACAGSGEQELRAILRDLGCGPCFLGTDFDKRFGFMAPHLKACAIVNTAGRETGGHEWLFAFA
WNPRSHTCYLDFPGFSDERLKQIYQFEYEGLLRRSALATEDRCVTLEKSTQTVQGPRSAACGLFCCMFLHAFVHWPDRPMDKNPT
MNLLTGVPNGMLQSPQVEPTLRRNQEALYRFLNAHSAYFRSHRARIKATAFDRMNQDM*SGVCM*MLYSS**TAHVYATFSEA
LTLFRNRRGSAGSRHGPRAGIRCGTGTWAAT*TRGSAASARGGRGTSRSTACA*VAGRPAGRARRS*NRSWDPRSARESYGTRGC
STGTPSGPGASRSPAPSR*CPRPDPRRWPSRRGSSCRSAAPCWARSACGCNRSAGGSASSGPARRSCPGTWPS*KPPAGGRP
AAPCRPR*RRPRTC*RTGWWSRQRRARSSARRCWPAAPRCAPSGSG*SWPGRGSPSARAARSRSPHPSRSCAPSGSSRSRAGT
AACPRPRCTRAATARSRCPSSCGRSGSASARSPAGSGPSSWSGSCW*RSAECRGAPRSHTGGRYGGTPRPARASAGRRTSGRSP
RGTGPSAASSLPCSPRPKRSAGSGGSSPLSS*SPPKSGGRSRPGSQTACRPSR*CARGES*SPRPPAPRPAFRPRCPG*CLAKAH
AWSCGVSWFAAEAAAETC WASASSRPLFLLGRRPRPRGGRHASSGAEEATGSRGSAGGWQSPFRVRGCAPGGAALTDFLR
GRPLCSPREQAWRLSHRRQHRHLPPPPPTRTSSSRMKA*PPRRPAPPPTPQPQTCKRWRNPSRLTWAT*RPRSTRRSWQRAFQP
RKRTTKSSQSRKQASRTRLGSSMATT*AGQRTCCSSIWPANASSRTRCSTAPRCPSAWRSSAAPT SATSSRRACPPSASPTAPASP
TRASTSTRSSRCRPPWPTTFSRTKGSPPAAPTAPAPTPCSTWAPAPAYLISPPWKFRPSSRVWAATRLGPRTLCKEAERSMSTT

Fig. 26K

APWWSWKATTRAWRSSARSS*PTSPTRRSTCPPRS*APSWTRCSSAPRPSRRRCRTPRARTRASPWSATSSWRAGWERVAP
 PRAWKSGASS*WPWSW*PWSWSVCAASSPTRRPCARSRRCTTSSDTGSCARPARSPTWS*PTWSPTWASCTRATAWGRTCTP
 PCAGRPAATTSATASTCTSATPGRRRAWACGSSAWRSRT*KSSASSCRTRSRCGPGSTSAPPRTWPTSSSPSACG*RCATGCPTL*
 AKACCKTFALSSSNAPGSCPPAPRCPTSCR*PSASAPRRSGATATCCAWPTTWPTTRT*SRTSAARACSSATAAATSARRTAPWP
 ATPSC*ARPRSSAPSSCKAPARARGV*NSPRGCGPRPTCASSCPRTTIPSRSGSTRNPSRPRPSCRPPASSPRGPSWPNCPSRNP
 AK*KRATGSTWTPRPERSTPASPRMPRGSSKKLKVLPPEDELEEDWESSQAEEEEMEDWDSTQAEEDSLQDSLEEDEVEEA
 EEEEEAAARPSSAEEEEKASSTDTISAPGRGRGGRASRWDETRFPNPTTQTGKKERQGYKSWRGHKNAIVSCLQACGGNISFTRR
 YLLFHRGVNFPNRILHYRHLHSPYCFQEEAETQQQQQQKTSGSS*KIHSGGRWTEDRGERAGADPGAEEDLSHPLCHLPAES
 GARAGTESQEPFSALAHPLQSVSQERRPTSASRGRGSLQQLVLAHS*RVARARPHTEKGGNYVTTCALRPTIIMSKEIPTPYMWS
 YQPQMGLAAGAAQDYSTRMNWLSAGPAMISRVNDIRAHNRQILLEQSAITATPRHHLNPRNWPAAALVYQEIPQPTTVLLPRDAQ
 AEVQLTNSGVQLAGGAALCRHRPAQGIKRLVIRGRGTQLNDEVSSSLGLRPDGVFQLAGSGRSSFTPRQAVLTLESSSQPRSGGI
 GTLQFVEEFTPSVYFNPFSGSPGHYPDEFIPNFDaisesVDGYD*MSHGGAADLARLRHLDHCRFRFCFARDLAEFAYFELPEEHPQG
 PAHGVRIVVEGGLDShLLRIFSQRPIAEREQGTLLTYLCINHPGLHESLCCLCTEYNKS*DQRLLRTSVCSYQPVPLHRRERDRA
 PAPV*APQEVPHLAVPGLSDRRRCQLRQRSPAERPCQPYFFHPQKQAPALPTLPPRDLSVRLGTLPSHLPPDPEYHSVAPRY*QPN
 YPPTPPSRPRTCTELEKY*ATIHAIHRL*GRATATHAPRY*LLQSNRRR*LTHWPTTTSTTFSWTWTAAPRSSDSPNFAFASSRREPSR
 SCRTA*PSTSARKASSAW*NRPRSPTSRPTIASPTSSCSSARSSPAWSESTPSSSPSSRAIPRGASTAPATPPTASTL*SRPSAASATS
 SP*TNHPLIQ*NKYHIDDLNKK*SFDLK*RYNHIDDLSEKK*RITYLKS DTRSLSMFSANTTSLPSSQLWYCRPRAANFLHTLKGMS
 NSSCPSIFILSSIRCPKSASGWMMTSTPSTPTMQTTHRPCPSSTPPSSQLQMDSKRSPWGCCPCDWLTSPSPRTGKSPSSWERGWT
 TPRENSSPTRPPRPPLSVFPTTFFPLTWIPLFIPKMENYPYKFLHR*TY*NQPF*TH*L*LMDQV*D*VVALLLQYSWPLSHLLMKKE
 ILKLT*PVVH*QLMQVDLVSTAKEGSLSLPQEMQLKAT*AGLKV*DLKVMA*LQTLAEDWNLEPLVQLRMSQMHTQFKLNWVLA
 LPLTVQAPLLLGTKRMINLHYGPQPTPRQIAKYTLKMPNSHFA*QSVEVKFWVL*LYWQ*IMEVSTQSQTQ*ALHSSPSSLMQVE
 FC*AAPH*TKNIGTSEREMLHLLSPILML*VLCLT*RPILKTHLQLKAILSVKFISMGMMPNH*C*LLLLMKLRMLQAPTVSLFNGNG
 IVLSTQVKHLLPAPSPSPSPKNEHCIPPCMPTLPTPLCLWKKL*STK*NKVQVY*FNSFTGFEQLFFLHPRTWNTPPSPPAQ*TS
 ECHW*WTCFWSRSTQFQSEPVSGRSGR*NPPGTPASAPHSSTAEDCPRWSGSRSLSGRSRAAVGIIVRERDRPVVSHQAPQQSL
 PPPLRQAAAQGVVRVQGLPQHDAHGPHQSSGAAGAAAHADLAQVA AVRATQDHQVVQQSIVQHAPAETHRGKDATHVAVVP
 DPQVNQVALPPEAAHVHDLGHVAVHHLVPVPHPLVEHAAPDDPAEPQGQHRPARHAAKRPRVPAMAMEDPPLVPVDHLGA
 EQVYVGTAQAYAHASLQHSQLLGGQNHIPGHGELLQDSEPRRTGQSSHITYIVHGQGIARQHRVILHQRSAGLGLLTAW*GGPPIR
 VMAGRG*SCSRPCHDAVAFGHFRTCCSRTWSGRCTPIAGGGPGAWNARC*NCKTATLS DRAADLGPQE**RSHHA**L*SHRPP
 WNGPDPAR*CNFVGFR*RRGREEQEEP*LTFNPNGLGALQNEGRGDGTSRPRCVGGK*QPGQR*YGRDVPRLWPAKPPRAHP
 ETRQ*RKREGSLIPQSSCYTPAPSPDNFHFSSLE*FELVPEVNPSPQ**RARAERPPPAFLSTPS*FQDILLVHLQQIDKRNKISAAIPK
 LLPQQ*L*VLFHILSEIFSHRTTRNKIRASHSTD KPKSSPVSIKCKTAISMLARP GDIFQITGQKITQAIFKKINKRKILQVHV*SLGNND
 EVNASGAFQHG*LADL*KTKNKTLNHASLANRWVNRSLQHQAAGHVSGATLVKIVAMIENHHRETFPVAGVNDSTR*IHPRNIGV
 RE*KKAPEEAI RHYNASQVQSQSDAMRMKHKILRCVQNVITPLLHRQSRPSRLQIHIQSLSVHSLPSSSTQQAQSEK*ALTCPPAL
 CSIYSPDLH*RKQGSLKIPAK*SHTPSTRPETGDTLKKIRALPQTPKLPSPFGSHATSSEDFQIPSTVKNVTRPAPNGRPSLGQSPSSLP
 KFKQLICILTRTKSLRYIID

Fig. 27A

AdC7 010-DU422gp160(E1623) Nucleic Acids – SEQ ID NO: 8

CATCATCAATAATATACCTCAAACCTTTTGGTGCGCGTTAATATGCAAATGAGCTGTTTGAATTTGGGGAGGGAGGAAGGTGAT
TGGCCGAGAGACGGGCGACCGTTAGGGGCGGGGCGGGTGACGTTTTGATGACGTGGCCGTGAGGCGGAGCCGGTTTGCAA
GTTCTCGTGGGAAAAGTGACGTCAAACGAGGTGTGGTTTGAACACGGAAATACTCAATTTTCCCGCGCTCTCTGACAGGAAAT
GAGGTGTTTCTGGGCGGATGCAAGTGAAAACGGGCCATTTTCGCGCGAAAACTGAATGAGGAAAGTAAAAATCTGAGTAATTT
CGCGTTTATGGCAGGGAGGAGTATTTGCCGAGGGCCGAGTAGACTTTGACCGATTACGTGGGGGTTTCGATTACCGTATTTTT
CACCTAAATTTCCGCGTACGGTGTCAAAGTCCGGTGTTTTTACGTACGATATCATTTCCCCGAAAGTGCCACCTGACCGTAACTA
TAACGGTCCTAAGGTAGCGAAAGCTCAGATCTCCCGATCCCCTATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGT
TAAGCCAGTATCTGCTCCCTGCTTGTGTGTTGGAGGTGCTGAGTAGTGCGCGAGCAAAATTAAGCTACAACAAGGCAAGGC
TTGACCGACAATTGCATGAAGAATCTGCTTAGGGTTAGGCGTTTTGCGCTGCTTCGCGATGTACGGGCCAGATATACGCGTTG
ACATTGATTATTGACTAGTATGCCAAGTACGCCCCCTATTGACGTCAATGACGGTAAATGGCCCCGCTGGCATTATGCCCAGTA
CATGACCTTATGGGACTTTCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGTATGCGGTTTTGGCAGTAC
ATCAATGGGCGTGGATAGCGGTTTGACTCACGGGGATTTCCAAGTCTCCACCCATTGACGTCAATGGGAGTTTGTGTTTGGCA
CCAAAATCAACGGGACTTTCCAAAATGTCGTAACAACTCCGCCCATTGACGCAATGGGCGGTAGGCGTGTACGGTGGGAG
GTCTATATAAGCAGAGCTCGTTTAGTGAACCGTCAGATCACTAGAAGCTTTATTGCGGTAGTTTATCACAGTTAAATTGCTAAC
GCAGTCAGTGCTTCTGACACAACAGTCTGAACTTAAGGCTAGAGTTCGACGCCACCATGCGCGTGCGCGGCATCCCCCGCAA
CTGGCCCCAGTGGTGGATCTGGGGCATCTGGGCTTCTGGATGATCATCATCTGCCGCGTGGTGGGCAACCTGGACCTGTGG
GTGACCGTGTACTACGGCGTGCCCGTGTGGAAGGAGGCCAAGACCACCTGTTCTGCGCCTCCGACGCCAAGGCCTACGACA
AGGAGGTGCACAACGTGTGGGCCACCCACGCCTGCGTGCCACCGACCCCAACCCCAAGGAGATCGTGCTGGAGAACGTGAC
CGAGAACTTCAACATGTGGAAGAACGACATGGTGGACCAGATGCACGAGGACATCATCTCCCTGTGGGACCAGTCCCTGAAG
CCCTGCGTGAAGCTGACCCCCCTGTGCGTGACCTGAACTGCAAGAACGTGAACATCTCCGCCAACGCCAACGCCACCGCCAC
CCTGAACTCTCCATGAACGGCGAGATCAAGAACTGCTCCTTCAACACCACCACCGAGCTGCGCGACAAGAAGCAGAAGGTGT
ACGCCCTGTTCTACAAGCCCCGACGTGGTGCCCTGAACGGCGGCGAGCACAACGAGACCGGCGAGTACATCTGATCAACTG
CAACTCCTCCACCATCACCCAGGCCTGCCCAAGGTGTCTTCGACCCCATCCCCATCCACTACTGCGCCCCCGCCGGCTACGCC
ATCCTGAAGTGCAACAACAAGACCTTCAACGGCACCGGCCCTGCAACAACGTGTCCACCGTGACGTGCACCCACGGCATCAA
GCCCGTGGTGTCCACCCAGCTGCTGCTGAACGGCTCCCTGGCCGAGGAGGAGATCATCGTGCGCTCCGAGAACCTGACCAAC
AACATCAAGACCATCATCGTGACCTGAACAAGTCCGTGGAGATCAAGTGACCCGCCCAACAACAACACCCGCAAGTCCGT
GCGCATCGGCCCGGCCAGACCTTCTACGCCACCGGCGAGATCATCGGCGACATCCGCGAGGCCCACTGCAACATCTCCGCG
AGACCTGGAACCTCACCTGATCCAGGTGAAGGAGAAGCTGCGCGAGCACTACAACAAGACCATCAAGTTCGAGCCCTCCTCC
GGCGGCGACCTGGAGGTGACCACCACTCCTTCAACTGCCGCGGCGAGTTCTTCTACTGCGACACCACCAAGCTGTTCAACGA
GACCAAGCTGTTCAACGAGTCCGAGTACGTGGACAACAAGACCATCATCTGCCCTGCCGATCAAGCAGATCATCAACATGT
GGCAGGAGGTGGGCCGCGCCATGTACGCCCCCCCATCGAGGGCAACATCACCTGCAAGTCCAACATCACCGGCCTGCTGCT
GACCTGGGACGGCGGCGAGAACTCACCGAGGGCGTGTTCGCCCCGGCGGCGCAACATGAAGGACAAGTGGCGCTCCGA
GCTGTACAAGTACAAGGTGGTGGAGATCAAGCCCTGGGCGTGCCCCCAAGAGCAAGCGCAAGGTGGTGGGCCGCGA
GAAGCGCGCGTGGGCGTGGGCGCGTGTGCTGCTGGGCTTCTGGGCGCGCGGCGAGCACCATGGGCGCGCGCAGCATCACC
CTGACCGTGACGGCCCGCCAGCTGCTGAGCGGCATCGTGACGAGCAGAGCAACCTGCTGCGCGCCATCGAGGCCAGCAGC
ACCTGCTGCAGCTGACCGTGTGGGGCATCAAGCAGCTGCAGACCCCGTGTGGCCATCGAGCGCTACCTGAAGGACCAGCA
GCTGCTGGGCGTGTGGGGCTGCAGCGGCAAGCTGATCTGCGCCACCGCGTGCCTGGAACAGCAGCTGGAGCAACAAGAG
CCTGGGCGACATCTGGGACAACATGACCTGGATGCAGTGGGACCGCGAGATCAGCAACTACCAACACCATCTTCCGCTGC
TGGAGGACAGCCAGAACCAGCAGGAGAAGAAGCAGAGGACCTGCTGGCCCTGGACAGCTGGAAGAACCTGTGGAACCTGGT
TCGACATACCAACTGGCTGTGGTACATCAAGATCTTCATCATGATCGTGGGCGGCCTGATCGGCCTGCGCATCATCTTCGGCG
TGCTGGCCATCGTGAAGCGCGTGCGCCAGGGCTACAGCCCCCTGAGCTTCCAGACCCTGATCCCCAACCCCGCGGCCCGAC
CGCTGGGCCGATCGAGGAGGAGGGCGGCGAGCAGGACAAGGACCGCAGCATCCGCTGGTGAGCGGCTTCTGGCCCTG
GCCTGGGACGACCTGCGCAGCCTGTGCCTGTTACGTACACACAGCTGCGCGACTTCATCTGACCGCCGCGCGCGCGCCGA
GCTGCTGGGCCGAGCAGCCTGCGCGGCTGCAGCGGCTGGGAGGTGCTGAAGTACCTGGGCAACCTGGTGCAGTACTG
GGGCTGGAGCTGAAGCGCAGCGCCATCAACCTGTTGACACCATCGCCATCGCCGTGGCCGAGGGCACCGACCGCATCATC
GAGGTGATCCAGCGCATCTGCCGCGCATCCGCTACATCCCCACCGCATCCGCCAGGGCTTCGAGGGCCCGCTGCTGTAAGG
TACCTCTAGAGTCGACCCGGGCGGCCAAACCGCTGATCAGCTCGACTGTGCTTCTAGTTGCCAGCCATCTGTTGTTGCCCC
TCCCCCGTGCCTTCTTACCCTGGAAGGTGCCACTCCACTGTCTTCTTAATAAAATGAGGAAATTGCATCGCATTTGTCTGA
GTAGGTGTCAATTCTATTCTGGGGGGTGGGGTGGGGCAGGACAGCAAGGGGGAGGATTGGGAAGACAATAGCAGGCATGCT

Fig. 27B

GGGGATGCGGTGGGCTCTATGGCTTCTGAGGCGGAAAGAACCAGCAGATCTGCAGATCTGAATTCATCTATGTCGGGTGCGG
AGAAAGAGGTAATGAAATGGCATTATGGGTATTATGGGTCTGCATTAATGAATCGGCCAGATATCGATATGCTGGCCACCGTG
CATGTGACCTCGCACCCCGCAAGACATGGCCCGAGTTCGAGCACAACGTCATGACCCGATGCAATGTGCACCTGGGGTCCCG
CCGAGGCATGTTATGCCCTACCACTGCAACATGCAATTTGTGAAGGTGCTGCTGGAGCCCGATGCCATGTCCAGAGTGAGCC
TGACGGGGGTGTTTGACATGAATGTGGAGCTGTGGAAAATTCTGAGATATGATGAATCCAAGACCAGGTGCCGGGCTGCGA
ATGCGGAGGCAAGCACGCCAGGCTTCAGCCCGTGTGTGTGGAGGTGACGGAGGACCTGCGACCCGATCATTTGGTGTGTCC
TGCAACGGGACGGAGTTCGGCTCCAGCGGGGAAGAATCTGACTAGAGTGAGTAGTGTGGGGGAGGTGGAGGGCTTGAT
GAGGGGCGAATGACTAAAATCTGTGTTTTCTGTGTGTGCAGCAGCATGAGCGGAAGCGCTCCTTTGAGGGAGGGGTAT
TCAGCCCTTATCTGACGGGGCGTCTCCCTCTGGGCGGGAGTGCGTCAGAATGTGATGGGATCCACGGTGGACGGCCGGCC
CGTGACGCCCGCAACTCTCAACCCTGACCTACGCGACCCTGAGCTCCTCGTCCGTGGACGAGCTGCCCGCCGAGCTGCTG
CTTCGCCCGCCAGCGCGTGCGCGGAATGGCCCTGGGCGCCGGCTACTACAGCTCTCTGGTGGCCAACTCGACTTCCACCAAT
AATCCCGCCAGCCTGAACGAGGAGAAGCTGCTGCTGCTGATGGCCAGCTCGAGGCCCTGACCCAGCGCCTGGGCGAGCTGA
CCCAGCAGGTGGCTCAGCTGCAGGCGGAGACGCGGGCCGCGTTGCCACGGTGAAAACCAATAAAAAATGAATCAATAAAT
AAACGGAGACGGTGTGATTAAACAGAGTCTTGAATCTTTATTTGATTTTCGCGCGCGGTAGGCCCTGGACCACCGGTC
TCGATCATTGAGCACCCGGTGGATTTTCCAGGACCCGGTAGAGGTGGGCTTGATGTTGAGGTACATGGGCATGAGCCCGT
CCCGGGGGTGGAGGTAGCTCATTGACGGGCTCGTGCTCGGGGGTGGTGTGTAATCACCAGTCATAGCAGGGGCGCA
GGGCGTGGTGTGACGATGTCCTTGAGGAGGAGACTGATGGCCACGGGCGAGCCCTTGGTGTAGGTGTTGACGAACCTGTT
GAGCTGGGAGGGATGCATGCGGGGGGAGATGAGATGCATCTTGGCCTGGATCTTGAGATTGGCGATGTTCCCGCCAGATCC
CGCCGGGGGTTTATGTTGTGACGAGACCACGACGCGGTGTATCCGCGCACTTGGGGAATTTGTCATGCAACTTGAAGGGA
AGGCGTGAAAGAATTTGGAGACGCCCTTGTACCGCCAGGTTTTCATGCACTCATCCATGATGATGGCGATGGGCGCGTGG
GCGGCGGCTGGGCAAGACGTTTCGGGGGTGCGACACATCGTAGTTGTGGTCTGGGTGAGCTCGTCATAGGCCATTTAA
TGAATTTGGGGCGGAGGGTGCCGACTGGGGGACGAAGGTGCCCTCGATCCCGGGGCGTAGTTGCCCTCGCAGATCTGCAT
CTCCCAGGCCTTGAGCTCGGAGGGGGGATCATGTCCACCTGCGGGGCGATGAAAAAACGGTTTCCGGGGCGGGGAGAT
GAGCTGGGCGGAAAGCAGGTTCCGGAGCAGCTGGGACTTCCCGCAGCCGGTGGGGCCGTAGATGACCCGATGACCGGCTG
CAGGTGGTAGTTGAGGGAGAGACAGTGCCTGCTCGCGAGGAGGGGGGCCACCTCGTTCATCATCTCGCGCACATGCATG
TTCTCGCGCACGAGTTCGCCAGGAGGCGCTCGCCCCCAGCGAGAGGAGCTCTTGACGCGAGGCGAAGTTTTCAGCGGCTT
GAGYCCGTGCGCATGGGCATTTTGGAGAGGGTCTGTTGCAAGAGTTCCAGACGGTCCCAGAGCTCGGTGATGTGCTTAGG
GCATCTCGATCCAGCAGACCTCTCGTTTCGCGGGTTGGGGCGACTGCGGGAGTAGGGCACCAGGCGATGGGCGTCCAGCGA
GGCCAGGGTCCGGTCTTCCAGGGTGCAGGGTCCGCGTCAGCGTGGTCTCCGTACGGTGAAGGGGTGCGCGCCGGGCTG
GGCGCTTGCGAGGGTGCCTTCAGGCTCATCCGGCTGGTTCGAGAACCCTCCCGTCCGCGCCCTGCGCGTCCGCCAGGTAG
CAATTGAGCATGAGTTCGTAGTTGAGCGCTCGGCCGCTGGCCCTTGGCGCGGAGCTTACCTTTGGAAGTGTGTCCGAGAC
GGGACAGAGGAGGACTTGAGGGCGTAGAGCTTGGGGGCGAGGAAGACGGAAGTCCGGGGCGTAGGCGTCCGCGCCGAG
CTGGCGCAGACGGTCTCGCACTCCAGAGCCAGGTGAGGTGCGGGCGGTTGGGGTCAAAAACGAGGTTTCTCCGTGCTTTT
GATGCGTTTCTTACCTCTGGTCTCATGAGCTCGTGTCCCCGCTGGGTGACAAAGAGGCTGTCCGTGTCCCGTAGACCGACTT
TATGGGCCGGTCTCGAGCGGGGTGCCGCGTCTCGTCTGAGAGGAACCCCGCCACTCCGAGACGAAGGCCCGGGTCCAG
GCCAGCACGAAGGAGGCCACGTGGGAGGGGTAGCGTCTGTGTCACACGCGGGTCCACCTTCTCCAGGGTATGCAAGCACA
TGTCCTCCCTCGTCCACATCCAGGAAGGTGATTGGCTTGTAAAGTGTAGGCCACGTGACCGGGGGTCCCGGCCGGGGGGTATA
AAAGGGGGCGGGCCCTGCTCGTCTCACTGTCTTCCGGATCGCTGTCCAGGAGCGCCAGCTGTTGGGGTAGGTATTCCCTCT
CGAAGGCTGGCATAACCTCGGCACTCAGGTTGTGAGTTCTAGAAACGAGGAGGATTTGATATTGACGGTGCCGTTGGAGAC
GCCTTTATGAGCCCTCGTCCATCTGGTCAGAAAAGACGATCTTTTTGTTGTCGAGCTTGGTGGCGAAGGAGCCGTAGAGGG
CGTTGGAGAGGAGCTTGGCGATGGAGCGCATGGTCTGTTCTTTCTTGTGCGCGCGCTCCTTGGCGGCGATGTTGAGCTGC
ACGTACTCGCGCGCCACGCACTTCCATTCCGGGAAGACGGTGGTGAGCTCGTGGGCGACGATTCTGACCCGCCAGCCGCGGTT
GTGACGGGTGATGAGGTCCACGCTGGTGCCACCTCGCCGCGCAGGGGCTGTTGGTCCAGCAGAGCGCCCGCCCTTGGCG
GAGCAGAAGGGGGGCGAGCGGTCCAGCATGAGCTCGTGGGGGGGTGCGGCTCCACGGTGAAGATGCCGGGCGAAGCTC
GGGGTCAAGTAGCTGATGAGGTGTCCAGATCGTCCAGCGCCGCTTCCAGTCCGCGCACGGCCAGCGCGCGCTCGTAGGGG
CTGAGGGGCGTGCCCGAGGGCATGGGGTGCCTGAGCGCGGAGGCGTACATGCCGAGATGTCGTAGACGTAGAGGGGCTCC
TCGAGGACGCCGATGTAGGTGGGGTAGCAGCGCCCCCGCGGATGCTGGCGCGCACGTAGTCTGACAGCTCGTGCAGGGG
GCGAGGAGCCCCGTGCCAGGTTGGAGCGTTGCGGCTTTTCGGCGCGGTAGACGATCTGGCGGAAGATGGCGTGGGAGTTG
GAGGAGATGGTGGGCTCTGGAAGATGTTGAAGTGGGCGTGGGGCAGGCCGACCGAGTCCCTGATGAAGTGGGCGTAGGA
GTCCTGCAGCTTGGCGACGAGCTCGGCGGTGACGAGGACGTCCAGGGCGCAGTAGTCGAGGGTCTTTGGATGATGTCGTAC
TTGAGCTGGCCCTTCTGCTCCACAGCTCGCGGTTGAGAAGGAACCTTCGCGGTCTTCCAGTACTCTTCGAGGGGGAACCCG

Fig. 27C

TCCTGATCGGCACGGTAAGAGCCCACCATGTAGAACTGGTTGACGGCCTTGTAGGCGCAGCAGCCCTTCTCCACGGGGAGGG
CGTAAGCTTGTGCGGCCTTGCAGAGGGAGGTGTGGGTGAGGGCGAAGGTGTGCGCACCATTGACCTTGAGGAACTGGTGCT
TGAAGTCGAGGTCTGTCGAGCCGCCCTGCTCCAGAGCTGGAAGTCCGTGCGCTTCTGTAGGCGGGGTTGGGCAAAGCGAA
AGTAACATCGTTGAAGAGGATCTTGCCCGCGCGGGGCATGAAGTTGCGAGTGATGCGGAAAGGCTGGGGCACCTCGGCCCG
GTTGTTGATGACCTGGGCGGCGAGGACGATCTCGTGAAGCCGTTGATGTTGTGCCCAGCATGTAGAGTTCCACGAATCGC
GGGCGGCCCTTAACGTGGGGCAGCTTCTTGAGCTCGTCGTAGGTGAGCTCGGCGGGGTCGCTGAGCCCGTGTCTGCTGAGGG
CCCAGTCGGCGACGTGGGGGTTGGCGCTGAGGAAGGAAGTCCAGAGATCCACGGCCAGGGCGGTCTGCAAGCGGTCCCGGT
ACTGACGGAAGTGTGCCCCACGGCCATTTTTTCGGGGGTGACGCAGTAGAAGGTGCGGGGTCGCCGTGCCAGCGGTCCCA
CTTGAGCTGGAGGGCGAGGTCTGGGCGAGCTCGACGAGCGGCGGTCCCCGAGAGTTTCATGACCAGCATGAAGGGGAC
GAGCTGCTTGCCGAAGGACCCCATCCAGGTGTAGGTTTCCACATCGTAGGTGAGGAAGAGCCTTTCGGTGCGAGGATGCGAG
CCGATGGGGAAGAACTGGATCTCTGCCACCAGTTGGAGGAATGGCTGTTGATGTGATGGAAGTAGAAATGCCGACGGCGC
GCCGAGCACTCGTGCTTGTGTTTATAAAGCGTCCGAGTGCTCGCAACGCTGCACGGGATGCACGTGCTGCACGAGCTGTAC
CTGGGTTCTTTGACGAGGAATTCAGTGGGCAGTGGAGCGCTGGCGGCTGCATCTGGTGCTGTACTACGTCTGCCATCGG
CGTGCCATCGTCTGCCTCGATGGTGGTCATGCTGACGAGCCGCGCGGAGGAGGTCAGACTTCGGCTCGGACGGGTGCG
GAGAGCGAGGACGAGGGCGCGCAGGCCGAGCTGTCCAGGGTCTGAGACGCTGCGGAGTCAGGTGAGTGGGCGAGCGGCG
GCGCGCGGTTGACTTGACGAGGCTTTCCAGGGCGCGCGGAGGTCCAGATGGTACTTGATCTCCACGGCGCGGTTGGTGGC
GACGTCCACGGCTTGACGGGTCCCGTGCCCTGGGGCGCCACCACCGTGCCCCGTTTCTTCTGGGCGCTGCTTCATGCCGGT
CAGAAAGCGGCGGCGAGGACGCGCGCCGGGCGGACAGGGGCGGCTCGGGACCCGAGGAGGGGCGGACAGGGGCGGACGTCGG
CGCCGCGCGCGGCGAGGTTCTGGTACTGCGCCGAGAAAGACTGGCGTGAGCGACGACGCGACGCGGTTGACGTCTGGATCT
GACGCTCTGGGTGAAGGCCACGGACCCGTGAGTTTGAACCTGAAAGAGAGTTCGACAGAATCAATCTCGGTATCGTTGAC
GGCGGCTGCGCAGGATCTCTGCACGTGCCCCAGTTGTCTGGTAGGCGATCTCGGTGATGAACTGCTGATCTCTCTCTC
CTGAAGGTCTCCGCGGCGGCGCGCTCGACGGTGGCCGCGAGGTGCTTGGAGATGCGGCCCATGAGTGTGCGAGAAGGCGTT
CATGCCGGCCTCGTTCCAGACGCGGCTGTAGACCAGGCTCCGTGCGGGTTCGCGCGCGCATGACCACCTGGGCGAGGTTG
AGCTCGACGTGGCGCGTGAAGACCGCGTAGTTGCAGAGGCGCTGGTAGAGGTAGTTGAGCGTGGTGCGATGTGCTCGGTG
ACGAAGAAGTACATGATCCAGCGGCGGAGCGGCATCTCGTGACGTGCGCCAGGGCTTCAAGCGCTCCATGGCCTCGTAGA
AGTCCACGGCGAAGTTGAAAACTGGGAGTTGCGCGCGGAGACGGTCAACTCTCTCCAGAAGACGGATGAGCTCAGCGAT
GGTGGCGCGCACCTCGCGCTCGAAGGCCCGGGGGGCTCCTTCTTCCATCTCTCTCTCCACTAACATCTCTTACTTCC
TCCTCAGGAGGCGGCGGCGGGGAGGGGCCCTGCGTGC CGGCGGCGCACGGGCGAGCGGTGATGAAGCGCTCGATGGT
CTCCCCGCGCGGCGGCGACGATGGTCTCGGTGACGGCGCGCCGTCTCGCGGGGCGGCGAGCGTGAAGACGCCGCGCGCATC
TCCAGGTGGCCGCGGGGGGCTCTCGTTGGGCGAGGAGAGGGCGCTGACGATGCATCTTATCAATTGGCCGTAGGGACTC
CGCGCAAGGACCTGAGCGTCTCGAGATCCACGGATCCGAAAACCGCTGAACGAAGGCTTCGAGCCAGTCGAGTCGAAGG
TAGGCTGAGCCCGTTTCTTGTCTTGGGGATTTCGGGAGGCGGGCGGGCGATGCTGCTGGTGATGAAGTTGAAGTAGGCG
GTCCTGAGACGCGGATGGTGGCGAGGAGCACCAGGTCTTGGGCCGGCTGCTGGATGCGCAGACGGTCGGCCATGCC
CAGGCGTGGTCTGACACCTGGCGAGGTCTTGTAGTAGTCTGATGAGCGCTCCACGGGCACCTCTCTCTCGCCGCGCG
GCCGTGATGCGCGTGAGCCGAACCCGCGCTGGGGCTGGACGAGCGCCAGGTGCGCGACGACGCGCTCGGCGAGGATGGC
CTGCTGTATCTGGGTGAGGGTGGTCTGGAAGTCGTGAAGTCGACGAAGCGGTGGTAGGCTCCGTTGTTGATGGTATAGGA
GCAGTTGGCATGACGGACAGTTGACGGTCTGGTGCCGGGTGCGACGAGCTCGTGGTACTTGAGGCGGAGTAGGCGCG
CGTGTCGAAGATGTAGTCGTTGCAGGTGCGCACGAGGTAAGTATCCGACGAGGAAGTGCAGCGCGGCTGGCGGTAGAG
CGGCCATCGTCTGGTGCGGGGGCGCCGGGCGGAGGTCTCGAGCATGAGGCGGTGGTAGCCGTAGATGTACCTGGACAT
CCAGGTGATGCCGCGGCGGTGGTGGAGGCGCGCGGAACTCGCGGACGCGGTTCCAGATGTTGCGCAGCGGCAGGAAGT
AGTTCATGGTGGCGCGGTCTGGCCGTGAGGCGCGCGCAGTCTGGATGCTCTAGACATACGGGCAAAAACGAAAGCGGTC
AGCGGCTCGACTCCGTGGCTGGAGGCTAAGCGAACGGGTTGGGCTGCGCGTGTACCCCGTTTCAATCTCGAATCAGGCTG
GAGCCGAGCTAACGTGGTACTGGCACTCCGTCTCGACCAAGCCTGTAACGAAACCTCAGGATACGGAGGCGGGTGGT
TTTTGGCCTTGGTCTGTCGTCATGAAAACTAGTAAGCGCGGAAAGCGACCGCCGCGATGGCTCGCTGCGTAGTCTGGAG
AAAGAATCGCCAGGGTTGCGTTGCGGTGTGCCCCGTTTCAGCCTCAGCGCTCGGCGCGGCGGATTCCGCGGCTAACGTG
GGCGTGGCTGCCCCGTGTTTCAAGACCCCTTAGCCAGCCGACTTCTCCAGTTACGGAGCGAGCCCTCTTTTCTGTGTTTT
TGCCAGATGCATCCCGTACTGCGGCAGATGCGCCCCACCCTCCACCTCAACCGCCCTACCGCCGAGCAGCAGCAACAGCC
GGCGTCTGCCCCCGCCAGCAGCAGCCAGCCACTACCGCGGCGGCGCGGTGAGCGGAGCCGGCGTTAGTATGACCTG
GCCTTGAAGAGGGCGAGGGGCTGGCGCGGCTGGGGGCTGCTGCGCGGAGCGGCACCCGCGCGTGCAGATGAAAAGGGA
CGCTCGCGAGGCTACGTGCCAAGCAGAACCTGTTAGAGACAGGAGCGGCGAGGAGCCGAGGAGATGCGCGCCTCCCG
CTTCCACGCGGGGCGGGAGCTGCGGCGCGGCTGGACCGAAAGCGGGTGTGAGGGACGAGGATTCGAGGCGGACGAGC

Fig. 27D

TGACGGGGATCAGCCCCGCGCGCGCACGTGGCCGCGGCCAACCTGGTCACGGCGTACGAGCAGACCGTGAAGGAGGAGA
GCAACTTCCAAAAATCCTTCAACAACACGTGCGCACGCTGATCGCGCGCAGGAGGTGACCCTGGGCTGATGCACCTGTGG
GACCTGCTGGAGGCCATCGTGCAAGACCCACGAGCAAGCCGCTGACGGCGCAGCTGTTTCTGGTGGTGCAGCACAGTCGGG
ACAACGAGACGTTACGGGAGGCGCTGCTGAATATCACCGAGCCGAGGGCCGCTGGCTCCTGGACCTGGTGAACATTCTGCA
GAGCATCGTGGTGCAGGAGCGCGGGCTGCCGCTGTCCGAGAAGCTGGCGGCTATCAACTTCTCGGTGCTGAGCCTGGGCAAG
TACTACGCTAGGAAGATCTACAAGACCCGTACGTGCCCATAGACAAGGAGGTGAAGATCGACGGGTTTTACATGCGCATGA
CCCTGAAAGTGCTGACCCTGAGCGACGATCTGGGGGTGTACCGAACGACAGGATGCACCGCGCGGTGAGCGCCAGCCGCC
GGCGCGAGCTGAGCGACCAGGAGCTGATGCACAGCCTGCAGCGGGCCCTGACCGGGGCCGGGACCGAGGGGGAGAGCTAC
TTTGACATGGGCGCGGACCTGCGCTGGCAGCCAGCCGCCGGGCTTGAAGCTGCCGGCGGTTCCCCCTACGTGGAGGAGG
TGGACGATGAGGAGGAGGAGGGCGAGTACCTGGAAGACTGATGGCGCGACCGTATTTTTGCTAGATGCAGCAACAGCCACC
GCCTCCTGATCCCGGATGCGGGCGGCGCTGCAGAGCCAGCCGTCCGGCATTAACTCCTCGACGATTGGACCCAGGCCATGC
AACGCATCATGGCGCTGACGACCCGCAATCCCGAAGCCTTTAGACAGCAGCCTCAGGCCAACCGGCTCTCGGCCATCCTGGAG
GCCGTGGTGCCTCGCGCTCGAACCCACGCACGAGAAGGTGCTGGCCATCGTGAACGCGCTGGTGGAGAACAAGGCCATCC
GCGGCGACGAGGCCGGGCTGGTGTACAACGCGCTGCTGGAGCGCTGGCCCGCTACAACAGCACCAACGTGCAGACGAACC
TGGACCGCATGGTGACCGACGTGCGCGAGGCGGTGTCGACGCGCAGCGGTTCCACCGCAGTGAACCTGGGCTCCATGGT
GGCGCTGAACGCCTTCTGAGCACGCAGCCGCCAACGTGCCCGGGGCCAGGAGGACTACACCAACTTCATCAGCGCGCTG
CGGCTGATGGTGGCCGAGGTGCCCCAGAGCGAGGTGTACCAGTCGGGGCCGGACTACTTCTCCAGACCAAGTCGCCAGGGCT
TGCAGACCGTGAACCTGAGCCAGGCTTTCAAGAACTTGACAGGACTGTGGGGCGTGCAGGCCCGGCTCGGGGACCGCGCGA
CGGTGTCGAGCCTGCTGACGCCGAACTCGCGCTGCTGCTGCTGCTGGTGGCGCCCTTACGGACAGCGGCAGCGTGAGCCG
CGACTCGTACCTGGGTACCTGCTTAACCTGTACCGCGAGGCCATCGGGCAGGCGCACGTGGACGAGCAGACCTACCAGGAG
ATCACCCACGTGAGCCGCGCTGGGCCAGGAGGCCGGGCAACCTGGAGGCCACCCTGAACCTCCTGCTGACCAACCGGT
CGCAGAAGATCCCGCCCCAGTACGCGCTGAGCACCGAGGAGGAGCGCATCCTGCGCTACGTGCAGCAGAGCGTGGGGCTGTT
CCTGATGCAGGAGGGGGCCACGCCAGCGCCGCGCTCGACATGACCGCGCGCAACATGGAGCCCAGCATGTACGCTCGCAAC
CGCCCGTTCATCAATAAGCTGATGGACTACTTGATCGGGCGGCCCATGAACCTCGGACTACTTTACCAACGCCATCTTGAAC
CCGCACTGGCTCCCGCCGCCGGGTTCTACACGGGCGAGTACGACATGCCCGACCCCAACGACGGGTTCTGTGGGACGACG
TGGACAGCAGCGTGTCTCGCCGCGCCCGCCACCACCGTGTGGAAGAAAGAGGGCGGGGACCGCGGCCGTCTCGGCGC
TGTCGGTTCGCGCGGGTGTGCGCGCGCGGTGCTGAGGCCGCCAGCCCTTCCCGAGCCTGCCCTTTCTGCTGAACAGCGTG
CGCAGCAGCGAGCTGGGTGGGTGACGCGGCCGCGCTGCTGGGCGAGGAGGAGTACCTGAACGACTCCTGTTGAGGCC
GAGCGCGAGAAGAACTTCCCAATAACGGGATAGAGAGCCTGGTGGACAAGATGAGCCGCTGGAAGACGTACGCGCACGAG
CACAGGGACGAGCCCCGAGCTAGCAGCAGCGCAGGCACCCGTAGACGCCAGCGACACGACAGGCAGCGGGGTCTGGTGTGG
GACGATGAGGATTCGCCGACGACAGCAGCGTGTGGACTTGGGTGGGAGTGGTGGTGGTAACCCGTTCTGCTACTTGCGCC
CCCGTATCGGGCGCCTGATGTAAGAATCTGAAAAATAAAAAACGGTACTACCAAGGCCATGGCGACCAGCGTGCGTTCTTC
TCTGTTGTTGTAGTAGTATGATGAGGCGCGTGTACCCGAGGGTCTCTCTCCTCGTACGAGAGCGTGATGCAGCAGGCGGT
GGCGGGCGGATGCAGCCCCCGCTGGAGGCGCCTTACGTGCCCGCGGTTACCTGGCGCTACGGAGGGGCGGAACAGCAT
TCGTTACTCGGAGCTGGCACCTTGTACGATACACCCGGTGTACCTGGTGGACAACAAGTCGGCGGACATCGCTCGCTGA
ACTACCAGAACGACCACAGCAACTTCTGACCACCGTGGTGCAGAACAACGATTTACCCCCACGAGGCCAGCACCCAGACC
ATCAACTTTGACGAGCGCTCGCGGTGGGGCGGCCAGCTGAAAACCATCATGCACACCAACATGCCAACGTGAACGAGTTCAT
GTACAGCAACAAGTTCAAGGCGCGGTGATGGTCTCGCGCAAGACCCCAATGGGGTTCGCGGTGGATGAGAATTATGATGGT
AGTCAGGACGAGCTGACTTACGAGTGGGTGGAGTTTGAAGCTGCCGAGGGCAACTTCTCGGTGACCATGACCATCGATCTGA
TGAACAACGCCATCATCGACAATACTTGGCGGTGGGGCGTCAGAACGGGGTGTGGAGAGCGACATCGGCGTGAAGTTCTG
ACACGCGCAACTTCCGGCTGGGCTGGGACCCGTGACCGAGCTGGTGTGCGGGCGTGTACACCAACGAGGCCTTCCACCC
CGACATCGTCTGCTGCCCGGTGCGGCGTGGACTTACCGAGAGCCGCTCAGCAACCTGCTGGGCATCCGCAAGCGGCAG
CCCTTCCAGGAGGGCTTCCAGATCCTGTACGAGGACCTGGAGGGGGGCAACATCCCCGCGCTCTTGGATGTGGAAGCCTATGA
GAAAAGCAAGGAGGAGGCCGCGCAGCGGCGACCGCAGCGTGGCCACCGCCTTACCGAGGTGCGGGGCGATAATTTTGC
TAGCGCCGCGCAGTGGCCGAGGCGGTGAAACCGAAAGTAAGATAGTCATCCAGCCGGTGGAGAAGGACAGCAAGGACA
GGAGCTACAACGTGCTCGCGGACAAGAAAAACACCGCTACCGCAGCTGGTACCTGGCCTACAACTACGGCGACCCGAGAA
GGGCGTGCCTCTGGACGTGCTCACCACTCGGACGTACCTGCGGCGTGGAGCAAGTCTACTGGTCTGCTGCCGACATGA
TGCAAGACCCGGTACCTTCCGCTCCACGCGTCAAGTTAGCAACTACCCGGTGGTGGGCGCGAGTCTGCCCCGTCTACTCCA
AGAGCTTCTTCAACGAGCAGGCCGTCTACTCGCAGCAGCTGCGCGCCTTCACTCGCTCACGCACGTCTTCAACCGCTTCCCCG
AGAACCAGATCCTCGTCCGCCCGCCGCGCCACCATACCACCGTCAGTGAACAGTTCTGCTCTCACAGATCACGGGACCC
TGCCGCTGCGCAGCAGTATCCGGGGAGTCCAGCGCGTGACCGTCACTGACGCCAGACGCCGCACTGCCCTACGTCTACAAG

Fig. 27E

GCCCTGGGCGTAGTCGCGCCGCGCGTCTCTCGAGCCGCACCTTCTAAAAAATGTCCATTCTCATCTCGCCAGTAATAACACC
GGTTGGGGCCTGCGCGCGCCAGCAAGATGTACGGAGGCGCTCGCCAACGCTCCACGCAACACCCCGTGC GCGTGCGCGGGC
ACTTCGCGCTCCCTGGGGCGCCCTCAAGGGCCGCGTGCGCTCGCGCACCACCGTCGACGACGTGATCGACCAGGTGGTGGC
CGACGCGCAACTACACGCCCCGCGCGCGCCGCTCCACCGTGACGCGCTCATCGACAGCGTGGTGGCCGATGCGCGC
CGGTACGCCCCGCGCAAGAGCCGCGCGCGGCGCATCGCCGCGCGGACCCGAGCACCCCGCCATGCGCGCGGCGCGAGCC
TTGCTGCGCAGGGCCAGGCGCACGGGACGACGGGCCATGCTCAGGGCGGCGAGACGCGCGGCTCCGGCAGCAGCAGCGCC
GGCAGGACCCGAGACGCGCGGCCACGGCGCGGCGCGGCCATCGCCAGCATGTCCCGCCGCGGCGCGGCAACGTGTAC
TGGGTGCGCGACGCGGCCACCGGTGTGCGCGTGCCCGTGCGCACCCGCCCCCTCGCACTTGAAGATGCTGACTTCGCGATGT
TGATGTGTCCAGCGGCGAGGAGGATGTCAAGCGCAAATACAAGGAAGAGATGCTCCAGGTCATCGCGCTGAGATCTACG
GCCCCGCGGTGAAGGAGGAAAGAAAGCCCCGAAACTGAAGCGGGTCAAAAAGGACAAAAAGGAGGAGGAAGATGTGGAC
GGACTGGTGGAGTTTGTGCGCGAGTTCGCCCCCGGCGGCGCGTGAGTGCGCGGGCGGAAAGTGAAACCGGTGCTGCGG
CCCGGCACACGGTGGTCTTACGCCCCGCGAGCGTTCGGGCTCCGCTCCAAGCGCTCTACGACGAGGTGTACGGGGACG
AGGACATCCTCGAGCAGGCGGTGAGCGTCTGGGCGAGTTTGCTTACGGCAAGCGCAGCCGCCCCGCGCCCTTGAAAGAGGA
GGCGGTGTCCATCCCGCTGGACCACGGCAACCCACGCCGAGCTGAAGCCGGTGACCTGCAGCAGGTGCTGCCGAGCGCG
GCGCCGCGCGGGGCTTCAAGCGCGAGGGCGGCGAGGATCTGTACCCGACCATGCAGCTGATGGTGCCCAAGCGCCAGAAG
CTGGAGGACGTGCTGGAGCACATGAAGGTGGACCCCGAGGTGCAGCCGAGGTCAAGGTGCGGCCCATCAAGCAGGTGGCC
CCGGGCTGGGCGTGACACCGTGGACATCAAGATCCCCACGGAGCCCATGGAAACGCAGACCGAGCCCGTGAAGCCACGC
ACCAGCACCATGGAGGTGCAGACGGATCCCTGGATGCCGGCGCGGCTTCCACCACTCGCCGAAGACGCAAGTACGGCGCGG
CCAGCCTGCTGATGCCAACTACGCGTGCATCTTCCATCATCCCCACGCCGGCTACCGCGGCACGCGTTCTACCGCGGCT
ACACCAGCAGCCGCCGAAGACCACCCGCGCGCGCTGCTGCGACCCGCGCAGCAGCACCGCGACTTCCGCCCGCGCC
CTGGTGCGGAGAGTGATCCGACGCGGGCGGAGCCTTGACCCTGCCGCGCGCGCTACCACCCGAGCATCGCCATTTAACT
CTGCCGTGCGCTCTACTTGAGATATGGCCCTCACATGCCGCTCCGCTCCCCATTACGGGCTACCGAGGAAGAAAGCCGC
GCCGTAGAAGGCTGACGGGGAACGGGCTGCGTCCCATCACACCGCGCGGCGCGCCATCAGCAAGCGGTTGGGGGGA
GGTTCTGCCCCGCTGATCCCCATCATCGCCGCGGCGATCGGGGCGATCCCCGGCATAGTTCCGTGGCGGTGCAGGCCTC
TCAGCGCCACTGAGACACAGCTTGAAAAATTTGTAATAAAAAAATGGACTGACGCTCTGGTCTGTGATGTGTGTTTTAGAT
GGAAGACATCAATTTTCTGCTCCCTGGCACC GCGACACGGCAGCGCGCGCTTATGGGCACCTGGAGCGACATCGGCAACAGCC
AACTGAACGGGGGCGCCTCAATTGGAGCAGTCTTGAGCGGGCTTAAGAATTTGGGTCCACGCTCAAAACCTATGGCAAC
AAGGCGTGGAACAGCAGCACAGGGCAGGCGCTGAGGGAAAAGCTGAAAGAGCAGAACTTCCAGCAGAAAGGTGGTCGATGG
CCTGGCCTCGGGCATCAACGGGGTGGTGGACCTGGCCAACAGGCGCTGCAGAAAACAGATCAACAGCCGCTGGACGCGGTC
CCGCCCCGCGGGTCCGTGGAGATGCCCCAGGTGGAGGAGGAGTGCTCCCTGGACAAGCGCGGCGACAAGCGACCGCGT
CCCGACGCGGAGGAGACGCTGCTGACGCACACGGACGAGCCGCCCCGTACGAGGAGGCGGTGAAACTGGGTCTGCCACC
ACGCGGCCGCTGGCGCTCTGGCCACCGGGTGTGAAACCCAGCAGCAGCAGCCAGCCGCGACCTGGACTTGCCTCCGC
CTGCTTCCGCCCCCTCCACAGTGCTAAGCCCTGCCGCGGTGGCGTGCCTGCGCGCGCCCCCGAGGCCGCCCCCAGGCG
AACTGGCAGAGCACTCTGAACAGCATCGTGGTCTGGGAGTGACAGTGTGAAGCGCGCGCTGCTATTAAGACACTGT
AGCGCTTAACCTGCTGTGTGTATGTATGTCCGCCGACCAGAAGGAGGAAGAGGCGCTGCGCGAGTTGCAAGATG
GCCACCCCATCGATGCTGCCCCAGTGGGCGTACATGCACATCGCCGACAGGACGCTTCGGAGTACCTGAGTCCGGGTCTGGT
GCAGTTGCCCCGCGCCACAGACACTTCACTGCTGGGGAACAAGTTAGGAACCCACGGTGGCGCCACGCACGATGTGA
CCACCGACCGCAGCCAGCGGCTGACGCTGCGCTTGTGCCGTGGACCGCGAGGACAACACCTACTCGTACAAAGTGCGCTAC
ACGCTGGCCGTGGGCGACAACCGCGTGTGGACATGGCCAGCACCTACTTTGACATCCGCGCGTGTGGATCGGGGGCCCA
GCTTCAAACCTACTCCGGCACCGCCTACAACAGCCTGGCTCCCAAGGGAGCGCCCAACACTTGCCAGTGGACATATAAGCT
GGTGATACTGATACAGAAAAACCTATACATATGGAATGCACCTGTGCAAGGCATTAGCATTACAAAGGATGGTATTCAACT
TGAAACTGACAGCGATGGTCAGGCAATCTATGCAGACGAACTTATCAACCAGAGCCTCAAGTGGGTGATGCTGAATGGCAT
GACATCACTGGTACTGATGAAAAATATGGAGGCAGAGCTCTTAAGCCTGACACCAAATGAAGCCTTGCTATGGTTCTTTGCC
AAGCTACCAATAAAGAGGAGGCCAGGCAAATGTGAAAACCGAAACAGGCGGTACCAAAGAATATGACATTGACATGGCAT
TCTTCGATAATCGAAGTGACGTGCCGCCGCGCTAGCCCCAGAAATTGTTTGTATACTGAGAATGTGGATCTGGAACTCCAG
ATACCCATATTGTATACAAGGCAGGTACAGATGACAGTAGCTCTTCTATCAATTTGGGTGAGCAGTCCATGCCAACAGACCCA
ACTACATTGGCTTCAGAGACAACCTTATCGGTCTGATGTACTACAACAGCACTGGCAATATGGGTGTAAGTGGTGGACAGGCC
TCCAGCTGAATGCTGTGGTGGACTTGACAGACAGAAACACCGAACTGTCTACCAGCTCTGCTTGACTCTGCGGTGACAG
AACCAGGTATTTCACTATGTGGAATCAGGCGGTGGACAGTTATGACCCGATGTGCGCATTATTGAAAATCACGGTGTGGAG
GATGAACTTCTAACTATTGCTTCCCCCTGGATGCTGTGGGTAGAACTGATACTTACCAGGGAATTAAGGCCAATGGTGATAAT
CAAACCACTGGACCAAAGATGATACTGTTAATGATGCTAATGAATTGGGCAAGGGCAATCCTTTCGCCATGGAGATCAACAT

Fig. 27F

CCAGGCCAACCTGTGGCGGAACTTCCTCTACGCGAACGTGGCGCTGTACCTGCCCCACTCCTACAAGTACACGCCGGCCAACA
TCACGCTGCCACCAACACCAACACCTACGATTACATGAACGGCCGCGTGGTGGCGCCCTCGCTGGTGGACGCTACATCAAC
ATCGGGGCGCGCTGGTCGCTGGACCCCATGGACAACGTCAACCCCTTAACCACCACCGCAACGCGGGCCTGCGATACCGCTC
CATGCTCCTGGGCAACGGGCGCTACGTGCCCTTCCACATCCAGGTGCCCCAAAAGTTTTTCGCCATCAAGAGCCTCCTGCTCCT
GCCCGGTCTACACCTACGAGTGGAACTTCCGCAAGGACGTCAACATGATCTGCAGAGCTCCCTCGGCAACGACCTGCGCA
CGGACGGGGCCTCCATCGCCTTACCAGCATCAACCTCTACGCCACCTTCTCCCCATGGCGCACAACACCGCCTCCACGCTCG
AGGCCATGCTGCGCAACGACACCAACGACCAGTCTTCAACGACTACCTCTCGGCGGCCAACATGCTCTACCCCATCCCGGCCA
ACGCCACCAACGTGCCATCTCCATCCCCTCGCGCAACTGGGCGCGCTTCCGCGGTGGTCTTACGCGCCTCAAGACCCGCG
AGACGCCCTCGCTCGGCTCCGGTTGACCCCTACTTCGTCTACTCGGGTCCATCCCCTACCTCGACGGCACCTTCTACCTCAA
CCACACCTTCAAGAAGGTCTCCATCACCTTCGACTCCTCCGTAGCTGGCCCGGCAACGACCGCCTCCTGACGCCAACGAGTT
CGAAATCAAGCGCACCGTCGACGGAGAGGGGTACAACGTGGCCAGTGCAACATGACCAAGGACTGGTTCCTGGTCCAGATG
CTGGCCCACTACAACATCGGCTACCAAGGCTTCTACGTGCCGAGGGTACAAGGACCGCATGTACTCCTTCTCCGCAACTTC
CAGCCCATGAGCCGCCAGGTCTGGACGAGGTCAACTACAAGGACTACCAGGCCGTACCCCTGGCCTACCAGCACAACAACTC
GGGCTTCGTGCGCTACCTCGCGCCACCATGCGCCAGGGCCAGCCCTACCCCGCAACTACCCCTACCCGCTCATCGGCAAGA
GCGCGCTCGCCAGCGTCACCCAGAAAAAGTTCCTCTGCGACCGGGTCTGTGGCGCATCCCCTTCTCCAGCAACTTCATGTCCA
TGGGCGCGCTACCGACCTCGGCCAGAACATGCTCTACGCCAACTCCGCCACGCGCTAGACATGAATTTGAAAGTCGACCCC
ATGGATGAGTCCACCTTCTCTATGTTGTCTTGAAGTCTTCGACGTCTCGAGTGCACAGCCCCACCGCGGCTCATCGAG
GCCGTCTACCTGCGCACGCCCTTCTCGGCCGGCAACGCCACCACCTAAGCCTCTTGCTTCTTGAAGATGACGGCCTGCGCGGG
CTCCGGCGAGCAGGAGCTCAGGGCATCTCCGCGACCTGGGCTGCGGGCCCTGCTTCTGGGCACCTTCGACAAGCGCTTCC
CGGGATTCTAGGCCCCGACAAGCTGGCTGCGCCATCGTCAACACGGCCGGCCGAGACCGGGGGCGAGCACTGGCTGG
CCTTCGCTGGAACCCGCGCTCCACACCTGTACTCTTCGACCCCTTCGGGTTCTCGGACGAGCGCCTCAAGCAGATCTACC
AGTTGAGTACGAGGGCCTGCTGCTGCGAGCGCCTGGCCACCGAGGACCGCTGCGTCACCCTGAAAAGTCCACCCAGAC
CGTGACGGGTCCGCGCTCGGCCGCTGCGGGCTTCTGCTGCATGTTCTGACGCCTTCGTGCACTGGCCCCACCGCCCCAT
GGACAAGAACCCACCATGAACTTGCTGACGGGGGTGCCAACGGCATGCTCCAGTGCAGCCAGGTGGAACCCACCTGCGC
CGCAACCAGGAGGCGCTCTACCGCTTCTCAACGCCCACTCCGCTACTTTCGCTCCACCGCGCGCATCGAGAAGGCCACC
GCCTTCGACCGCATGAATCAAGACATGTAATCCGGTGTGTGTATGTGAATGCTTTATTCATCATAATAAACAGCACATGTTTAT
GCCACCTTCTCTGAGGCTCTGACTTTATTTAGAAATCGAAGGGTTCTGCGGGCTCTCGGCATGGCCCGCGGGCAGGGATACG
TTGCGGAACTGGTACTTGGGCAGCCACTTGAACTCGGGGATCAGCAGCTTCGGCACGGGGAGGTGCGGGGAACGAGTCGCTCC
ACAGCTTGCAGTGAAGTTCAGGGGCGCCAGAGGTGCGGCGCGGAGATCTTGAAATCGCAGTTGGGACCCGCGTTCTGCGC
GCGAGAGTTACGGTACACGGGGTTGACGCACTGGAACACCATCAGGGCCGGGTGCTTACGCTCGCCAGCACCGTCGCGTCG
GTGATGCCCTCCACGTCCAGATCCTCGGCGTTGGCCATCCGAAGGGGGTCTGCTTGCAGGTCTGCCGCCCATGCTGGGCAC
GCAGCCGGGCTTGTGGTTGCAATCGCAGTGCAGGGGGATCAGCATCATCTGGGCTGCTCGGAGCTCATGCCGGGTACATG
GCCTTCATGAAAGCTCCAGTGGCGGAAGGCTGCTGCGCTTGGCGCCCTCGGTGAAGAAGACCCCGCAGGACTTGCTAGA
GAACTGGTTGGTGGCGCAGCCAGCGTCTGACGACGAGCGCGCGTCTGTTGGCCAGCTGCACCAGCTGCGCCCCCAG
CGGTTCTGGGTGATCTTGGCCCGGTGCGGGTTCTCCTTCAGCGCGCGTCCCCGTTCTCGCTCGCCACATCCATCTCGATCGTG
TGCTCCTTCTGGATCATCACGGTCCCGTGCAGGACCCGAGCTTGCCTCGGCCTCGGTGCACCCGTGCAGCCACAGCGCGCA
GCCGGTGTCTCCAGTCTTGTGGGCGATCTGGGAGTGCAGTGCACGAAGCCCTGCAGGAAGCGGCCCATCATCGTGGTC
AGGGTCTTGTGCTGGTGAAGGTACGCGGAATGCCGCGGTGCTCCTCGTTACATACAGGTGGCAGATACGGCGGTACACCTC
GCCCTGCTCGGGCATCAGCTGGAAGGCGGACTTCAGGTGCTCTCCACGCGGTACCGGTCCATCAGCAGCGTCATCACTTCCA
TGCCCTTCTCCAGGCCGAAACGATCGGCAGGCTCAGGGGGTCTTACCGTTGTCTAGTCGCGCGCCGCCGAAGTCAGG
GGGTGTTCTGCTCAGGGTCTCAAACTCGCTTGCCGTCTTCTCGGTGATGCGCACGGGGGGAAAGCTGAAGCCACGGC
CGCCAGCTCCTCCTCGGCCTGCCTTTCGTCTCGCTGTCTGGCTGATGTCTTGAAAGGCACATGCTTGGTCTTGGGGGTTTC
TTTTTGGGCGGCGAGAGGCGGCGGAGACGTGCTGGGCGAGCGGAGTTCTCGCTCACCAGACTATTTCTTCTCTTGGCC
GTCGTCCGAGACCACGCGCGGTAGGCATGCCTTCTGGGGCAGAGGCGGAGGCGACGGGCTCTCGCGGTTGGCGGGCG
GCTGGCAGAGCCCCCTCCGCGTTCGGGGTGCCTCTGGCGCGCTGCTCTGACTGACTTCTCCGCGCGCGGCCATTGTGT
TCTCTAGGGAGCAAGCATGGAGACTCAGCCATCGTCGCAACATCGCCATCTGCCCCCGCGCGCGGACGAGAACCAGCAG
CAGCAGAATGAAAGCTTAACCGCCCCGCCGCCAGCCCCACCTCCGACGCCGAGCCCCAGACATGCAAGAGATGGAGGAAT
CCATCGAGATTGACCTGGGCTACGTGACGCCCCGCGAGACGAGGAGGAGTGGCAGCGCGCTTTTCAGCCCCGGAAGAGA
ACCACCAAGAGCAGCCAGAGCAGGAAGCAGAGAGCGAGCAGAACCAGGCTGGGCTCGAGCATGGCGACTACCTGAGCGGG
GCAGAGGACGTGCTCATCAAGCATCTGGCCCGCAATGCATCATCGTCAAGGACGCGCTGCTGACCGCGCGGAGGTGCCCT
CAGCGTGCGGAGCTCAGCCGCGCTACGAGCGCAACCTTCTCGCGCGCGTGCCCCCAAGCGCCAGCCCAACGGCACCT

Fig. 27G

GCGAGCCCAACCCGCGCCTCAACTTCTACCCGGTCTTCGCGGTGCCCGAGGCCCTGGCCACCTACCACCTCTTTTTCAAGAACC
AAAGGATCCCCGTCTCTGCGCGCCAACCCGACCCGCGCGACGCCCTGCTCAACCTGGGCCCCGGCGCCCGCTACCTGAT
ATCGCCTCCTTGAAGAGGTTCCCAAGATCTTCGAGGGTCTGGGACGCGACGAGACTCGGGCCGCGAACGCTCTGCAAGGAA
GCGGAGAGGAGCATGAGCACCACAGCGCCTGGTGGAGTTGGAAGGCGACAACGCGCGCTGGCGGTCTCAAGCGCACGG
TCGAGCTGACCCACTTCGCTACCCGGCGCTCAACCTGCCCCCAAGGTCTGAGCGCGTCTGAGGACAGGTGCTCATCAAG
CGCGCTCGCCCTCTCGGAGGAGGAGATGCAGGACCCCGAGAGCTCGGACGAGGGCAAGCCCGTGGTCAGCGACGAGCAG
CTGGCGCGCTGGCTGGGAGCGAGTAGCACCCCCAGAGCCTGGAAGAGCGGCGCAAGCTCATGATGGCCGTGGTCTGGTG
ACCGTGGAGCTGGAGTGTCTGCGCCGCTTCTTCGCGACGCGGAGACCCCTGCGCAAGGTGAGGAGAACCTGCACTACCTCT
CAGACACGGGTTCTGTCGCCAGGCCTGCAAGATCTCCAACGTGGAGCTGACCAACCTGGTCTCTACATGGGCATCTGCACG
AGAACCGCCTGGGGCAGAACGTGTGACACCACCTGCGCGGGGAGGCCCGCGCGACTACATCCGCGACTGCGTCTACCT
GTACCTCTGCCACACCTGGCAGACGGGCATGGGCGTGTGGCAGCAGTGCTGGAGGAGCAGAACCTGAAAGAGCTCTGCAA
GCTCTGCAGAAGAACCTCAAGGCCCTGTGGACCGGGTTCGACGAGCGCACACCAGCCGCGGACCTGGCCGACCTCATCTTCC
CCGAGCGCCTGCGGCTGACGCTGCGCAACGGGTGCCCGACTTATGAGCCAAAGCATGTTGCAAACTTTGCTCTTTTATCC
TCGAACGCTCCGGGATCTGCCCCGACCTGCTCCGCGCTGCCCTCGGACTTCGTGCGCTGACCTTCGCGAGTGCCCCCGC
CGCTCTGGAGCCACTGCTACCTGCTGCGCCTGGCCAACTACCTGGCTACCACTCGGACGTGATCGAGGACGTGACGCGGCGAG
GGCCTGCTCGAGTGCCACTGCCGCTGCAACCTCTGCACGCCGACCGCTCCCTGGCCTGCAACCCCCAGCTGCTGAGCGAGAC
CCAGATCATCGGCACCTTCGAGTTGCAAGGCCCGGCGAGGGCAAGGGGGGTCTGAAACTACCCCGGGGTGTGGACCTCG
GCCTACTTGCGCAAGTTCTGTGCCGAGGACTACCATCCCTTCGAGATCAGGTTCTACGAGGACCAATCCAGCCGCCCCAAGGC
CGAGTGTGCGCCTGCGTCATCACCCAGGGGGCCATCCTGGCCCAATTGCAAGCCATCCAGAAATCCCGCCAAGAATTTCTGC
TGAAAAAGGGCCACGGGGTCTACTTGACCCCCAGACCGGAGAGGAGCTCAACCCAGCTTCCCCAGGATGCCCGAGGAA
GCAGCAAGAAGCTGAAAGTGGAGTGCCGCCGCCGCGGAGGATTGGAGGAAGACTGGGAGAGCAGTCAGGCAGAGGAG
GAGGAGATGGAAGACTGGGACAGCACTCAGGCAGAGGAGGACAGCCTGCAAGACAGTCTGGAGGAGGAAGACGAGGTGG
AGGAGGCAGAGGAAGAAGCAGCCGCCGACCGTCTGCTCTCGGCGGAGGAGGAGAAAGCAAGCAGCACGGATACCATC
TCCGCTCCGGGTGCGGGTTCGCGCGCGGCCGGCCACAGTAGATGGGACGAGACCGGGCGCTTCCGAACCCACCACCAGA
CCGGTAAGAAGGAGCGGCAGGGATACAAGTCTGGCGGGGGCACAAAAACGCCATCGTCTCTGCTTGAAGCCTGCGGGG
GCAACATCTCCTTACCCGGCGCTACCTGCTCTTCCACCGCGGGGTGAATTTCCCCGCAACATCTTGCACTTACTACCGTCACT
CCACAGCCCCCTACTACTGTTTCAAGAAGAGGCAGAAACCCAGCAGCAGCAGCAGCAGCAAAAACAGCGGCAGCAGCTAG
AAAATCCACAGCGGCGGCAGGTGGACTGAGGATCGCGGCGAACGAGCCGGCGCAGACCCGGGAGCTGAGGAACCGGATCTT
TCCACCCCTCTATGCCATCTTCCAGCAGAGTGGGGGCAAGAGCAGGAAGTCAAGAACCCTTCTCTGCGCTCGCTCA
CCCGCAGTTGTCTGTATCACAAGAGCGAAGACCAACTTCAGCGCACTCTCGAGGACGCCGAGGCTCTCTTCAACAAGTACTGC
GCGCTCACTCTTAAAGAGTAGCCCGCGCCCGCCACACACGGAAAAAGGCGGGAATTACGTACCACCTGCGCCCTTCGCCCCG
ACCATCATATGAGCAAAGAGATTCCACGCCTTACATGTGGAGCTACCAGCCCCAGATGGGCTGGCCGCCGCGCGCCGCA
GGACTACTCCACCCGATGAAGTGGCTCAGTGCCGGGCCCGCATGATCTCACGGGTGAATGACATCCGCGCCACCCGAAACC
AGATACTCTAGAACAGTCAGCGATCACCGCCACGCCCGCCATCACCTTAATCCGCGTAATTGGCCCGCCGCCCTGGTGTACC
AGGAAATTTCCAGCCACGACCGTACTACTTCCGCGAGACGCCAGGCGGAAGTCCAGCTGACTAACTCAGGTGTCCAGCTG
GCCGGCGGCGCCGCCCTGTGTCTGTCACCGCCCCGCTCAGGGTATAAAGCGGCTGGTGTATCCGAGGCAGAGGCACACAGCTCA
ACGACGAGGTGGTGAGCTCTTCGCTGGGTCTGCGACCTGACGGAGTCTTCCAACCTCGCCGATCGGGGAGATCTTCTTCACG
CCTCGTCAGGCCGTCTGACTTTGGAGAGTTCGTCTCGCAGCCCCGCTCGGGTGGCATCGGCACTTCCAGTTCTGTGGAGGA
GTTCACTCCCTCGGTCTACTTCAACCCCTTCTCCGGCTCCCCGGCCACTACCCGGACGAGTTCATCCCGAATTCGACGCCATC
AGCGAGTCGGTGGACGGCTACGATTGAATGTCCCATGGTGGCGCGGCTGACCTAGCTCGGCTTCGACACCTGGACCACTGCC
GCCGCTTCGCTGCTTCGCTCGGGATCTCGCCGAGTTTGCCTACTTTGAGCTGCCCCGAGGAGCACCTCAGGGCCCCGGCCAC
GGAGTGGGATCGTCTGCAAGGGGGTCTCGACTCCACCTGCTTCGGATCTTCAGCCAGCGTCCGATCCTGGCCGAGCGCG
AGCAAGGACAGACCTTCTGACCCTGTACTGCATCTGCAACCACCCGCGCTGCATGAAAGTCTTTGTTGTCTGCTGTGTACTG
AGTATAATAAAAGTGAGATCAGCGACTACTCCGACTTCGTGTGTTCTGCTATCAACCAGTCCCTGTTCTTACCAGGGAAC
GAGACCGAGCTCCAGTCCAGTGAAGCCCCACAAGAAGTACCTCACCTGGCTGTTCCAGGGCTCTCGATCGCCGTTGTCAA
CCACTGCGACAACGACGGAGTCTGCTGAGCGGCCCTGCCAACCTTACTTTTTCCACCCGAGAAGCAAGTCCAGCTCTTCCA
ACCCTTCTCCCCGGGACCTATCAGTGCGTCTCGGGACCTGCCATCACACCTTCCACCTGATCCGAATACCACAGCGTCGCTC
CCCCTACTAAACAACTACCCACCAACGCCACCGTTCGCGACCGCGGACATGTACAGAGCTCGAGAAGTACTAGGCCACA
ATACATGCCCATATTAGACTATGAGGCCGAGCCACAGCGACCATGCTCCCCGCTATTAGTTACTTCAATCTAACCGGCGGAGA
TGACTGACCCACTGGCCAACAACAACGTCAACGACCTTCTCCTGGACATGGACGGCCGCGCCTCGGAGCAGCGACTCGCCAA
CTTCGATTCGCCAGCAGCAGGAGAGAGCCGTCAAGGAGCTGCAGGACGGCATAGCCATCCACCAAGTGAAGAAAGGCATCT

Fig. 27H

TCTGCCTGGTGAAACAGGCCAAGATCTCTACGAGGTACCCCGACCGACCATCGCCTCTCTACGAGCTCCTGCAGCAGCGCC
AGAAGTTCACCTGCCTGGTCGGAGTCAACCCCATCGTCATACCCAGCAGTCGGGCGATACCAAGGGGTGCATCCACTGCTCC
TGCGACTCCCCGACTGCGTCCACACTCTGATCAAGACCCTCTGCGGCCCTCCGCGACCTCCTCCCATGAACTAATCACCCCTT
ATCCAGTGAAATAAATATCATATTGATGATGATTTAAATAAAAAATAATCATTTGATTTGAAATAAAGATACAATCATATTGATG
ATTTGAGTTTTAAAAATAAAGAATCACTTACTTGAAATCTGATACCAGGTCTCTGTCCATGTTTTCTGCCAACACCACCTCACTC
CCCTCTTCCAGCTCTGGTACTGCAGACCCCGCGGGCTGCAAACTTCTCCACACGCTGAAGGGGATGTCAAATTCCTCCTGT
CCCTCAATCTTCATTTTATCTTCTATCAGATGTCCAAAAAGCGCTCCGGGTGGATGATGACTTCGACCCCGTCTACCCCTACGA
TGAGACAACGCACCGACCGTGCCCTTCATCAACCCCCCTTCGTCTCTTCAGATGGATTCCAAGAGAAGCCCCCTGGGGGTGCT
GTCCCTGCGACTGGCTGACCCCGTCACCAACAAGACGGGGAAATCACCTCAAGCTGGGAGAGGGGGTGGACCTCGACTCC
TCGGGAAAACTCATCTCCAACACGGCCACCAAGGCCGCCGCCCTCTCAGTTTTTCCAACAACACCATTTCCCTAACATGGATA
CCCCTCTTTATACCAAAGATGGAAAATTATCCTTACAAGTTTCTCCACCGTTAAACATATTAATAACACCATTTCTGAACACATTA
GCTGTAGCTTATGGATCAGGTTTAGGACTGAGTGGTGGCACTGCTCTTGCAGTACAGTTGGCCTCTCCACTCACTTTTGATGAA
AAAGGAAATATTAATAAATTAACCTAGCCAGTGGTCCATTAAACAGTTGATGCAAGTCGACTTAGTATCAACTGCAAAAGAGGGGT
CACTGTCACTACCTCAGGAGATGCAATTGAAAGCAACATAAGCTGGCCTAAAGGTATAAGATTGAAGGTAATGGCATAGCTG
CAAACATTGGCAGAGGATTGGAATTTGGAACCACTAGTACAGAGACTGATGTCACAGATGCATACCAATTCAAGTTAAATTG
GGTACTGGCCTTACCTTTGACAGTACAGGCGCCATTGTTGCTTGAACAAAGAGGATGATAAACTTACATTATGGACCACAGC
CGACCCCTCGCCAAATTGCAAAATATACTTGAAAAAGATGCCAACTCACACTTTGCTTGACAAAGTGGAAGTCAAATCT
GGGTACTGTGACTGTATTGGCAGTGAATAATGGAAGTCTCAACCAATCACAAACACAGTAAGCACTGCACTCGTCTCCCTCAA
GTTTGATGCAAGTGGAGTTTGGTAAGCAGCTCCACATTAGACAAAGAATATTGGAACCTCAGAAAGGGAGATGTTACACCTG
CTGAGCCCTATACTAATGCTATAGGTTTTATGCTAACATAAAGGCCTATCTAAAAACACATCTGCAGCTTCAAAAGCCATAT
TGTCAGTCAAGTTTATCTCAATGGGGATGAGGCCAAACCACTGATGCTGATTATTACTTTTAAATGAAACTGAGGATGCAACTTG
CACCTACAGTATCACTTTTCAATGGAATGGGATAGTACTAAGTACACAGGTGAAACACTTGCTACCAAGCTCCTTCACCTTCTCC
TACATCGCCCAAGAATGAACACTGTATCCACCTGCATGCCAACCTTCCACCCCACTCTGTCTATGGAAAAAATCTGAAGC
ACAAAATAAAATAAAGTTCAAGTGTATTATTGATTCAACAGTTTACAGGATTGAGCAGTTATTTTTCTCCACCTCCCAGGA
CATGGAATACACCACCTCTCCCCCGCACAGCCTTGAACATCTGAATGCCATTGGTGATGGACATGCTTTTGGTCTCCACGTTT
CACACAGTTTCAGAGCGAGCCAGTCTCGGGTGGTCCAGGAGATGAAACCTCCGGGCACTCCCGCATCTGCACCTCACAGCT
CAACAGCTGAGGATTGCTCGGTGGTCCGGATCACGGTTATCTGGAAGAAGCAGAAGAGCGGGTGGGAATCATAGTCC
GCGAACGGGATCGGCCGGTGGTGTGCGATCAGGCCCGCACAGCATCGCTGCCCGCGCGCTCCGTCAAGCTGCTGTCTCAGGG
GGTCCGGGTCCAGGACTCCCTCAGCATGATGCCACGGCCCTCAGCATCAGTCTGGTGGCGGGCGCAGCAGCGCAT
GCGGATCTCGTCAAGTCTGCTGAGTACGTGCAACACAGGACCACAGGTTGTTCAACAGTCCATAGTTCAACACGCTCCAGC
CGAAACTCATCGCGGGAAGGATGCTACCCACGTGGCGTCTGACCAGATCCTCAGGTAAATCAAGTGGCGCTCCCTCCAGAAC
ACGCTGCCACGTACATGATCTCCTTGGGCATGTGGCGTTTACCACCTCCCGGTACCACATCACCTCTGGTTGAACATGCAG
CCCCGGATGATCTGCGGAACCACAGGGCCAGACCGCCCCGCCCGCCATGCAGCGAAGAGACCCCGGTCCCGGCAATGGC
AATGGAGGACCCACCGCTCGTACCCGTGGATCATCTGGGAGCTGAACAAGTCTATGTTGGCACAGCACAGGCATATGCTCATG
CATCTCTTCAGCACTCTCAGCTCCTCGGGGTCAAACCATATCCAGGGCACGGGAACTCTTGCAAGGACAGCGAACCCCGC
AGAACAGGGCAATCCTCGCACATAACTTACATTGTGCATGGACAGGGTATCGCAATCAGGCAGCACCGGGTGATCTCCACCA
GAGAAGCGCGGTCTCGGTCTCTCACAGCGTGGAAGGGGGCGGCCGATACGGGTGATGGCGGGACGCGGTGATCGTG
TTCGCGACCGTGTGATGATGCAGTTGCTTTCGGACATTTTCGTACTTGCTGTAGCAGAACCTGGTCCGGGCGTGCACACCGAT
CGCCGGCGGCGGTCCCGCGCTTGAACGCTCGGTGTTGAAATTGAAAAACAGCCACTCTCTCAGACCGTGCAGCAGATCTAG
GGCCTCAGGAGTGAAGATCCCATCATGCCTGATAGCTCTGATCAGTACGACACCGTGGAAATGGGCCAGACCCAGCCAGA
TGATGCAATTTTGTGGTTTGGTGACGGCGGGGAGGAAGAACAGGAACCATGATTAAATTTTAAATCCAAACGGTC
TCGGCACTTTCAAATAAGGTGCGGAGATGGCACTCTCGCCCCGCTGTGTTGGTGGAAATAACAGCCAGTCAAG
GTGATACGGTTCTCGAGATGTTCCACGGTGGCTTCCAGCAAAGCTCCACGCGCATCCAGAAACAAGACAATAGCGAAAGC
GGGAGGGTTCTCTAATTCCTCAATCATCATGTTACACTCTGCACCATCCCCAGATAATTTTCAATTTTCCAGCCTTGAATGATTC
GAACTAGTTCCTGAGGTAAATCCAAGCCAGCCATGATAAAGAGCTCGCGCAGAGCGCCCTCCACCGGCATTCTTAAGCACACC
CTCATAATTCAGATATTTCTGCTCTGGTTACCTGCAGCAGATTGACAAGCGGAATATCAAAATCTCTGCCGCGATCCCTAA
GCTCTCCCTCAGCAATAACTGTAAGTACTCTTCATATCTCTCGAAATTTTATGCCATAGGACCACAGGAATAAGATTAGG
GCAAGCCACAGTACAGATAAACCGAAGTCTCCCCAGTGAGCATTGCCAAATGCAAGACTGCTATAAGCATGCTGGCTAGACC
CGGTGATATCTTCAGATAACTGGACAGAAAATCACCCAGGCAATTTTAAAGAAAATCAACAAAAGAAAAATCTCCAGGTGC
ACGTTTAGAGCCTCGGGAACAACGATGAAGTAAATGCAAGCGGTGCGTTCCAGCATGGTTAGTTAGCTGATCTGTAAAAACA
AAAAATAAAACATTAACCATGCTAGCCTGGCGAACAGGTGGGTAAATCGTTCTCTCCAGCACACAGGCAGGCCACGGGGTCTC
CGGCGCGACCTCGTAAAAATTGTCGCTATGATTGAAAACCATCACAGAGAGACGTTCCCGGTGGCCGGCGTGAATGATTGCA
CAAGATGAATACACCCCGGAACATTGGCGTCCGCGAGTGAAAAAAGCGCCGAGGAAGCAATAAGGCACTACAATGCTCA
GTCTCAAGTCCAGCAAAGCGATGCCATGCGGATGAAGCACAAAATCCTCAGGTGCGTACAAAATGTAATTACTCCCTCTGC
ACAGGCAGCGAAGCCCCCGATCCCTCCAGATACACATACAAAAGCCTCAGCTCCATAGCTTACCGAGCAGCAGCACACAACAG
CGCAAGAGTCAGAGAAAGGCTGAGCTCTAACCTGTCCACCCGCTCTGCTCAATATATAGCCAGATCTACACTGACGTAA
AGGCCAAAGTCTAAAAATACCCGCCAAATAATCACACACGCCCAGCACACGCCCAGAAACCGGTGACACACTCAAAAAATAC
GCGCACTTCTCAAACGCCCAAAGTCCGCTATTTCCGGGTTCCACGCTACGTCATCGGAATTCGACTTTCAAATTCGTCGAC
CGTAAAAACGTACCCGCCCCGCCCTAACGGTCCGCGTCTCTCGGCAATCACCTTCTCCCTCCCAAAATCAAACAGCTC
ATTTGCATATTAACGCGCACCAAAAGTTTGAGGTATATTATTGATGATG

Fig. 27I

AdC7 010-DU422gp160(E1623) Amino acids – SEQ ID NO: 16**The symbol “ * ” refers herein to stop codons in the non coding regions**

HHQ*YTSNFWCALICK*AV*IWGGRKVIGRETGDR*GRGG*RFDDVAVRRSRFASSRGKSDVKRGVV*TRKYSIFPRSLTGNEVFLG
 GCK*KRAIFARKLNEEVKI*VISRLWQGGVFAEGRVDFDLRGGFDIRIFHLNFRVRCQSPVFLRTISFPRKCHLTVTITVLR*RKLRS
 DPLWCTLSTICSDAA*LSQYLLPACVLEVAE*CASKI*ATTRQGLTDNCMKNLLRVRRFALLRDVARYTR*H*LLTSMPTSTPIDVND
 GKWPAWHYAQYMTLWDFPTWQYIYVLVIAITMVMRFWQYINGRG*RFDSRGFSPSLHPIDVNGSLFWHQNRDFFPKCRNNSAP
 LTQMGGRRVRWEVYISRARLVNRQITRSFIADVHS*IANAVSASDTSVSNLRFEDATMRVRGIPRNWPQWWIWGILGFWMIIC
 RVVGNLDLWVTVYGVVWKEAKTTLFCASDAKAYDKEVHNWATHACVPTDNPQEIENVNTENFMWKNDMVDQMHED
 IISLWDQSLKPCVKLTPLCVTLNCKNVNISANANATATLNSSMNGEIKNCSENTTTELDRDKQKVYALFYKPDVPLNGGEHNETGEY
 ILINCNSSTITQACPKVSFDPPIPIHYCAPAGYAILKCNKTFNGTGPCNNVSTVQCTHGIKPVVSTQLLNGSLAEIIIIVRSENLTNNIKT
 IIVHLNKSVEIKCTRPNNNTRKSVRIGPGQTFYATGEIIGDIREAHCNISRETWNSTLIQVKEKLEHYNKTIKFEPSSGGDLEVTTHSFN
 CRGEFFYCDTTKLFNETKLFNESEYVDNKTIILCRIKQIINMWQEVGRAMYAPPIEGNITCKSNITGLLLTWDGGENSTEGVFRPGG
 GNMKDNWRSELYKYKVEIKPLGVAPTCKSRKVVGREKRAVGLGAVLLGLGAAGSTMGAASITLVQARQLLSGIVQQSNLLRA
 IEAQQLHLLQTLVWGIKQLQTRVLAIERYLKQQLLGLWGCSGLICATAVPWNSSWSNKSGLDIWDNMTWMQWDREISNYNTNTI
 FRLLDSQNNQKEKNEKDLLALDSWKNLWNWFDITNWLWYIKIFIMIVGGIGLRIIFGVLAIVKRVRGYSPLSFQTLIPNPRGPDRL
 GRIEEEGGEQDKDRSIRLVSGFLALAWDDLRLSLCLFSYHQLRDFILTAARAAELLGRSSLRGLQRGWEVLKYLGNLVQYWGLELKRS
 AILFDITIAIAVAEGTDRIIEVIQRICRAIRYIPTRIRQGFEAALL*GTSRVDPGGQTADQPRCLLVASHLLFAPPPCLP*PWKVPLPLSFPN
 KMRKLHRIV*VGILFWGVGWGRTARGRIGKTIAGMLGMRWALWLLRRKEPADLQI*IHLCRVRRKR**NGIMGIMGLH**IGQI
 SICWPPCM*PRTPARHGPSSSTTS*PDAMCTWGPAEACSCPTSATCNL*RCCWSPMPCPE*A*RGCLT*MWSCGKF*DMMNPR
 PGAGPANAEASTPGFSPCVWR*RTCDPIIWCCPATGRSSAPAGKNLTRVSSVWGRWRACMRGRMTKICVFLCVA***AEAPPL
 REGYSALI*RGVSPPGRECVRM*WDPRTWAGPCSPRTLQP*PTRP*APRPWTQLPPQLLLPPPAPCAEWPAWATTALWWPTRL
 PPIPPA*TRRSSCC*WPSSRP*PSAWAS*PSRWLSCRRRRRGPRLPR*KPNKK*INK*TETVDFNTES*IFI*FFARGRPWTTGLDH*
 APGGFFPGPGRGGLGC*GTWA*ARPGGGGSSAGPRARGWCCKSPSHSRGAGRGAAARCP*GGD*WPRAPWCRC*RTC*AGR
 DACGR*DASWPGS*DWRCRDPAGGSCCAGPPARCIRRTWGICHATWKGRRIEWRPCDRPGFPCTHP**WRWARGRRP
 GQRRFGGRTHRSCGPG*ARHRPF**IWGGGCPTGGRRCPRSRGRSCPRRSASPRP*ARRGGSCPPAGR*KKRFPGRGR*AGPKAG
 SGAAGTCRSRWGR*PR*PAAGGS*GRDSCRPRGGGPPRSSRAHACSARVPPGGARPPARGALAAARSFSA**XRRPWAF
 WRGSVARVPDGPARR*CALGHLDPADLLSVRGATAGVGHQAMGVQRGQGPVLPQSQGPQRGLRHGEGVRAGLGACEGAL
 QAHPAGREPLPVGALRVGQVAIEHEFVVERLGRVALGAELTFGSVSADGTEEGLEGVELGGEEDGLGGVGVRAAAGADGLALHEP
 GEVGPVGVKNEVSSVLDAFLTSLGHELVSLPGDKEAVRVPVDRLYGPVLERGA AVLVEEPRPLRDEGPGPGQHEGGHVGGVAV
 VVHQRVHLLQGMQAHVPLVHIQEGDWLVSVGHVTGGPGRGGIKGGGPLLVTVFRIAVQERQLLG*VFPLEGWHNLGTQVVSF*
 KRGGFDIDGAVGDAFHEPLVHLVRKDDLFFVELGGEGAVEGVGEELGDGAHGLVFLVVGALLGGDELHVLAHALPFGEDGGELV
 GHDSPPAAVVQGDEVHAGGHAAQGLVGPAEAPALARAEGGQVRVQHELVGGVGVHGEDAGQKLGVEVADAGVQIVQRRPLV
 AHGQRALVGAEGRAPGHGVRERGGVHAADVVDVEGLLEDADVGGVAAPPADAGAHVVVQLVRGREEPRAEVGALRLFGAVDD
 LAEDGVGVGGDGGPLEDEVGVGQADRVPEDEVGVVLQGLDELGGDEDVQGA VVEGLLDDVLELALLLPQLAVEKELFAVLVPL
 FEGEPVLIGTVRAHHVELVDGLVGAAALLHGEVSLCGLAQGGVGEGEVVAHHDLEELVLEEVVAAALLPELEVRALLVGGVGQS
 ESNIVEEDLARAGHEVASDAERLGHLPVDDDLGGEDDLVEAVDVVPDDVEFHESRAALNVGQLELVVGGELGGAEPVLLGEPVG
 DVGVAEEGSPEIHGQGLQAVPVLTELLAHGHFFGGDAVEGAGVAVPAVPLEGEVVGELDERRVPGEFHDQHEGDELLAEGP
 HPGVGFHIVGEEEPFGARMRADGEELDLLPVGGMADVMEVEMPTARRALVLFIQASAVLATLHGMHVLHLYLGSFDEEFQ
 WAVERWRLHLVLYYLAIGVAIVCLDGGHADEPAREAGPDFGSDGSESEDEGAQAGAVQGPETLSQVSGQRRRAVDLQELFQG
 AREVQMVLDLHGAVGGDVHGLQGPVPLGRHHRAPFLGRCFHAGQKRRRGRAPGGRRGSGPGRGGRGTSAPRAGRFWYCAR
 RRLA*ATTRRLTSWI*RLWVKATGPVSLNLKESSTESISVSLTAACRRISCTSPELSW*AISVMNCSSISS*RSRPARSTVAARSLEMR
 PMSCEKAFMPASFQTRL*TTAPSGSRARMTTWARLSSTWRVKTA*LQRRW*R*LSVVAMCSVTKKYMIQRRSGISLTSRASKRS
 MAS*KSTAKLKNWELRAETVNSSRRRMSSAMVARTSRKAPGGSSSSISSTNISSTSSSGGGGGGALRRRRRTGRRSMKRSM
 VSPRRRRMVSVTARPSRGRSVKTPPRISRWPGGSPLGREALTMLHINWPVGTPRKDLVSRSTGSENR*TKASSQSQSQGRLS
 PVSCSSGISGGGRAMLLVMKLK*AVLRRRMVARSTRSLGPACWMRRRSAMPQAWS*HLARSL**SCMSRSTGTSSSPARPCMRV
 SPNPRWGWTSARSATTSARMACCIWVRVWVKSSKSTKRW*APVLMV*EQLAMTDQLTVWWPGRTSSWYLRE*ARVSKM*
 SLQVRTRYWYPTKCGGGWR*SGHRSVAGAPGARSSSMRRW*P*MYLDIQVMPAAVVEARGNSRTRFQMLRSGRK*FMVAAV
 WPVRAAQSWML*TYGQKRKRSARLRGLEAKRTGWAARVPRFESRIRLEPQLTWYWSRLDPSLLTKPPGYGGGSSFFGLGRWS*
 KTSKRGRPPAMARCRLSEKESPLRCGVPRFEPQRSAPAGFRG*RGRGCPVVSCTP*PADFSSYGASPSFSCVFARCIPIYCGRCAPT
 LHLNRPYRRSSSNSRRFCPRPSSSQPLRRPP*AEPAFSMTWPWKARGWRGWGRRRRSGTRACR*KGTLARPTCPSRTCSETGA

Fig. 27J

ARSPRRCAPPASTRGGSCGAAWTESGC*GTRISRRTS*RGSA PRARTWPRPTWSRRTSRP*RRRATSKNPSTTTTCAR*SRARR*PW
 A*CTCGTCWRPSCRTPRASR*RRSCFWWCSTVGTTTTRSGRR*ISPSRAAGSWTW*TFCRASWCRSAGCRCPRSWRLSTSRC*A
 WASTTLGRSTRPRTCP*TRR*RSTGFTCA*P*KC*P*ATIWGCTATTGCTAR*APAAGAS*ATRS*CTACSGP*PGPGPRGRATLTW
 ARTCAGSPAAGPWKLPAVPPTWRRWTMRRRRASTWKTDGATVFLDDAATAS*SRDAGGAAEPAVRH*LLGRDPGHATHHG
 ADDPQSRSL*TAASGPALGHPGGRGALALEPHAREGAGHRERAGGEQGHPRRRRGRAGVQRAAGARGPLQQHQRADEPGPHG
 DRRARGGVAARAVPPRVEPLHGGAERLPEHAARQRAPGPGGLHQLHQRAAADGGRGAPERGVVPGAGLLLPDQSPGLADREP
 EPGFQELAGTVGRAGPGRGPRDGVPEADAELAPAAAAGGALHGQRQREPRVPLPA*PVPRGHRAGARGRADLPGDHPREPR
 AGPGGPGQPGGHPPELADQPAEDPAPVRAEHRGGAHPALRAAERGAVPDAGGGHAQRRARHDAQHGAQHVSQPPVHQ*
 ADGLLASGGRHELGLLYQRHLEPALAPAARVLHGRVRHARPQRRVPVGRRGQQRVLAAPRHHRVEERGRGPAAVLGAVRSRGCC
 RGG*GRQPLPEPALFAEQRAQQRAGSADAAAPAGRGVPERLLVEARARELPQ*RDREPGGQDEPLEDVRARAQGRAPS*QQ
 RRHP*TPATRQAAGSGVGR*GFRRRQQRVGLGWEWW*PVRSLAPPYRAPDVRI*KNKKRYSRPRWPACVLLCCL**YDEARV
 PGGSSSLVRERDAAGGGGGDAAPAGGALRAPAVPGAYGGAEQHSLLGAGTLVRYHPVVPGGQQVGGHRLAELPERPQQLPDHR
 GAEQRFHPHGGQHPDHQL*RALAVGRPAENHHAHQHAQRERVHVQQVQAGDGLAQDPQWGRGG*EL*W*SGRADLRV
 GGV*AARGQLLDHHRSDERHHRQLLGGGASERGAGERHRRERVHAQLPAGLGRDRAGDAGRVRHQRGLPPRHRPAARLR
 RGLHREPPQQPAGHPQAAALPGGLPDPVRGPGGGQHPRALGCRSL*EKQGGRRSGDRSRGHRLYRGAGR*FC*RRGSGRGG*
 NRK*DSHPAGGEGQQQELQARAGQEKHRLPQLVPLQLRRPREGRALLDAAHHLGRHLRRGASLLVAARHDARPGHLLPHASS
 *QLPGGGRRAPARLLQELLQAGRLAAARLHLAHLARLQPLPREDPDPPPARAHYHRQ*KRSCSHRSRDPAAAQQYQGPSPARD
 RH*RQTPHLRLQGPGRSRAARPLEPHLLKNVHSHLAQ**HRLGPARAQDVRRRSPTLHATPRARARALPRSLGRPQGPRAAH
 HRRRRDRPGGGRRALHARRRRLHRRRRHRQGGRCAPVRPRQEPAAAHRAAPEHPRHARGASLAAQGAHGTQGHQAQ
 GQTRGLRQQRRQDPQTRGHGGGGGHRQHVPAAARQVRLGARRRHRCARARAHPPPSHLKMLTSRC*CVPAARRMSKRKYKE
 EMLQVIAPEIYPAYKEERKPRKLKRVKKDKKEEDVDGLVEFVREFAPRRRVQWRGRKVKPVLPGTTVVFTPGERSGSASKRSYD
 EYVGDEDILEQAVERLGEFAYGKRSRPAPLKEEAVSIPLDHGNPTSLKPVTLQQLPSAAPRRGFKREGGEDLYPTMQLMVPKRQK
 LEDVLEHMKVDPEVQPEVKVRPIKVAPGLGVQTVDIKIPTEPMETQTEPVKSTSTMEVQTDPMWPAPASTTRRRRKYGAASLL
 MPNYALHPSIIPTPGYRGRTRFYRGYTSSRRKTTTTRRRRRRTRRSSTATSAAALVRRVYRSGREPLTLPRARYHPSIAI*LCRRLLLADMA
 LTCRLRPITGYRGRKPRRRRLTGNGLRHHHRRRRRAISKRLGGGFLPALIPIIAAIGAIPGIASVAVQASQRH*DTAWKICNKKMD*
 RSWSCDVCF*MEDINFSSLAPRHGTRPFMTGWSIDGNSQLNGGAFNWSSLSGLKNFGSTLKTYGNKAWNSSTGQALREKLEQ
 NFQQKVVDGLASGINGVVDLANQAVQKQINSRLDAVPPAGSVEMPQVEELPLDKRGDKRPRPDAETLLTHTDEPPPYEEAVKL
 GLPTTRPVAPLATGVLKPSSSSQPATLDLPPASRPSTVAKPLPPVAVASRAPRGRPQANWQSTLNSIVGLGVQSVKRRRCY*KTL*R
 LTCLSVVICMSADQKEEARRRVARWPPHRCPCSGRTCTSPDRTLST*VRVWCSSPAPQTPTSVWGTSLGTPTWRPRTM*PPTA
 ASG*RCASCPTWARTTPTRTKCATRWPWATTACWTWPAPTLSAACWIGGPASNPTPAPPTAWLPRERPTLASGHILKVLILQKK
 PIHMEMHLCKALALQRMVFNLELTAMVRQSMQTKLINQSLKWMMLNGMTSLVLMKNMEAEELSLTPK*SLAMVLLPSLPKKEAR
 QM*KPKQAVPKNMTLTWHSIIEVQLPPA*PQKLFCLRMWIKLQIPILYTRQVQMTVALLSIWVSSPCPTDPTTLASETTLV*CT
 TTALAIWVYWLDRPPS*MLWWTCRTETPNCPTSSCLTLWVTEPGISVCGIRRWTVMTPMCALKITVWRMNLFTIASPWMLWVE
 LILTRLRPMVIKPPGPKMILLMMLMNWARAILSPWRSTSRTCGGTSSTRTWRTCTPTPTSTRPTSRCPTPTPTIT*TAAWWR
 PRWWTPTSTSGRAGRWPWTSTSTTTATRACTAPCSWATGATCPTSRCPKSFSPSRASCSCPGPTPTSGTSARTST*SCRAPS
 ATTCARTGPPSPASTSTPPSPWRTPPPRSRCCATTPTTSPSTTSRRPTCSTPSRPTPTCPSPSRATGPPSAAGPSRASRPAR
 RPRSAPGSTPTSSTRAPSTSTAPSTSTPSRRSPSTPPSAGPATTAS*RPTSSKSSAPSTERGTTWPSAT*PRTGSWSRCWPTTTS
 ATRASTCPRATRTACTPSSATSSP*AARSWTRSTTRTRPSWPSTSTTRASSATSRPPCARASPTPTTPTRSSARAPSPASPRKSS
 ATGSCGASPSPATSCPWARSPTSARTCSTPTPPTT*ISKSTPWMSPPFMSMLSSKSSSTSECTSPTAASSRPSTCARPSRPATPPKPL
 ASCKMTACAGSGEQLRAILRDLGCGPCFLGTFDKRFPGFMAPHKLACAIVNTAGRETGGEHWLAFAWNPRSHTCYLFDPFGFSD
 ERLKQIYQFEYEGLLRRSALATEDRCVTLEKSTQTVQGPRSAACGLFCCMFLHAFVHWPDRPMDKNPTMNLTLGVPNGMLQSPQV
 EPTLRRNQEALYRFLNAHSAYFRSHRARIEKATAFDRMNQDM*SGVCM*MLYSS**TAHVYATFSEALTFLRNRGRSAGSRHGPR
 GIRCGTGTWAAT*TRGSAASARGGRGTSRSTACA*VAGRPAGRARRS*NRSWDPRESARESYGTRGCSTGTPSGPGASRSPAPSRR
 *CPRPDPRRWPSRRGSSCRSAAPCWARSACGCNRSAGGSASSGPARRSSCPGTWPS*KPPAGGRPAAPCRPR*RRPRRTC*RTG
 WWRSQRRARSSARRCWPAAPRCAPSGSG*SWPGRGSPSARAARSRPHPSRSCAPSGSSRSRAGTAACPRPRCTRAATARSRCSP
 SSCGRSGSASARSPAGSGPSSWSGCCW*RSAECRGA PRSHTGGRYGGTPRPARASAGRRTSGRSPRGTPSAASSLPCPSRPRKR
 SAGSGGSSPLSS*SPPKSGGSRPGSQTACRPSR*CARGES*SPRPPAPRPAFRPRCPG*CLAKAHAWSCGVSWAAEAAAETC
 WASASSRSPRLFLLLGRRPRPRGGRHASSGAEEATGSRGSAGGWQSPFRVRGCAPGGAALTDFLGRPLCSPREQAWRLSHRRQ
 HRHLPPPPPTRTSSRMKA*PPRRPAPPPTPQPQTCKRWRNPSRLTWAT*RPRSTRRSWQRAFAQPRKRTTKSSQSRKQASRTRL
 GSSMATT*AGQRTCSSIWPANASSRTRCSTAPRCPSAWRSSAAPTATSSRRACPPSASPTAPASPTRASTSTRSSRCPRPWPTT
 SFSRTKGSPSPAAPTAPPTPCSTWAPAPAYLISPPWKRFPRSSRVWAATRLGPRTLCKEERSMSTTAPWWSWKATTRAWRSS

Fig. 27K

ARSS*PTSPTRRSTCPPRS*APSWTRCSSAPRPSRRRCRTPRARTRASPWSATSSWRAGWERVAPPRAWKSGASS*WPWSW*
PWSWSVCAASSPTRRPCARSRRCTTSSDTGSCARPARSPTWS*PTWSPTWASCTRTAWGRTCTTPCAGRPAATTSATASTCTS
ATPGRRRAWACGSSAWRSRT*KSSASSCRRTSRPCGPGSTSAPPPRTWPTSSSPSACG*RCATGCPTL*AKACCKTFALSSSNAPGSC
PPPAPRCPRTSCR*PSASAPRRSGATATCCAWPTTWPTTRT*SRTSAARACSSATAAATSARRTAPWPATPSC*ARPRSSAPSSCKA
PARARGV*NSPRGCGPRPTCASSCPRTTIPSRSGSTRTNPSRPRPSCRPASSPRGPSWPNCCKPSRNPAPKNFC*KRATGSTWTPRPER
SSTPASPRMPRGSSKKLVLPPEDELEEDWESSQAEEMEDWDSTQAEEDSLQDSLEEEDEVEEAEAAAAARPSSSAEEKAS
STDTISAPGRGRGGRASRWDETRFPNPTTQTGKKERQGYKSWRGHKNAIVSCLQACGGNISFTRRYLLFHRGVNFPRNHLHYR
HLHSPYYCFQEEAETQQQQQQKTSGSS*KIHSGGRWTEDRGERAGADPGAEEDLSHPLCHLPAESGARAGTESQEPFSALAH
QLSVSQERRPTSASHRGRRGSLQQVLAHS*RVARARPHTEKGGNYVTTCALRPTIIMSKEIPTYMWSYQPMGLAAGAAQDYS
TRMNWLSAGPAMISRVDIRAHNRNILLEQSAITATPRHHLNPRNWPAALVYQEIPQPTTVLLPRDAQAEVQLTNSGVQLAGGAA
LCRHRPAQGKRLVIRGRGTQLNDEVSSSLGLRPDGVFQLAGSGRSSFTPRQAVLTLESSSSQPRSGGIGTLQFVEEFTPSVYFNPF
GSPGHYPDEFIPNFDASESVDGYD*MSHGGAADLARLRHLDHCRFRFCFARDLAEFAYFELPEEHPOGPAHGVRIVVEGGLDHLL
RIFSQRPIAEREQGQTLTLYCICNHPGLHESLCLCTEYNKS*DQRLRTSVCSYQPVVHLHRERDRAPAPV*APQEVPHLAVPG
LSDRRQCPLRQRSPAERPCQPYFFHPQKQAPALPTLPRLDSVRLGTLPSHLPPDPEYHSVAPRY*QPNYPPTPPSRPRTCTELEKY*
ATIHAIHRL*GRATATHAPRY*LLQSNRRR*LTHWPTTSTTFSWTWTAAPRSSDSPNFASFSSRREPSRSCRTA*PSTSARKASSAW
*NRPRSPTRSPRTIASPTSSCSSARSSPAWSESTPSSSPSSRAIPRGASTAPATPPTASTL*SRPSAASATSSP*TNHPLIQ*NKYHIDD
DLNKK*SFDLK*RYNHIDDLSEFKK*RITYLKSDTRLSMFSANTTSLPSSQLWYCRPRRAANFLHTLKGMSSNSCPSIFILSIRCPKSAS
GWMMTSTPSTPTMQTTHRCPSSSTPPSSLQMDSKRSPWGCCPCDWLTSPSPRTGKSPSSWERGWTSTPRENSSPTRPPRPPPLS
VFPTTFFPLTWIPLFIPKMEYNYKFLHR*TY*NQPF*TH*L*LMDQV*D*VVALLQYSWPLHSLMKKEILKLT*PVVH*QLMQVD
LVSTAKEGSLSLPQEMQLKAT*AGLKV*DLKVMA*LQTLAEDWNLEPLVQRLMSQMHTQFKLNWVLALPLTVQAPLLGLTKRMIN
LHYGPQPTPRQIAKYTLKKMPNSHFA*QSVEVKFWVL*LYWQ*IMEVSTQSQTQ*ALHSSPSSLMQVEFC*AAPH*TKNIGTSERE
MLHLLSPILML*VLCLT*RPILKTHLQLQKAILS VKFISMGMRPNH*C*LLLLMKLRMQLAPT VSLFNGNGIVLSTQVKHLLPAPSPSP
SPKNEHCIPPCMPTLPTPLCLWKKL*STK*NKVQVY*FNSFTGFEQLFFLHPRTWNTPPSPPAQ*P*TSECHW*WTCFWSPRSTQ
FQSEPVSGRSGR*NPPGTPASAPHSSTAEDCPRWGSRLSGRSRAAVGIIVRERDRPVVSHQAPQQLPPLRQAAAQGV RVQGL
PQHDAHGPQHQS SGAAGAAAHADLAQVA AVRATQDHQV VQQSIVQHAPAETHRGKDATHVAVVPDPQVNQVALPPEHAAHV
HDLLGHVAVHHLVPVHPLVEHAAPDDPAEPQGQHRPARHAAKRPRVPAMAMEDPPLVPVDHLGAEQVYVGTAQAYAHASLQ
HSQLLGGQNHIPGHGELLQDSEPRRTGQSSHITYIVHGQGIARQHRVILHQRSAGLGLLTAW*GGRPIRMAGRG*SCSRPCHDA
VAFGHFRTCSTWSGRCTPIAGGGPGAWNARC*NCKTATLS DRAADLGPQE**RSHHA**L*SHRPPWNGPDPAR*CNFVGFR
*RRGREEQEEP*LTFNPNGLGALQNEGRGDGTSRPRCVGGK*QPGQR*YGSRDVPRWLPAPKPPRAHPETRQ*RKREGSLIPQSSC
YTPAPSPDNFHFSSLE*FELVPEVNPSQP**RARAERPPPAFLSTPS*FQDILLVHLQQIDKRNIKISAAIPKLLPQQ*L*VLFHILSEIFS
HRTTRNKIRASHSTDKPSSPVSIAKCKTAISMLARPGDIFQITGQKITQAIKKINKRKILQVHV*SLGNNDEVNASGAFQHG*LADL*
KTKNKT LNHASLANRWVNRSLQHQAAGHGVSGATLVKIVAMIENHRET FVAGVNDSTR*IHPRNIGVRE*KKAPEEAI RHYNAS
QVQQSDAMRMKHKILRCVQNVITPLLHRQSRPSRLQIHQSLSVHSLPSSSTQQAQSEK*ALTCPPALCSIYSPDLH*RKQGSLKIP
AK*SHTPSTRPETGDTLKKIRALPQTPKLPSPFGSHATSSEDFQIPSTVKNVTRPAPNGRPSLGQSPSSLPKFKQLICILTRTKSLRYIID
D

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/43315

Box No. 1 Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of a sequence listing:

- a. ☒ forming part of the international application as filed:
 ☒ in the form of an Annex C/ST.25 text file.
 ☐ on paper or in the form of an image file.
- b. ☐ furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
- c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
 ☐ in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 ☐ on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
2. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/43315

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

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

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

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

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

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

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

--continued on first extra sheet--

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-6 limited to gp140 (SEQ ID NOs: 1 and 9)

Remark on Protest

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

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/43315

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(8) - A61K 47/48, A61K 48/00, C07K 14/005 (2017.01)
 CPC - C12N 15/86, C07K 14/005, C12N 7/00

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- A	US 2014/0065105 A1 (THE TRUSTEES OF THE UNIVERSITY OF PENNSYLVANIA) 06 March 2014 (06.03.2014) para [0011]; [0021]; [0025]; [0069]-[0071]; [0078]; [0111]; [0119]-[0121]; [0145]; SEQ ID NO: 5.	1-3 ----- 4-6
A	US 2013/0315871 A1 (THE TRUSTEES OF THE UNIVERSITY OF PENNSYLVANIA) 28 November 2013 (28.11.2013) para [0011]; [0162]; SEQ ID NO: 246.	4-6

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

14 November 2017

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/43315

--continued from Box III: Observations where unity of invention is lacking--

Group I+: Claims 1-6, directed to a composition comprising a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, and a protein expression system comprising the same. The composition will be searched to the extent that the heterologous protein encompasses gp140 (nucleic acid sequence SEQ ID NO: 1 and corresponding amino acid sequence SEQ ID NO: 9). It is believed that claims 1-6 encompass this first named invention, and thus these claims will be searched without fee to the extent that the heterologous protein encompasses gp140 (SEQ ID NOs: 1 and 9). Additional heterologous protein(s) will be searched upon the payment of additional fees. Applicants must specify the claims that encompass any additionally elected heterologous protein(s). Applicants must further indicate, if applicable, the claims which encompass the first named invention, if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched. An exemplary election would be an adenovirus vector for expressing heterologous protein encompassing Gag (nucleic acid SEQ ID NO: 2 and corresponding amino acid sequence SEQ ID NO: 10) (claims 1-6).

Group II+, claims 7-18, directed to a treatment method comprising administering a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7 comprising heterologous protein. Group II+ will be searched upon payment of additional fees. The method may be searched, for example, to the extent that the heterologous protein encompasses gp140 (SEQ ID NO: 1) for an additional fee and election as such. It is believed that claims 7-18 read on this exemplary invention. Additional heterologous protein(s) will be searched upon the payment of additional fees. Applicants must specify the claims that encompass any additionally elected heterologous protein(s). Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched. Another exemplary election would be wherein the heterologous protein encompass Gag (SEQ ID NO: 2) (claims 7-18).

The inventions listed as Group I+ and II+ do not relate to a single special technical feature under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Special technical features

Group I+ has the special technical feature of a composition, that is not required by Group II+.

Group II+ has the special technical feature of eliciting an immune response in a mammal against a heterologous protein comprising administering to the mammal a composition, that is not required by Group I+.

The inventions of Group I+ and II+ each include the special technical feature of a heterologous protein. Each heterologous protein is considered a distinct technical feature.

Shared technical features

The inventions of Group I+ share the common technical feature of a composition comprising a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7, wherein the early gene E1 is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted, and wherein the nucleic acid sequence further comprises a promoter sequence linked to a sequence encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag, wherein the nucleic acid sequence encodes an amino acid sequence, and a protein expression system comprising the composition.

The inventions of Group II+ further share the common technical feature of a method of eliciting an immune response in a mammal against a heterologous protein, the method comprising administering to the mammal said composition.

The inventions of Group II+ further share the common technical feature of treating and/or preventing HIV in a mammal, or vaccinating a mammal against HIV infection.

The inventions of Group II+ further share the common technical feature of administering a second effective amount of the vector at a second, subsequent time period, wherein T memory cells directed against the heterologous protein are reactivated in the mammal, or wherein B memory cells directed against the heterologous protein are reactivated in the mammal.

However, these shared technical features do not represent a contribution over prior art, because the shared technical features are anticipated by reference US 2014/0065105 A1 to The Trustees of the University of Pennsylvania, (hereinafter Univ Pennsylvania).

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/43315

--continued from previous extra sheet--

Univ Pennsylvania teaches a method of treating and/or preventing HIV in a mammal, or vaccinating a mammal against HIV infection (para [0115] "The recombinant simian adenoviruses may also be employed as immunogenic compositions...a humoral (e.g., antibody) or cellular (e.g., a cytotoxic T cell) response is mounted to a transgene product delivered by the immunogenic composition following delivery to a mammal, and preferably a primate"; [0118] "the recombinant adenoviruses are considered to be vaccine compositions useful in preventing infection and/or recurrent disease"), comprising administering a composition comprising a nucleic acid sequence of a chimpanzee-derived adenovirus vector of serotype AdC6 or AdC7 (para [0111] "novel nucleic acid and amino acid sequences from Ad...which were originally isolated from chimpanzee lymph nodes. In several instances throughout the specification, these adenoviruses are alternatively termed herein C5, C6 and C7, respectively"; [0145] "Replication-defective versions of AdC5, AdC6 and AdC7 were created"), wherein the early gene E1 is deleted, the ORF3, ORF4, ORF5, ORF6, and ORF7 from the early gene E3 are deleted (para [0078] "in one exemplary vector, the adenovirus sequence may have deletions of the E1 genes and the E4 gene, or of the E1, E2a and E3 genes, or of the E1 and E3 genes"), and wherein the nucleic acid sequence further comprises a promoter sequence linked to a sequence (para [0069]-[0070] "the vector also includes conventional control elements necessary which are operably linked to the transgene in a manner that permits its transcription...Expression control sequences include...promoter and enhancer sequences") encoding a heterologous protein, wherein the heterologous protein is at least one HIV protein selected from the group consisting of gp140, gp160 and Gag (para [0119] "the vectors of the invention may contain a transgene encoding a peptide, polypeptide or protein which induces an immune response to a selected immunogen. The recombinant adenoviruses of this invention are expected to be highly efficacious at inducing cytolytic T cells and antibodies to the inserted heterologous antigenic protein expressed by the vector"; [0121] "Examples of suitable HIV and SIV antigens include, without limitation the gag, pol, Vif, Vpx, VPR, Env, Tat, Nef, and Rev proteins, as well as various fragments thereof. For example, suitable fragments of the Env protein may include any of its subunits such as the gp120, gp160").

Univ Pennsylvania teaches a method of eliciting an immune response in a mammal against a heterologous protein (para [0115] "The recombinant simian adenoviruses may also be employed as immunogenic compositions...a humoral (e.g., antibody) or cellular (e.g., a cytotoxic T cell) response is mounted to a transgene product delivered by the immunogenic composition following delivery to a mammal, and preferably a primate").

Univ Pennsylvania further teaches administering a second effective amount of the vector at a second, subsequent time period, wherein T memory cells directed against the heterologous protein are reactivated in the mammal, or wherein B memory cells directed against the heterologous protein are reactivated in the mammal (para [0111] "protective regimens include variable regions of antibodies made by B cell lymphomas and variable regions of T cell receptors of T cell lymphomas which, in some embodiments, are also used as target antigens for autoimmune disease"; [0129] "a method of priming and boosting an immune response to a selected antigen by delivering a plasmid DNA vector carrying said antigen, followed by boosting with a recombinant simian adenoviral vector of the invention. In one embodiment, the prime-boost regimen...useful for generating an immune response against HIV").

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

Therefore, Group I+ and II+ inventions lack unity under PCT Rule 13 because they do not share the same or corresponding special technical feature.