

ENGINEERED BLOOD BRAIN BARRIER PENETRANT AAV CAPSIDS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 63/466,598 filed on May 15, 2023 and entitled “Engineered Blood Brain Barrier Penetrant AAV Capsids,” and U.S. Provisional Patent Application No. 63/606,012 filed on December 4, 2023 and entitled, “Engineered Blood Brain Barrier Penetrant AAV Capsids,” the entire contents of each of which are incorporated by reference herein.

FIELD

[0002] This application relates to engineering AAV capsids.

BACKGROUND

[0003] The clinical translation of genomic medicines to treat disorders of the central nervous system (CNS) has been limited by inefficient gene delivery. AAV capsids that cross the blood brain barrier (BBB) in rodents exhibit widespread CNS transduction and efficacy; however, capsids that cross the BBB in non-human primates have been challenging to engineer.

[0004] Attempts at providing AAV capsids with improved properties, e.g., improved tropism to a target cell or tissue upon systemic administration, have met with limited success. As such, there is a need for improved methods of producing AAV capsids and resulting AAV capsids for delivery of genetic material of interest to a target cell or tissue, e.g., a CNS cell or tissue, including delivery across the BBB.

SUMMARY

[0005] In an aspect, CNS-targeting molecules, i.e., targeting peptides, are provided. In another aspect, an engineered AAV capsid protein is provided wherein a peptide sequence is inserted into a parent capsid at a peptide insertion site. In embodiments, the peptide sequence, the parent capsid, and the peptide insertion site are as indicated in a single row of Table 1.

[0006] In an aspect, an adeno-associated virus (AAV) capsid protein is provided comprising, consisting of, or consisting essentially of at least 3, 4, 5, 6, 7, 8, 9, or all contiguous amino acids of any amino acid sequence set forth in any one of SEQ ID NO: 1-1232.

[0007] In embodiments, the amino acid sequence comprises, consists of, or consists essentially of at least 3, 4, 5, 6, 7, 8, 9, or all contiguous amino acids of the amino acid sequence set forth in SEQ ID NO: 71.

[0008] In embodiments, the AAV capsid protein comprises, consists of, or consists essentially of serotype AAV2. In embodiments, the serotype AAV2 comprises, consists of, or consists essentially of a sequence having at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1233. In embodiments, the amino acid sequence is inserted into the AAV2 capsid protein between amino acids 588 and 589. In embodiments, the AAV capsid protein having SEQ ID NO 71 inserted therein comprises, consists of, or consists essentially of a sequence having at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1233. In embodiments, the AAV capsid having SEQ ID NO 71 inserted therein protein comprises, consists of, or consists essentially of the sequence set forth in SEQ ID NO: 1233.

[0009] In embodiments, the AAV capsid protein comprises, consists of, or consists essentially of serotype AAV9. In embodiments, the serotype AAV9 comprises, consists of, or consists essentially of a sequence having at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1234. In embodiments, the amino acid sequence is inserted into the AAV9 capsid protein between amino acids 587 and 590. In embodiments, the AAV capsid protein having SEQ ID NO 71 inserted therein comprises, consists of, or consists essentially of a sequence having at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1235. In embodiments, the AAV capsid having SEQ ID NO 71 inserted therein protein comprises, consists of, or consists essentially of the sequence set forth in SEQ ID NO: 1235.

[0010] In embodiments, the AAV capsid protein comprises, consists of, or consists essentially of an amino acid sequence set forth in any one of SEQ ID NO: 1-1232. In embodiments, the AAV capsid protein comprises, consists of, or consists essentially of an amino acid sequence set forth in SEQ ID NO: 71.

[0011] In embodiments, the AAV capsid protein comprises, consists of, or consists essentially of AAV1, AAV2, AAV3B, AAV5, AAV6, AAV8, AAV9, AAV3, AAV4, AAV7, AAV11,

AAVrh10, AAVrh39, or AAVrh74. In embodiments, the AAV capsid protein comprises, consists of, or consists essentially of AAV2 or AAV9.

[0012] In embodiments, the amino acid sequence is inserted into a surface exposed region of the AAV capsid.

[0013] In an aspect, an AAV capsid protein is provided comprising, consisting of, or consisting essentially of at least 3, 4, 5, 6, 7, 8, 9 or all contiguous amino acids of an amino acid sequence set forth in any of SEQ ID NO: 1-1232, wherein the amino acid sequence is inserted between amino acid positions 450 and 600 of the AAV capsid protein.

[0014] In embodiments, the amino acid sequence is inserted between amino acid positions 588 and 589 of the AAV capsid protein. In embodiments, the AAV capsid protein comprises, consists of, or consists essentially of the sequence set forth in SEQ ID NO: 1233. In embodiments, the amino acid sequence comprises the sequence set forth in SEQ ID NO: 71.

[0015] In embodiments, the amino acid sequence is inserted between amino acid positions 587 and 590 of the AAV capsid protein. In embodiments, the AAV capsid protein comprises consists of, or consists essentially of a sequence having at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1234. In embodiments, the amino acid sequence comprises, consists of, or consists essentially of SEQ ID NO: 71. In embodiments, the AAV capsid protein having SEQ ID NO 71 inserted therein comprises, consists of, or consists essentially of a sequence having at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1235. In embodiments, the AAV capsid protein comprises a sequence having at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1235, and at least 3, 4, 5, 6, 7, 8, 9, or all contiguous amino acids of SEQ ID NO: 71. In embodiments, the AAV capsid protein comprises, consists of, or consists essentially of the sequence set forth in SEQ ID NO: 1235.

[0016] In an aspect, a CNS-targeting molecule is provided comprising, consisting of, or consisting essentially of at least 3, 4, 5, 6, 7, 8, 9, or all contiguous amino acids of an amino acid set forth in any of SEQ ID NO: 1-1232.

[0017] In embodiments, the amino acid sequence comprises, consists of, or consists essentially of at least 3, 4, 5, 6, 7, 8, 9, or all contiguous amino acids of the amino acid sequence set forth

in SEQ ID NO: 71. In embodiments, the amino acid sequence is fused or conjugated to a small molecule, antibody, scFV, ASO, siRNA, lipid, polymer, or recombinant protein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] **FIG. 1** illustrates an example schematic of the barriers and selective pressure to identify AAV variants that exhibited enrichment in CNS tissue.

[0019] **FIG. 2** illustrates examples of SIFTER (Selecting in vivo for transduction and expression of RNA) capsid libraries linked to barcodes. Each capsid is linked to multiple barcodes defined in a look-up table and created by pooled oligo synthesis. Different oligo pool designs allow for multiplexing libraries varying parental capsid identity or mutational strategy. Hundreds to thousands of unique molecular identifiers (UMIs) are cloned per barcode enabling detection of individual transduction events. Barcodes and UMIs are expressed under the control of either a neuron specific human synapsin I or ubiquitous CMV promoter, allowing the read out of capsid performance in multiple cell types.

[0020] **FIG. 3** shows the diversities of the five round 2 sub-libraries (Library A-E) that were multiplexed and cloned under expression of a neuron specific human synapsin 1 (hSyn1) promoter or a ubiquitous CMV promoter. The resulting 10 libraries were administered via intravenous injection, and an endpoint analysis to recover library transcripts was performed.

[0021] **FIG. 4** provides data showing that the production of libraries is relatively uniform with most variants found +/- 32-fold change from the cloned library. As expected, variants that produce well are associated with more UMIs recovered. Bubbles circled in black outlines are variants that were selected for a third-round evaluation from NHP tissue samples. The position of the AAV9 in the library is highlighted.

[0022] **FIGs. 5 and 6.** The library was administered to two cynomolgus macaques and barcodes were recovered from CNS and peripheral tissues to assess biodistribution and expression of the library transcript. **FIG. 5** shows data from *in vitro* induced pluripotent stem cell (iPS) neuron transduction. Overall, the performance of the library *in vitro* is not predictive of the performance *in vivo* as many recovered variants from the NHP samples are less enriched in cultured neurons. **FIG. 6** shows data of *in vivo* library recovery from NHP samples. After filtering out variants that were poorly recovered, a total of 6,728 variants were identified from the human synapsin I library, and 4,005 variants from the CMV library. Based on consistency

in recovery across animals and fold enrichment, 810 variants were selected from the hSyn1 library and 426 variants from the CMV library, for a final evaluation in NHP.

[0023] Bubble Plot Legend for FIGs. 5 and 6. The graphs show the fold-change in variant enrichment normalized to the administered viral library on the y-axis and the coefficient of variation in the detection on the x-axis. The bubble size corresponds to the fraction of replicates the variant was recovered from. The color scale indicates the number of unique molecular identifiers (UMI) associated with each variant. The top graphs are the variants' performance under the control of the neuron specific hSyn1 promoter and the bottom graphs are under the control of the ubiquitous CMV promoter. Bubbled circles in black outlines are variants that were selected for a third-round evaluation from NHP tissue samples.

[0024] FIG. 7. The round 3 library was administered to three cynomolgus macaques and barcodes were recovered from CNS tissues to assess on-target biodistribution and expression of the library transcript. The figure shows the performance of the 1236 variants in the round 3 library evaluation. The log2 fold change (log2FC) in expression of each variant from the hSyn1 and CMV promoters is shown on the y-axis and the coefficient of variation of the log2 fold change measurement is shown on the x-axis. The data represents assessment of whole brain transduction and mRNA expression mediated by each capsid in the library.

[0025] FIG. 8. The figure shows the performance of the 1236 variants in the round 3 library evaluation. The vector genome biodistribution of each variant is shown. The data represents assessment of whole brain transduction mediated by each capsid in the library.

[0026] FIG. 9. The graph shows the log2 fold-change in neuronal (hSyn1) mRNA expression of CNSRCV300 (also referred to as SEQ ID NO: 1235, STAC-BBB, STAC/BBB, or STACBBB) and AAV9 across six brain slices analyzed per animal. The box and whisker plots contains the rest of the round 3 library performance.

[0027] FIG. 10. The graph shows the log2 fold-change in ubiquitous (CMV) mRNA expression of CNSRCV300 and AAV9 across six brain slices analyzed per animal. The box and whisker plots contains the rest of the round 3 library performance.

[0028] FIG. 11. The graph shows the log2 fold-change in vector genome biodistribution of CNSRCV300 and AAV9 across four brain slices analyzed per animal. The box and whisker plots contains the rest of the round 3 library performance.

[0029] FIG. 12. The graph shows the log2 fold-change in mRNA expression and vector genome biodistribution of CNSRCV300 and AAV9 across all animals included in the study. The box and whisker plots contains the rest of the round 3 library performance.

[0030] FIG. 13. The graph shows the log2 fold change in neuronal (hSyn1) mRNA expression of CNSRCV300 and AAV9 in all tissues punches analyzed across the cortex, hippocampal region, deep brain regions, cerebellum and brain stem. The neuronal (hSyn1) mRNA expression in cervical, thoracic and lumbar spinal cord and dorsal root ganglia levels is also shown for CNSRCV300 and AAV9.

[0031] FIG. 14. The graph shows the log2 fold change in ubiquitous (CMV) mRNA expression of CNSRCV300 and AAV9 in all tissues punches analyzed across the cortex, hippocampal region, deep brain regions, cerebellum and brain stem. The ubiquitous (CMV) mRNA expression in cervical, thoracic and lumbar dorsal root ganglia levels is also shown for CNSRCV300 and AAV9. Lastly, peripheral tissues mRNA expression in peripheral tissues is also shown for CNSRCV300 and AAV9.

[0032] FIG. 15. The image shows that CNSRCV300 drives widespread and robust transgene expression throughout the brain at a dose of 2×10^{13} vg/kg. Negative control tissue without AAV treatment shows no signal.

[0033] FIG. 16. The images show that CNSRCV300 exhibits widespread transduction across all cortical regions.

[0034] FIG. 17. The images show that CNSRCV300 mediates efficient transduction of neurons in a variety of cortical and subcortical regions.

[0035] FIG. 18. The images show that CNSRCV300 mediates efficient transduction of neurons in the dentate nucleus.

[0036] **FIG. 19.** The images show that CNSRCV300 mediates efficient transduction of neurons in the Thalamus.

[0037] **FIG. 20.** The images show that CNSRCV300 mediates efficient transduction of neurons in the Putamen.

[0038] **FIG. 21.** The images show that CNSRCV300 mediates efficient transduction of neurons in the substantia nigra.

[0039] **FIG. 22.** The images show that CNSRCV300 mediates efficient transduction of neurons in the lateral geniculate nucleus.

[0040] **FIG. 23.** The images show that CNSRCV300 mediates efficient transduction of neurons in the pons.

[0041] **FIG. 24.** The images show that CNSRCV300 mediates efficient transduction of neurons in the precentral gyrus.

DETAILED DESCRIPTION

[0042] In an aspect, CNS (central nervous system)-targeting molecules, i.e., targeting peptides, are provided. In embodiments, CNS-targeting molecules comprising a targeting peptide sequence indicated in Table 1 are provided. In another aspect, engineered AAV capsid proteins are provided. In embodiments, a targeting peptide is inserted into an AAV capsid, for example an AAV9 capsid protein or an AAV2 capsid protein. In embodiments, the targeting peptide is any of the targeting peptide disclosed in Table 1. In embodiments, the peptide sequence is inserted into the AAV9 or AAV2 capsid at any of the peptide insertion sites disclosed in Table 1. In some embodiments, the targeting peptide comprises a targeting peptide that functions to target the CNS-targeting molecule to a specific target tissue (e.g., CNS tissue).

Libraries of AAV Capsid Proteins

[0043] In one aspect, disclosed herein is the development of libraries encoding AAV capsid proteins with a desired characteristic compared to a natural/wild-type AAV serotype. Thus, described herein are libraries of AAV capsid proteins with a desired characteristic compared to a natural/wild-type AAV serotype. In some embodiments, the desired characteristic is

enhanced cell or tissue tropism as compared to the natural/wild-type AAV serotype, for example, enhanced cell or tissue tropism to the central nervous system (CNS) as compared to the natural/wild-type AAV serotype. In some embodiments, the desired characteristic is increased penetrance through the blood brain barrier following administration to a subject. In some embodiments, the desired characteristic is wider distribution throughout the multiple brain regions, e.g., frontal cortex, sensory cortex, motor cortex, putamen, thalamus, cerebellar cortex, dentate nucleus, caudate, and/or hippocampus. In some embodiments, the desired characteristic is elevated genetic material expression in multiple brain regions. In some embodiments, the desired characteristic is delivery of genetic material of interest to a desired tissue, cell, or organelle.

[0044] In some embodiments, each member of a library comprises one or more of a) a nucleic acid sequence encoding an AAV capsid protein comprising a targeting peptide inserted into a hypervariable and/or surface exposed loop of the capsid protein; b) a nucleic acid sequence encoding barcode; c) one or more nucleic acid sequences encoding one or more promoters; and d) a nucleic acid sequence encoding a unique molecular identifier (UMI). In some embodiments, each member of the library also includes genetic material to be delivered to a cell or tissue of interest. In some embodiments, each member of the library also includes a polyA sequence.

[0045] In some embodiments, the genetic material encodes one or more peptides or a polypeptides. In some embodiments, the genetic material encodes one or more antibodies or antibody fragments. In some embodiments the genetic material encodes one or more regulatory RNA, such as RNAi agents or microRNA.

[0046] In some embodiments, the genetic material can include sequences that are coding sequences. In some embodiments, the genetic material can include sequences that are non-coding sequences. In some embodiments, the genetic material can include sequences that are both coding sequences and non-coding sequences. In some embodiments, the expression of the genetic material is capable of being regulated. In some embodiments, the genetic material comprises elements that are regulatable.

[0047] In some embodiments, mRNA is encoded in the genetic material. In some embodiments, the mRNA is codon optimized.

[0048] In some embodiments, the genetic material encodes a gene therapy product. A gene therapy product can include a peptide, a polypeptide, a recombination donor template, or an RNA molecule that when expressed carries out a desired therapeutic effect. In some embodiments, the therapeutic effect is treating any one more diseases or disorders described herein.

[0049] In some embodiments, each member of the library is fused or coupled to an active agent. In some embodiments, each member of the library is fused or coupled to an active agent through conjugation. In some embodiments, the active agent comprises a therapeutic agent. In some embodiments, the therapeutic agent comprises a DNA-binding and/or targeting composition, for example, a zinc finger protein (ZFP), TAL-effector domain, and/or a sgRNA of CRISPR/Cas system. In some embodiments, the therapeutic agent comprises an antibody or a portion of an antibody (e.g., Fc region). In some embodiments, the peptide is fused to a Fc region of an antibody. In some embodiments, the peptide is fused to the C-terminus of the Fc region. In some embodiments, the peptide is fused to the N-terminus of the Fc region. In some embodiments, the therapeutic agent comprises an RNAi agent (e.g., siRNA, shRNA, lncRNA, piRNA, snoRNA, or miRNA). In some embodiments, the peptide is fused or coupled directly to at least one strand of the RNAi. In some embodiments, the peptide the peptide is fused or coupled to at least one strand of RNAi using a linker. In some embodiments, the peptide is fused or coupled to the sense strand of RNAi. In some embodiments, the peptide is fused or coupled to the antisense strand of RNAi. In some embodiments the active agent comprises a diagnostic agent. In some embodiments, the diagnostic agent comprises a detectable moiety such as a fluorophore. In some embodiments, the active agent is a small molecule.

[0050] In some embodiments, the promoter is operably linked to the genetic material to be delivered to the cell. In some embodiments, the one or more promoters comprises a tissue and/or cell specific promoter. In some embodiments, the one more promoters comprise a ubiquitous promoter. Examples of ubiquitous promoters include cytomegalovirus (CMV), chicken β -actin (CBA), ubiquitin C (UBC), and elongation factor 1 α -subunit (EF1- α), amongst others.

[0051] In some embodiments, the one or more promoters comprise a cell type and/or tissue specific type promoter. Exemplary cell type and/or tissue specific promoters include the human synapsin promoter (hSyn1), only expressed in neurons, or the transthyretin promoter

(TTR), expressed in hepatocytes. Other non-limiting cell type and/or tissue specific promoters for use in the methods and compositions of the invention include cytokeratin 18 and 19 (epithelial cell specific. Other cell-specific promoters include GFAP promoter (astrocytes), TBG promoter (liver), CAMK promoter (skeletal muscle), MYH6 promoter (cardiomyocytes).

[0052] In embodiments, tissue specific or cell specific promoters can restrict expression to tissues or cells of the CNS or PNS. In embodiments, tissue specific or cell specific promoters can be used to restrict expression to neurons of the sympathetic system, the parasympathetic system, astrocytes, microglia, oligodendrocytes, and/or Schwann cells.

[0053] In some embodiments, the one or more promoters are naturally occurring promoters. In some embodiments, the one or more promoters are synthetic. In some embodiments, the one or more promoters is derived from mammals, humans, viruses, or plants. In some embodiments, the one or more promoters is truncated. In some embodiments, the one or more promoters is mutated.

[0054] In some embodiments, a nucleic acid comprising a barcode is added to the genome of each AAV capsid proteins in a library. In some embodiments, the barcode is bioinformatically linked to the targeting peptide introduced into the capsid protein. In some embodiments, the DNA sequences encoding the targeting peptide are synthesized to further comprise a random or specified barcode. The barcode may comprise 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 or more nucleotides. In some embodiments, each targeting peptide is linked to at least 2 distinct barcodes. In some embodiments, each barcode is linked to one or more UMI.

[0055] In some embodiments, each member of the library comprises a nucleic acid comprising more than one barcode sequences. In some embodiments, each member of the library comprises two or more nucleic acids each comprising a barcode sequence. In some embodiments, each member of the library comprises a first nucleic acid comprising a first barcode and a second nucleic acid comprising a second barcode. In some embodiments, the first nucleic acid comprising the first barcode and the second nucleic acid comprising the second barcode are different. In some embodiments, each of the first nucleic acid comprising the first barcode and the second nucleic acid comprising the second barcode is independently operatively linked to a promoter.

[0056] In some embodiments, the AAV capsid proteins are derived from AAV1, AAV2, AAV3B, AAV5, AAV6, AAV8 and AAV9 serotypes. In some embodiments, the AAV variant capsid proteins are derived from less well characterized AAV serotypes, including but not limited to AAV4, AAV7, AAVrh10, AAVrh39, and AAVrh74. In some embodiments, a library of AAV variants comprises AAV variant capsid proteins derived from a single AAV serotype. In some embodiments, a library of AAV variants comprises AAV variant capsid proteins derived from 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or more AAV serotypes. In some embodiments, the AAV variant capsid proteins derived from 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or more AAV serotypes are combined once individual serotype libraries are developed. In some embodiments, combinatorial libraries are generated by modifying nucleic acids encoding AAV capsid proteins from 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or more serotypes in the same pool.

[0057] In some embodiments, the AAV serotype includes the AAV2 serotype. In some embodiments, the AAV2 serotype includes a mutation of arginine to alanine at amino acid position 588. In some embodiments, the AAV2 serotype includes the sequence SEQ ID NO: 1233. In some embodiments, the AAV serotype includes the AAV9 serotype. In some embodiments, AAV9 serotype includes the sequence of SEQ ID NO: 1234.

[0058] In some embodiments, targeting peptides are introduced into a DNA sequence encoding an exposed loop in the capsid protein. In some embodiments, the targeting peptide is inserted into exposed loops (e.g. hypervariable regions) in the AAV capsid. In some embodiments, the targeting peptide comprises 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, or more amino acids. In some embodiments, the targeting peptide comprises between 9 and 16 amino acids. In some embodiments, the targeting peptide is 9 amino acids in length. In some embodiments, the targeting peptide is 16 amino acids in length. In some embodiments, the HI loop is targeted (mutated) while in others, the DE loop is targeted (mutated). In some embodiments, mutations (e.g., insertions, deletions and/or substitutions) are made in both loops. In further embodiments, targeting peptides are introduced into the VR region of a surface loop, including into VR-I, VR-II, VR-III, VR-IV, VR-V, VR-VI, VR-VII, VR-VIII and or VR-IX. In yet other embodiments, targeting peptides are made in VR-I, VR-IV, and or VR-VIII. In some embodiments, targeting peptides are introduced into the AAV capsid proteins VP1, VP2 or VP3, or in two of the capsid proteins in any combination, or in all three. In some embodiments, the targeting peptides are introduced into VP1. In some embodiments, the targeting peptides

are introduced into VP2. In some embodiments, the targeting peptides are introduced into VP3. In some embodiments, the targeting peptides are introduced into VP1 and VP2. In some embodiments, the targeting peptides are introduced into VP1 and VP3. In some embodiments, the mutations are introduced into VP2 and VP3. In some embodiments, the targeting peptides are introduced into VP1, VP2, and VP3. In some embodiments, the targeting peptide is introduced at a single site in a gene encoding a capsid protein.

[0059] In some exemplary embodiments, a targeting peptide is introduced into the variable regions VR-I, VR-IV, or VR-VIII of the capsid protein. In some embodiments, the targeting peptide is introduced at a location between positions 450 and 600 of the capsid protein. In some embodiments, the targeting peptide is inserted between positions 587 and 590 of the capsid protein. In some embodiments, the targeting peptide is inserted between positions 587 and 590 of the AAV9 capsid protein. In some embodiments, the targeting peptide is inserted between positions 588 and 589 of the capsid protein. In some embodiments, position 588 has been altered from an arginine to an alanine. In some embodiments, the targeting peptide is inserted between positions 588 and 589 of the AAV2 capsid protein.

[0060] In some embodiments, the targeting peptide comprises any one of SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises at least 5, 6, 7, 8, or 9 contiguous amino acids of any one of SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises a sequence that is at least 80% identical to any one of SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises a sequence that is at least 80% identical, least 85% identical, at least 90% identical, at least 95%, or at least 99% identical to or comprises any one of SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises SEQ ID NO: 71. In some embodiments, the targeting peptide comprises at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of SEQ ID NO: 71.

Engineered AAV Capsid Proteins

[0061] Development of engineered AAV capsid proteins

[0062] Described are compositions comprising an engineered AAV capsid proteins and methods of making and using the same.

[0063] Disclosed are methods and compositions to develop engineered AAV capsid proteins with a desired characteristic compared to a natural/wild-type AAV serotype. For example,

capsid proteins are useful in delivering peptides (e.g., targeting peptides) across the blood brain barrier following administration to a subject. In some embodiments, the engineered AAV capsid proteins are useful in achieving a wider distribution of the genetic material throughout the multiple brain regions, e.g., frontal cortex, sensory cortex, motor cortex, putamen, thalamus, cerebellar cortex, dentate nucleus, caudate, and/or hippocampus. In some embodiments, the engineered AAV capsid proteins are useful in elevating genetic material expression in multiple brain regions. In some embodiments, the engineered AAV capsid proteins are used to deliver genetic material of interest to a desired tissue, cell, or organelle.

[0064] Gene editing system

[0065] In some embodiments, the genetic material of interest comprises a gene editing system or portions of a gene editing system. In some embodiments, the gene editing system is capable of inducing single or double-stranded breaks into nucleic acid sequences. In some embodiments, the gene editing system is capable of inserting, substituting, or deleting a base or a sequence of bases into nucleic acid sequences. In some embodiments, the gene editing system includes a CRISPR-Cas system. In some embodiments, the gene editing system includes a TALEN. In some embodiments, the gene editing system includes a zinc finger nuclease.

[0066] Engineered AAV capsid proteins within a cell

[0067] In some embodiments, engineered AAV capsid proteins are contained within a cell. In some embodiments, the cell is derived from the CNS. In some embodiments, the cell is derived from the PNS. In some embodiments, the cell is derived from the brain. In some embodiments, the cell is derived from the spinal cord. In some embodiments, the cell is derived from any of the frontal cortex, the sensory cortex, the motor cortex, the cerebellar cortex, the cerebral cortex, the brain stem, the hippocampus, or the thalamus, amongst others.

[0068] Engineered AAV capsid proteins delivered to a target cell

[0069] The engineered AAV capsid proteins may be delivered to one or more target cells, tissues, organs, or organisms. In some embodiments, the engineered AAV capsid proteins demonstrate enhanced tropism for a target cell type, tissue or organ. As a non-limiting example, the engineered AAV capsid proteins may have enhanced tropism for cells and tissues of the central or peripheral nervous systems (PNS), or cells and tissues of a muscle. The engineered

AAV capsid proteins may, in addition, or alternatively, have decreased tropism for an undesired target cell-type, tissue or organ. As a non-limiting example, the engineered AAV capsid proteins may have enhanced tropism for B cells, hematopoietic cells, leukocytes, platelets, macrophages, megakaryocytes, monocytes and/or T cells.

[0070] Methods of detecting engineered AAV capsid proteins

[0071] In some embodiments, a method of identifying an engineered AAV capsid protein with a desired characteristic compared to a natural/wild-type AAV serotype is provided comprising: (i) contacting a cell, cell line, or tissue *in vitro* or *in vivo* with any one of the libraries of engineered AAV capsid proteins, (ii) allowing the engineered AAV capsid proteins in said library to transduce the cell, cell line, or tissue; (iii) recovering from the cell, cell line, or tissue the AAV variant; and (iv) identifying the engineered AAV capsid protein with the desired characteristic.

[0072] In another aspect, disclosed herein are methods for directed evolution of engineered AAV capsid proteins and identification of an engineered AAV capsid protein with a desired characteristic compared to a natural/wild-type AAV serotype. In some embodiments, the steps for directed evolution of engineered AAV capsid proteins to identify engineered AAV capsid proteins with a desired characteristic compared to a natural/wild-type AAV serotype comprise (i) insertion of targeting peptides into hypervariable and/or surface-exposed loops in capsid proteins from one or more AAV serotypes creating libraries of modified variant capsids for each AAV serotype; (ii) packaging of the variant AAVs in producer cells wherein adenovirus helper and AAV *rep* functions are supplied in trans; (iii) purification of viral capsid library pools; (iv) administration of the pools *in vitro* or *in vivo*; (v) recovery of engineered AAV capsid proteins from target tissues or cell lines; (vi) next-generation sequencing to determine the identity of the engineered variant capsid sequences; (vii) repeated rounds of *in vitro* or *in vivo* selection where variants are isolated from a target tissue or cell line; and (viii) full evaluation of enriched variants. In some embodiments, the desired characteristic includes enhanced tissue tropism as compared to the natural/wild-type AAV serotype. In some embodiments, the desired characteristic includes enhanced tissue tropism for tissues of the peripheral nervous system as compared to the natural/wild-type AAV serotype. In some embodiments, the desired characteristic includes enhanced tissue tropism of the central nervous system as compared to the natural/wild-type AAV serotype. In some embodiments, the desired characteristic includes enhanced ability to cross the blood brain barrier as compared to the

natural/wild-type AAV serotype. In some embodiments, the targeting peptides that are inserted into the hypervariable and/or surface-exposed loops include any of the sequences set forth in SEQ ID NO: 1-1232. In some embodiments, SEQ ID NO: 71 is inserted into the hypervariable and/or surface exposed loop.

[0073] Capsid proteins

[0074] In some embodiments, capsid proteins, for example AAV1, AAV2, AAV3B, AAV5, AAV6, AAV8 and AAV9 are chosen for starting points. In some embodiments, capsid proteins from less well characterized AAV serotypes are chosen, including but not limited to AAV4, AAV7, AAV11, AAVrh10, AAVrh39, and AAVrh74. In some embodiments, a library of AAV variants comprises AAV variant capsid proteins derived from a single AAV serotype. In some embodiments, a library of AAV variants comprises AAV variant capsid proteins derived from 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or more AAV serotypes. In some embodiments, the AAV variant capsid proteins derived from 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or more AAV serotypes are combined once individual serotype libraries are developed. In some embodiments, combinatorial libraries are generated by modifying nucleic acids encoding AAV capsid proteins from 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or more serotypes in the same pool.

[0075] In some embodiments, the libraries are packaged in HEK293 cells where the helper functions (*e.g.* E2A, E4, VA, E1A and E1B) are supplied in *trans*. In some embodiments, the AAV rep function comprises rep78, rep68, rep52, and rep40 genes. In some embodiments, the rep genes are supplied in *trans*. In some embodiments, the start codon of the rep78 and/or the rep68 gene is altered from ACG to ATG to increase replication of the capsid library construct containing inverted terminal repeats (ITRs), thereby improving AAV library manufacturing yield. In some embodiments, the *cap* genes are supplied as genetic material to the manufactured AAVs. In some embodiments, the capsid gene is controlled by the p40 promoter such that it is only expressed during manufacturing in HEK293 cells in the presence of helper virus functions.

CNS (Central Nervous System)-Targeting Molecules (Targeting Peptides)

[0076] Described herein are CNS-targeting molecules, *i.e.*, targeting peptides. In some embodiments, the CNS-targeting molecules have enhanced tropism for a cell or tissue, such as

the delivery of genetic material of interest to said cell or tissue, for example a CNS tissue or PNS tissue or a CNS cell or PNS cell.

[0077] In some embodiments, the CNS-targeting molecule comprises a sequence set forth in SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises at least 5, 6, 7, 8, or 9 contiguous amino acids of a sequence set forth in SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises the sequence set forth in SEQ ID NO: 71. In some embodiments, the targeting peptide comprises at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of the sequence set forth in SEQ ID NO: 71.

[0078] In some embodiments, the CNS-targeting molecule comprises variants of the amino acid sequences set forth in SEQ ID NO: 1-1232. In embodiments, a variant refers to any one or more of a substitution, deletion, or addition to any of the amino acids of any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In some embodiments, the variant comprises 1, 2, 3, or 4 substitutions to any of the amino acids of any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In some embodiments, the variant comprises 1, 2, 3, or 4 deletions to any of the amino acids of any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In some embodiments, the variant comprises 1, 2, 3, or 4 insertions to any of the amino acids of any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In some embodiments, the variant comprises any combination of the substitutions, deletions, or insertions described above.

[0079] In embodiments, a variant refers to a variant in the nucleotide sequence that encodes any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In embodiments, the variant in the nucleotide sequence results in encoding any one or more of a substitution, deletion, or addition to any of the amino acids of any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In embodiments, the variant in the nucleotide sequence encodes 1, 2, 3, or 4 substitutions to any of the amino acids of any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In embodiments, the variant in the nucleotide sequence encodes 1, 2, 3, or 4 deletions to any of the amino acids of any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In embodiments, the variant in the nucleotide sequence encodes 1, 2, 3, or 4 insertions to any of the amino acids of any of the amino acid sequences set forth in SEQ ID NO: 1-1232. In embodiments, the variant in the nucleotide sequence encodes any combination of the substitutions, deletions, or insertions described above.

[0080] In some embodiments, the CNS-targeting molecule is fused or conjugated to a small molecule, an antibody, scFV, ASO (antisense oligonucleotide), siRNA, lipid, polymer or recombinant protein. In some embodiments, any of SEQ ID NO: 1-1232 are fused or conjugated to a small molecule, an antibody, scFV, ASO (antisense oligonucleotide), siRNA, lipid, polymer or recombinant protein. In some embodiments, SEQ ID NO: 71 is fused or conjugated to a small molecule, an antibody, scFV, ASO (antisense oligonucleotide), siRNA, lipid, polymer or recombinant protein. In some embodiments, CNS-targeting molecules may be utilized to enable a small molecule, an antibody, scFV, ASO (antisense oligonucleotide), siRNA, lipid, polymer or recombinant protein to cross the blood brain barrier.

[0081] In some embodiments, the CNS-targeting molecules are part of an engineered AAV capsid protein. In some embodiments the engineered capsid protein comprises any of the serotypes of AAV1, AAV2, AAV3B, AAV5, AAV6, AAV8 and AAV9. In embodiments, the capsid protein comprises the serotype AAV2 or AAV9. In some embodiments, the AAV2 serotype comprises SEQ ID NO: 1233. In some embodiments, the AAV2 serotype comprises a variant of SEQ ID NO: 1233. In some embodiments, the AAV9 serotype comprises SEQ ID NO: 1234. In some embodiments, the AAV9 serotype comprises a variant of SEQ ID NO: 1234. In embodiments, a variant refers to any one or more of a substitution, deletion, or addition to any of the amino acids in either of the amino acid sequences set forth in SEQ ID NO: 1233 or SEQ ID NO: 1234. In embodiments, the variant comprises 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 substitutions of any of the amino acids in either of the amino acid sequences of SEQ ID NO: 1233 or SEQ ID NO: 1234. In embodiments, the variant comprises 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 deletions of any of the amino acids in either of the amino acid sequences set forth of SEQ ID NO: 1233 or SEQ ID NO: 1234. In embodiments, the variant comprises 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 insertions of any of the amino acids in either of the amino acid sequences set forth SEQ ID NO: 1233 or SEQ ID NO: 1234.

[0082] In some embodiments, the variant comprises an amino acid sequence that comprises at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1234 or SEQ ID NO:

1233, and at least 3, 4, 5, 6, 7, 8, 9 or all contiguous amino acids of any of SEQ ID NOS: 1-1232.

[0083] In some embodiments, the AAV2 serotype comprises a sequence that is at least 80% identical, at least 85% identical, at least 90% identical, or at least 95% identical to SEQ ID NO: 1233. In some embodiments, the AAV9 serotype comprises a sequence that is at least 80% identical, at least 85% identical, at least 90% identical, or at least 95% identical to SEQ ID NO: 1234.

[0084] In embodiments, a variant refers to a variant in the nucleotide sequence that encodes the amino acid sequences set forth in SEQ ID NO: 1233 or SEQ ID NO: 1234. In some embodiments, the variant in the nucleotide sequences results in encoding any one or more of a substitution, deletion, or addition to any of the amino acids of either of the amino acid sequences set forth in SEQ ID NO: 1233 or SEQ ID NO: 1234. In embodiments, the variant in the nucleotide sequence encodes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 substitutions of any of the amino acids in either of the amino acid sequences of SEQ ID NO: 1233 or SEQ ID NO: 1234. In embodiments, the variant in the nucleotide sequence encodes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 deletions of any of the amino acids in either of the amino acid sequences of SEQ ID NO: 1233 or SEQ ID NO: 1234. In some embodiments, the variant in the nucleotide sequence encodes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 insertions of any of the amino acids in either of the amino acid sequences of SEQ ID NO: 1233 or SEQ ID NO: 1234.

[0085] In some embodiments, the variant in the nucleotide sequence encodes an amino acid sequence that comprises at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1234 or SEQ ID NO: 1233, and at least 3, 4, 5, 6, 7, 8, 9 or all contiguous amino acids of any of SEQ ID NOS: 1-1232

[0086] In some embodiments, a nucleotide sequence encodes an amino acid sequence that is at least 80% identical, at least 85% identical, at least 90% identical, or at least 95% identical to SEQ ID NO: 1233. In some embodiments, a nucleotide sequence encodes an amino acid

sequence that is at least 80% identical, at least 85% identical, at least 90% identical, or at least 95% identical to SEQ ID NO: 1234.

[0087] In some embodiments, any of the CNS-targeting molecules set forth in any of SEQ ID NO: 1-1232 is inserted into an AAV. In some embodiments, any of the CNS-targeting molecules set forth in any of SEQ ID NO: 1-1232 is inserted into AAV2. In some embodiments, AAV2 comprises the sequence set forth in SEQ ID NO: 1233. In some embodiments, SEQ ID NO: 71 is inserted into SEQ ID NO: 1233. SEQ ID NO: 1233 is AAV2 with an amino acid substitution. In some embodiments, any of the CNS-targeting molecules set forth in any of SEQ ID NO: 1-1232 is inserted into AAV9. In some embodiments, AAV9 comprises the sequence set forth in SEQ ID NO: 1234. In some embodiments, SEQ ID NO: 71 is inserted into SEQ ID NO: 1234. SEQ ID NO: 1234 is AAV9. SEQ ID NO: 71 inserted into SEQ ID NO: 1234 can result in SEQ ID NO: 1235.

[0088] In some embodiments, insertion of SEQ ID NO: 71 into AAV9 results in the sequence set forth in SEQ ID NO: 1235 (CNSRCV300). In some embodiments, insertion of SEQ ID NO: 71 into AAV9 results in a variant sequence of SEQ ID NO: 1235. In embodiments, the variant comprises 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 substitutions, insertions, and/or deletions of any of the amino acids in the amino acid sequence of SEQ ID NO: 1235. In some embodiments, the variant comprises at least 80% sequence identity, at least 85% sequence identity, at least 90% sequence identity, at least 95% sequence identity, or at least 99% sequence identity with SEQ ID NO: 1235 or comprises SEQ ID NO: 1235. In embodiments, the variant comprises at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1235, and at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of SEQ ID NO: 71.

[0089] In some embodiments, the variant refers to a variant in the nucleotide sequence that encodes the amino acid sequences set forth in SEQ ID NO: 1235. In embodiments, the variant in the nucleotide sequence encodes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 substitutions, insertions, and/or deletions of any of the amino acids in the amino acid sequence of SEQ ID NO: 1235. In some embodiments, the variant in the nucleotide sequence encodes an amino acid sequence that comprises at least 80% sequence identity, at least 85% sequence identity, at least 90% sequence identity, at least 95% sequence identity, or at least 99% sequence identity

with SEQ ID NO: 1235. In embodiments, the variant in the nucleotide sequence encodes an amino acid sequence that comprises at least 80%, 85%, 90%, 95%, or 99% sequence identity to the sequence set forth in SEQ ID NO: 1235, and at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of SEQ ID NO: 71.

[0090] AAV particles

[0091] In some embodiments, the CNS-targeting molecules are part of an engineered AAV capsid protein, and the engineered AAV capsid proteins are packaged into AAV particles. In some embodiments, the AAV particles that have enhanced tropism for a target tissue (e.g., CNS and PNS) are provided. CNS-targeting molecules may be inserted into an AAV capsid protein sequence to alter tropism to a particular cell-type, tissue, organ or organism, *in vivo*, *ex vivo* or *in vitro*. In some embodiments, the AAV particles are capable of penetrating the blood brain barrier.

[0092] Delivery of AAV Particles

[0093] The AAV particles may be delivered to one or more target cells, tissues, organs, or organisms. In some embodiments, the AAV particles demonstrate enhanced tropism for a target cell type, tissue or organ. As a non-limiting example, the AAV particle may have enhanced tropism for cells and tissues of the central or peripheral nervous systems (CNS and PNS, respectively), or cells and tissues of a muscle. The AAV particles may, in addition, or alternatively, have decreased tropism for an undesired target cell-type, tissue or organ.

[0094] In some embodiments, the AAV particles are used to deliver a viral genome to a tissue or cells such as CNS or PNS cell or tissue.

[0095] The delivered viral genome may include genetic material of interest, such as, for example, an antibody, an enzyme, or regulatory RNA, amongst others. In some embodiments, the viral genome includes at least one ITR sequence. In some embodiments, the viral genome includes 2 ITR sequences. In some embodiments, the ITR sequences flank the genetic material of interest. In some embodiments, the ITR sequences are complementary to each other. In some embodiments, the ITR regions are derived from the same serotype as the capsid protein. ITR regions may be between 100 and 150 nucleotides in length.

[0096] In some embodiments, the AAV particles can be used to infect a wide range of cells (including quiescent and dividing cells) without integration into the host genome and without replicating. In some embodiments, the genome of the virus contains the components required for the assembly of a functional recombinant virus, or viral particle, which is loaded with or engineered to target a particular tissue and express or deliver genetic material of interest to the particular tissue.

[0097] AAV capsid proteins comprising CNS-targeting molecules (targeting peptides)

[0098] In some embodiments, the CNS-targeting molecules, i.e., targeting peptides, are part of a recombinant AAV capsid protein. In some embodiments, AAV capsid proteins described herein may be produced recombinantly and may be based on adeno-associated virus (AAV) wild type sequence.

[0099] CNS-targeting molecules may be inserted into an AAV capsid protein sequence to alter tropism relative to the natural AAV capsid protein, to a particular cell-type, tissue, organ or organism, *in vivo*, *ex vivo* or *in vitro*. Stated another way, CNS-targeting molecules, which refer to the targeting peptides, that are inserted into the capsid protein, allow the capsid protein to penetrate the blood brain barrier.

[0100] In some embodiments, the targeting peptide is used for enhanced or improved transduction of a target cell or tissue (e.g., cells or tissues of the central nervous system (CNS) or peripheral nervous system (PNS)). In some embodiments, the targeting peptide is used to facilitate the AAV capsid protein across the blood brain barrier following administration to a subject. In some embodiments, the targeting peptide is used for enhanced or improved distribution of the genetic material throughout the multiple brain regions, e.g., frontal cortex, sensory cortex, motor cortex, putamen, thalamus, cerebellar cortex, dentate nucleus, caudate, and/or hippocampus. In some embodiments, the targeting peptide is used for enhanced or improved genetic material expression in multiple brain regions. In some embodiments, the targeting peptide is used for enhanced or improved delivery of genetic material of interest to a desired tissue, cell, or organelle.

[0101] In some embodiments, the targeting peptide increases tropism of the AAV capsid to a cell, region, or tissue of the CNS. Examples of CNS cells include but are not limited to neurons (e.g., excitatory neurons, inhibitory neurons, and motor neurons) and glial cells (e.g.,

ependymal cells, astrocytes, oligodendrocytes. Examples of CNS tissue include but are not limited to the cortex (e.g., frontal cortex, parietal cortex, occipital cortex, temporal cortex), thalamus, hypothalamus, striatum, hippocampus, entorhinal cortex, and basal ganglia.

[0102] In some embodiments, the AAV capsid protein comprising a targeting peptide is capable of increased tropism by at least 1.1-, 1.2-, 1.3-, 1.4-, 1.5-fold, relative to an AAV capsid protein that lacks a targeting peptide. In some embodiments, the AAV capsid protein comprising a targeting peptide is capable of increased tropism by over 1.5-fold, relative to an AAV capsid protein that lacks a targeting peptide.

[0103] In some embodiments, the AAV capsid protein comprising the targeting peptide facilitates increased expression of delivered genetic material (e.g., a therapeutic cargo) by at least 1.1-, 1.2-, 1.3-, 1.4-, 1.5-fold in a specific cell, region, or tissue, relative to an AAV capsid protein that lacks a targeting peptide. In some embodiments, the AAV capsid protein comprising the targeting peptide facilitates increased expression of delivered genetic material (e.g., a therapeutic cargo) by more than 1.5-fold in a specific cell, region, or tissue, relative to an AAV capsid protein that lacks a targeting peptide.

[0104] In some examples, the targeting peptide is between 6 amino acids and 20 amino acids in length, for example 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, or 20 amino acids in length. In some examples, the targeting peptide is between 9 and 16 amino acids in length. In some examples, the targeting peptide is 9 amino acids in length. In some examples, the targeting peptide is 16 amino acids in length.

[0105] In some embodiments, the targeting peptide comprises an amino acid sequence of any sequence set forth in SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises the amino acid sequence set forth in SEQ ID NO: 71. In some embodiments, the targeting peptide comprises at least 3, 4, 5, 6, 7, 8, 9, or all contiguous amino acids of any sequence set forth in SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of the sequence set forth in SEQ ID NO: 71. In some embodiments, the targeting peptide is part of an AAV vector. In some embodiments, the targeting peptide is part of a capsid protein of the AAV vector. In some embodiments, nucleic acid sequences encode targeting peptides.

[0106] In some embodiments, the AAV capsid protein comprise a nucleic acid sequence encoding a peptide that comprises an amino acid sequence of any sequence set forth in SEQ ID NO: 1-1232. In some embodiments, the AAV capsid protein comprise a nucleic acid sequence encoding a peptide that comprises an amino acid sequence of SEQ ID NO: 71. In some embodiments, the AAV capsid protein comprise a nucleic acid sequence encoding a peptide that comprises at least 3, 4, 5, 6, 7, 8, 9, or all contiguous amino acids of any sequence set forth in SEQ ID NO: 1-1232. In some embodiments, the AAV capsid protein comprise a nucleic acid sequence encoding a peptide that comprises at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of the sequence set forth in SEQ ID NO: 71.

[0107] Insertion of Targeting Peptides into Capsid Proteins

[0108] In some embodiments, a targeting peptide is a part of a capsid protein, and the targeting peptide is inserted at a location between amino acid residues 450 and 600 of the capsid protein. In some embodiments, the amino acid sequence is inserted at a location between amino acid residues 587 and 590 of the AAV9 capsid protein. In some embodiments, the amino acid sequence is inserted at location between amino acid residues 588 and 589 of the AAV2 capsid protein.

[0109] In some embodiments, a peptide sequence that comprises any of the sequences set forth in SEQ ID NO: 1-1232 is inserted into the capsid protein. In some embodiments, the peptide sequence comprises 3, 4, 5, 6, 7, 8, 9 or all contiguous amino acids of any of the sequences set forth in SEQ ID NO: 1-1232. In some embodiments, disclosed is a peptide sequence that comprises the sequence set forth in SEQ ID NO: 71. In some embodiments, the peptide sequence comprises 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of the sequence set forth in SEQ ID NO: 71.

[0110] In some embodiments, a targeting peptide is inserted into any of the AAV capsid protein comprises any of the AAV serotypes AAV1, AAV2, AAV3B, AAV5, AAV6, AAV8 and AAV9. In some embodiments, the AAV capsid protein comprises the AAV2 serotype. In some embodiments, the AAV2 serotype includes a mutation at position 588 from arginine to alanine. In some embodiments, the AAV2 serotype comprises the sequence of SEQ ID NO: 1233. In some embodiments, an amino acid sequence is inserted between positions 450 and 600 of SEQ ID NO: 1233. In some embodiments, an amino acid sequence is inserted between positions 588 and 589 of SEQ ID NO: 1233. In some embodiments, the AAV capsid protein

comprises the AAV9 serotype. In some embodiments, the AAV9 serotype includes the sequence of SEQ ID NO: 1234. In some embodiments, an amino acid sequence is inserted between positions 450 and 600 of SEQ ID NO: 1234. In some embodiments, the amino acid sequence is inserted between positions 587 and 590 of SEQ ID NO: 1234. In some embodiments, the amino acid sequence inserted into the AAV2 or AAV9 serotypes comprises an amino acid sequence set forth in SEQ ID NO: 1-1232. In some embodiments, the amino acid sequence inserted into the AAV2 or AAV9 serotypes comprises an amino acid sequence set forth in SEQ ID NO: 71. In some embodiments, insertion of the amino acid sequence set forth in SEQ ID NO: 71 into an AAV9 serotype results in the sequence set forth in SEQ ID NO: 1235 (CNSRCV300).

[0111] In some embodiments, a targeting peptide is inserted into an AAV capsid protein. Any targeting peptide described herein may be inserted into a parent AAV capsid protein in any location that results in fully functional AAV particles. The targeting peptide may be inserted into capsid proteins VP1, VP2 and/or VP3. In some embodiments, a targeting peptide, is inserted in a hypervariable region of the AAV capsid protein. Non-limiting examples of such hypervariable and/or surface exposed loop of the AAV capsid protein. In some embodiments, the targeting peptide is inserted into the H1 loop. In some embodiments, the targeting peptide is inserted into the DE loop. In some embodiments, the targeting sequencing is inserted into the variable region of the surface exposed loop, for example any of VR-I, VR-II, VR-III, VR-IV, VR-V, VR-VI, VR-VII, VR-VIII and VR-IX. In some embodiments, the targeting peptide comprises any of SEQ ID NO: 1-1232. In some embodiments, the targeting peptide comprises SEQ ID NO: 71.

[0112] In some embodiments, the AAV capsid proteins described herein have enhanced tropism for a specific cell or tissue, for example, a CNS or PNS cell or tissue. In some embodiments, the enhanced tropism for a specific cell or tissue is due to the insertion of any of the sequences set forth in SEQ ID NO: 1-1232 into the AAV capsid protein. In some embodiments, the enhanced tropism for a specific cell or tissue is due to the insertion of SEQ ID NO: 71 in to the AAV capsid protein. In some embodiments, the AAV capsid proteins are capable of penetrating the blood brain barrier. In some embodiments, the AAV capsid proteins described herein are capable of penetrating the blood brain barrier due to the insertion of any of the sequences set forth in SEQ ID NO: 1-1232 into the AAV capsid protein. In some embodiments, the AAV capsid proteins described herein are capable of penetrating the blood

brain barrier due to the insertion of SEQ ID NO: 71 into the AAV capsid protein. In some embodiments, the AAV capsid proteins described herein are capable of distributing throughout multiple brain regions including, but not limited to the frontal cortex, sensory cortex, motor cortex, putamen, thalamus, cerebellar cortex, and hippocampus. In some embodiments, the AAV capsid proteins described herein are capable of distributing throughout multiple brain regions due to the insertion of any of the SEQ ID NO: 1-1232 into the AAV capsid protein. In some embodiments, the AAV capsid proteins described herein are capable of distributing throughout multiple brain regions due to the insertion of SEQ ID NO: 71 into the AAV capsid protein.

Pharmaceutical Compositions and Dosage Forms

[0113] Compositions described herein including CNS-targeting molecules (targeting peptides), AAV capsid proteins, AAV particles, and AAV vectors can be included in pharmaceutical compositions. In some embodiments, the pharmaceutical compositions can include one or more excipients or diluents to (1) increase stability; (2) increase cell transfection or transduction; (3) permit the sustained or delayed release of the genetic material; (4) alter the biodistribution (e.g., target the composition to specific tissues or cell types); (5) increase the translation of encoded protein; (6) alter the release profile of encoded protein and/or (7) allow for regulatable expression of the genetic material.

[0114] The pharmaceutical compositions described herein can be administered periodically, such as once or twice a day, or any other suitable time period. For example, pharmaceutical compositions may be administered to a subject in need once a week, once every other week, once every three weeks, once a month, every other month, every three months, every six months, every nine months, once a year, every eighteen months, every two years, every thirty months, every three years, every five years, every 10 years, every 20 years, or a one-time administration.

[0115] In some embodiments, the compositions described herein (CNS-targeting (targeting peptides), AAV capsid proteins, AAV particles, and AAV vectors) can be formulated in a wide variety of dosage forms, including but not limited to nasal, pulmonary, oral, topical, or parenteral dosage forms for clinical. Each of the dosage forms can comprise various solubilizing agents, disintegrating agents, surfactants, fillers, thickeners, binders, diluents such as wetting agents or other pharmaceutically acceptable excipients. The compositions described

herein can also be formulated for injection, insufflation, infusion, or intradermal exposure. For instance, an injectable formulation may comprise the disclosed compositions in an aqueous or non-aqueous solution at a suitable pH and tonicity. The compositions can be included liquid dosage form for oral administration, such as suspensions, emulsions, or syrups.

[0116] In some embodiments, the pharmaceutical compositions described herein function to increase the stability, increase transduction or transfection efficiency, impact biodistribution, increase expression of the protein, and/or alter the release profile.

Methods of Delivery of and Treatment using the CNS-Targeting Molecules

[0117] In some embodiments, methods for introducing the compositions described herein (CNS-targeting molecules (targeting peptides), AAV capsid proteins, AAV particles, and AAV vectors) into cells and/or tissues are provided. In some embodiments, the methods comprise introducing into cells and/or tissues any of the compositions described herein in an amount sufficient to modulate, e.g., increase, the production of a target mRNA and/or protein in the cells and/or tissues.

[0118] In some embodiments, the compositions described herein are delivered via a localized delivery route. In some embodiments, the localized delivery route includes any one or more of intramuscular administration, intraparenchymal administration, and intracerebral administration, amongst others. In some embodiments, the compositions described herein are administered via a localized delivery route through a bolus infusion.

[0119] In some embodiments, the compositions described herein are administered through systemic administration. In some embodiments, systemic administration includes intravenous administration. In some embodiments, intravenous administration includes subcutaneous administration. In some embodiments, the systemic administration includes intraventricular administration.

[0120] In some embodiments, the compositions described herein are administered to the central nervous system of via intraventricular administration and/or intravenous administration. In some embodiments, the compositions described herein are administered to the central nervous system via systemic administration. In some embodiments, the systemic administration is intravenous (IV) injection. In some embodiments, the CNS-targeting molecules described herein are administered to the central nervous system via intraventricular administration.

[0121] In some embodiments the compositions can be delivered to target cell or target tissue including, but not limited to, the CNS, heart, lung, trachea, esophagus, muscle, bone, cartilage, stomach, pancreas, intestine, liver, bladder, kidney, ureter, urethra, uterus, fallopian tube, ovary, testes, prostate, eye, blood, lymph, or oral mucosa. In some embodiments, the target cell or tissue includes, but is not limited to CNS, heart, lung, trachea, esophagus, muscle, bone, cartilage, stomach, pancreas, intestine, liver, bladder, kidney, ureter, urethra, uterus, fallopian tube, ovary, testes, prostate, eye, blood, lymph, or oral mucosa. In some embodiments, the target cell or target tissue is a CNS cell or tissue. In some embodiments, the target cell or tissue is liver cell or tissue.

[0122] In some embodiments, the target cell includes, but is not limited to, neurons, glial cells, astrocytes, oligodendroglia, microglia, Schwann cells, ependymal cells, hepatocytes, stellate fat storing cells, Kupffer cells, liver endothelial cells, epithelial cells, cardiomyocytes, smooth muscle cells, T-cells, B cells, hematopoietic stem cells, and embryonic stem cells.

[0123] In some embodiments, the compositions described herein are delivered to the central nervous system through the cerebral spinal fluid pathway. In some embodiments, compositions described herein are administered to the central nervous system via intraparenchymal delivery. In some embodiments, the compositions described herein are administered to the central nervous system via intracranial delivery. In some embodiments, the compositions described herein are delivered to the central nervous system via intraocular delivery. In some embodiments, the compositions described herein are administered to the brain. In some embodiments, the compositions described herein are administered to the brain via injection into the brain. In some embodiments, the compositions described herein are administered to the brain via intrahippocampal injection.

[0124] In some embodiments, disclosed is a method of delivering a nucleic acid to a target cell or tissue of a subject, comprising: administering a composition comprising an AAV vector, wherein the AAV vector further comprises a capsid protein comprising a targeting peptide comprising at least 5, 6, 7, 8, or 9 contiguous amino acids of an amino acid sequence set forth in SEQ ID NO: 1-1232. In some embodiments, the capsid protein comprises the targeting peptide set forth in any one of SEQ ID NO: 1-1232.

[0125] In some embodiments, the compositions described herein are administered as part of a composition that allows for extended release. In some embodiments, the compositions comprise a formulation that includes a depot.

[0126] Disclosed herein are methods of treatment using any of the compositions described herein (CNS-targeting molecules (targeting peptides), AAV capsid proteins, AAV vectors, and AAV particles). In embodiments, the disclosed compositions can be used to treat any one or more of muscular or neuromuscular disorders, neurooncological disorders, neurological diseases/disorders, and neurodegenerative disorders, amongst others. In embodiments, the disclosed compositions can be used to treat any one or more of Alzheimer's disease, Huntington's disease; autism; Parkinson's disease; Spinal muscular atrophy, Friedreich's ataxia. In embodiments, the disclosed compositions are used in treatments through any of the methods of delivery described herein.

[0127] In some embodiments, disclosed are methods for treating, or ameliorating a disease or condition associated with abnormal gene and/or protein in a subject in need of treatment, the methods comprising administering to the subject any effective amount of at least one of the compositions described herein (CNS-targeting molecules (targeting peptides), AAV capsid proteins, AAV vectors, and AAV particles), delivering the compositions described herein into targeted cells, inhibiting or activating the gene expression and protein production, and ameliorating symptoms of the disease or condition in the subject.

Equivalents and Scope

[0128] The disclosure includes many equivalents to the specific embodiments described herein. A person of skill in the art will be able to ascertain equivalents to the specific embodiments, through routine experimentation.

[0129] It is assumed that words of this disclosure are for the purpose of description and not limitation. Changes to words in the claims can be made, while still retaining the scope of the disclosure in its broad aspect. Specific embodiments of the disclosure have been described herein. However, these embodiments are not intended to be limiting of the broad scope of this disclosure. While some embodiments comprise/include the disclosed features and may therefore include additional features not specifically described, other embodiments may be

essentially free of or completely free of non-disclosed elements – that is, non-disclosed elements may optionally be essentially omitted or completely omitted.

[0130] The disclosure is further illustrated by the following examples, which are intended to be purely illustrative and not limiting of the disclosure herein.

EXAMPLES

Example 1. Methods

[0131] 1.1. AAV capsid library generation

[0132] Capsid variants for library screening were synthesized as an oligo pool. Each capsid peptide was synthesized with unique nucleotide sequences encoding the peptide, and each peptide was linked to at least two distinct barcodes. The oligo pool was cloned into a linearized intermediate plasmid, followed by cloning of a constant donor sequence to separate the barcode and peptide region and generate the full AAV vector construct. Two separate constant donor sequences were used, generating the barcoded library transcript under the control of a neuron specific promoter or a ubiquitous promoter. This enables an assessment of which capsids drive the most functional mRNA expression in neurons as well as all cell types transduced. Moreover, each barcode is linked to a unique molecular identifier (UMI). Based on the overall size of the cloned library each barcode is appended to hundreds to thousands of UMIs. The utility of the UMI is to additionally assess how many distinct AAV transduction events give rise to the NGS read counts that are measured.

[0133] The peptide sequences listed in Table 1 were inserted into variable region 8 of AAV serotypes 2 and 9. Where indicated in Table 1, peptides are inserted into AAV9 (SEQ ID 1234) between 587/590, the insertions are after amino acid 587 and before 590 replacing amino acids 588 and 589. Other peptides inserted into AAV9 indicated in Table 1 are inserted between amino acids 588/589. Peptides inserted into AAV2, were inserted between positions 588/589 and the wildtype arginine at position 588 is altered to alanine (R588A) (Seq ID 1233).

[0134] These AAV plasmid libraries were manufactured in HEK293 cells. Briefly, libraries were produced by transient transfection including supplementation of Rep *in trans*, capsids were purified by cesium density centrifugation, and buffer exchanged into PBS by Amicon filtration. DNase-resistant viral genomic titers were measured by quantitative real time PCR.

[0135] 1.2. Administration of AAV libraries to cynomolgus macaques

[0136] The AAV library was administered into cynomolgus macaques as an intravenous bolus injection with a volume ≤ 5 mL per kg of animal body weight.

[0137] 1.3. Tissue Collection and Processing

[0138] At the time of sacrifice, the brain was removed and placed in a coronal brain matrix in an ice-cold nuclease free PBS bath for approximately 10 minutes. The brain was sliced at a 4 mm coronal slice thickness. All slices were hemisected along the mid-sagittal plane. The brain slices were processed and stored according to the following table.

[0139] 1.4. Brain Tissue Collection for Molecular Analysis (mRNA and DNA)

[0140] Brain slices collected for mRNA and DNA molecular analysis (NGS) were placed in chilled RNA Later and refrigerated (1 to 8°C) for approximately 24 to 72 hours to preserve mRNA integrity. After storage, 2 mm punches were collected according to the Sponsor-provided brain template. The brain punch template is maintained in the raw data. Following removal from RNA Later and prior to obtaining the punches, the brain slices were placed on a flat surface and cross reference labels added to the brain slice and photographed (photographs are maintained with the raw data). All brain punch samples were placed into clean vials, frozen on dry ice and stored at -60°C or below until shipment. The residual brain slices, following sample collection, were frozen and stored at -60°C or below until shipment.

[0141] The residual brain slices, following sample collection, were frozen and stored at -60°C or below until shipment.

[0142] 1.5. Spinal Cord and Dorsal Root Ganglia

[0143] The spinal cord with dorsal root ganglia (DRG) attached were divided into four segments (cervical, thoracic, lumbar and sacral). From the central portion of each segment, a single 2-2.5 cm cross-sections were collected for potential evaluation. The cross-sections were placed in RNA Later and refrigerated (1 to 8°C) for approximately 24 to 72 hours after which the samples were frozen at -60°C or below until shipment. Right and left DRG pairs associated with the portion of each segment was removed and frozen (left and right saved together) on dry ice and stored at -60°C or below until shipment.

[0144] 1.6. Biodistribution-Other Tissues

[0145] An approximate 500-600 mg sample of tissue from the liver, testes, pancreas, lung, skeletal muscle (quadriceps), heart, kidney, lymph node, and spleen were collected for analysis. Samples were frozen on dry ice and stored at -60°C or below until shipment.

[0146] 1.7. Tissue Lysis and Total RNA Isolation for Analysis of Library Expression from Punches

[0147] Brain punches to be processed were placed on dry ice. For spinal cord, DRG and liver, approximately 35 mg of each tissue sample was excised on dry ice. Each tissue sample was then transferred to an Eppendorf tube pre-filled with 600 µL of TRIZOL and two 3.2 mm steel beads. Sample tubes were placed into a Retsch MM300 Tissue-Lyser and 8 rounds of homogenization were performed at a frequency of 25.1 Hz for 1 1/2 minutes with a 2-minute pause between rounds to prevent overheating.

[0148] Isolation and purification of total RNA from homogenized tissue was performed using the MagMAX™-96 Total RNA Isolation Kit in conjunction with the KingFisher™ Flex Purification System according to the manufacturer's protocol. Briefly, bromochloropropane (BCP) was added and then centrifugation was performed to separate the homogenate into aqueous and organic phases. The aqueous phase containing partially purified RNA was then transferred to a 96 well KingFisher processing plate. Isopropanol (100%) was added to each well followed by addition of magnetic RNA binding beads. Subsequent processing was performed on the KingFisher™ Flex Purification System. Briefly, the RNA binding beads were magnetically captured and an on-bead DNase digestion and several washes were performed. Purified RNA was eluted in 100 µL of low salt elution buffer. The KingFisher processing plate was then transferred to a magnetic stand on the benchtop. The eluants (~90 µL) were transferred away from any residual beads into a 96-well PCR plate for downstream processing. The yield and purity of the RNA was determined using a NanoDrop 8000 spectrophotometer.

[0149] 1.8. Tissue Lysis and Total RNA Isolation for Analysis of Library Expression from Brain Slices

[0150] Hemisected brain slices in cassettes to be processed were placed on dry ice. Each brain slice was removed from the cassette, weighted (up to 3 g), and placed into 50 mL Bigprep Lysing Matrix D tubes. The tubes were filled with TRIZOL Reagent at 10 mL per g of tissue. The samples were then placed in a CoolBigPrep adapter for 2x 50 mL tubes and into a FastPrep-

2 Classic bead beating grinder and lysis system. The tissue samples were homogenized at 4.0 meters/second for 30 seconds with 2 minutes pause. The tissue homogenization was repeated 4 times. The lysate was centrifuged at 4,300 xg for 5 minutes at 4°C. The clarified lysate was removed to a new tube and a second round of centrifugation and removal of clarified lysate to a fresh tube was conducted. Two 5 mL aliquots were transferred to separate tubes. The remaining sample was frozen at -80°C if present. The 5 mL aliquots were processed by adding 0.2 mL per mL Trizol of molecular grade chloroform. The sample was mixed by inversion and vortexing for 30 seconds then centrifuged at 4,300 xg for 30 minutes at 4°C. The aqueous phase, approximately 50 % of the lysate volume or ~2.5 mL was removed equally to 2 mL microcentrifuge tubes. 0.5 mL per mL Trizol of molecular grade isopropanol was added to the tubes and mixed by inversion. The samples were incubated for 10 minutes on ice followed by centrifugation at 12,000 xg for 10 minutes at 4°C. The RNA pellet was resuspended in 75% ethanol at 1 mL per mL Trizol, vortexed, and centrifuged at 12,000 xg for 5 minutes at 4°C. The RNA pellet was air dried for 5 minutes and dissolved in 0.2 mL per mL Trizol with RNase free DEPC treated water. The yield and purity of the RNA was determined using a NanoDrop 8000 spectrophotometer. Samples were spot checked for RNA integrity using the Agilent RNA 6000 Nano kit and Bioanalyzer 2100.

[0151] 1.9. Purification of mRNA from total RNA

[0152] mRNA was purified from select brain slice derived total RNA using Dynabeads mRNA Purification Kit following the manufacturer's instructions. Samples were spot checked for RNA integrity using the Agilent RNA 6000 Nano kit and Bioanalyzer 2100.

[0153] 1.10. Reverse Transcription of total RNA and mRNA to cDNA

[0154] The maximum allowable RNA input per kit was used following the manufacturer's protocol. QuantiTect Reverse Transcription Kit was used with a library transcript specific RT oligo using total RNA or purified mRNA as template. The manufacturer's protocol was used.

[0155] 1.11. PCR amplification of library barcodes, Illumina NGS, and bioinformatic analysis

[0156] All cDNA from various sources were treated similarly. Vector genomes from the test articles were extracted using QIAamp MinElute Virus Spin Kit. Library barcodes were amplified using transcript specific oligos with KAPA HiFi HotStart ReadyMix. Amplification

of library specific amplicons was performed with the following cycling conditions: 98°C for 2:00 min; 25 cycles at 98°C for 15 sec; 58°C for 25 sec; 72°C for 30 sec followed by 72°C for 3 minutes. Amplification was qualitatively confirmed by agarose gel electrophoresis and relative apparent amplification was used to determine the dilution of amplicons needed for indexing. Illumina plate level i5 and well level i7 indices were added to the amplicons with 12 cycles of amplification: 98°C for 30 sec; 12 cycles at 98°C for 15 sec; 60°C for 25 sec; 72°C for 30 sec followed by 72°C for 10 minutes. Finally, samples were pooled and purified using Qiagen GeneRead Size Selection Kit kit following the manufacturer's protocol. Samples were sequenced on Illumina MiSeq platform using MiSeq Reagent Kit v2.

[0157] Following NGS of library amplicons the reads were demultiplexed and features were extracted using a custom bioinformatic pipeline. Extracted barcodes were used to query a predetermined lookup table and return the identity of the corresponding variant. Finally, the log2 fold change enrichment of each variant was normalized to its relative abundance in the administered test article.

Example 2. Results from round 2 library evaluation

[0158] Previously, a first-round SIFTER (Selecting in vivo for transduction and expression of RNA) library was conducted that identified ~65,000 AAV variants included in this round 2 library. The round 2 library of ~65,000 variants each under the control of neuron specific human synapsin 1 (hSyn1) promoter or a ubiquitous CMV promoter was administered to two NHPs. Library barcodes were recovered from cDNA reverse transcribed from total RNA extracted from CNS tissue. Approximately 14,000 variants from this round 2 SIFTER library were recovered. After filtering out variants that were poorly recovered, a total of 6,728 variants were identified from the hSyn1 library, and 4,005 variants from the CMV library. A total of 1,236 variants were selected for evaluation in a final selection to nominate lead capsids. Several of the variants exhibited substantial improvement over AAV9 in CNS transduction.

[0159] The fold change enrichment in each tissue sample collected was determined by NGS and normalized to the abundance in the administered test article. The average log2FC across all the tissue samples analyzed from the animals per group is shown in Table 1.

Table 1.

Sequence ID	Peptide Sequence	Parent Capsid	Average Log2FC	Peptide Insertion Site
Seq ID 1	NFRQSEMLN	AAV9	9.99	587/590
Seq ID 2	QRNTDHITP	AAV9	9.33	587/590
Seq ID 3	MQFDPQKPD	AAV9	9.22	587/590
Seq ID 4	TMSSNDNMR	AAV9	9.10	587/590
Seq ID 5	VKESVQKAA	AAV9	8.82	587/590
Seq ID 6	ILNVSKPDN	AAV9	8.31	587/590
Seq ID 7	SQAAQLPTQ	AAV9	8.24	587/590
Seq ID 8	QVMAIDAAI	AAV9	8.17	587/590
Seq ID 9	NDTARERAI	AAV9	7.98	587/590
Seq ID 10	SMAAKVTAE	AAV9	7.94	587/590
Seq ID 11	TLGHQHSPI	AAV9	7.83	587/590
Seq ID 12	TVPSSGKQH	AAV9	7.49	587/590
Seq ID 13	AMVQISTPL	AAV9	7.47	587/590
Seq ID 14	VQVTGTVRF	AAV9	7.34	587/590
Seq ID 15	MIAQKTVVH	AAV9	7.32	587/590
Seq ID 16	NTHFQGQPP	AAV9	7.26	587/590
Seq ID 17	MDMQATGKN	AAV9	7.25	587/590
Seq ID 18	NLAHTRQPQ	AAV9	7.24	587/590
Seq ID 19	LDIPPMNSS	AAV9	7.22	587/590
Seq ID 20	QHSTPSWPS	AAV9	7.17	587/590
Seq ID 21	AFTRHNGTGGKSIYGA	AAV2	7.11	R588A/589
Seq ID 22	ARGARDEFT	AAV9	7.07	587/590
Seq ID 23	RPSNDKAMM	AAV9	7.06	587/590
Seq ID 24	AQVHMTMPQ	AAV9	7.05	587/590
Seq ID 25	ARQTFQHHL	AAV9	7.00	587/590
Seq ID 26	HQTDAPTDW	AAV9	6.98	587/590
Seq ID 27	ANMISEPRISYGNDAA	AAV9	6.97	588/589
Seq ID 28	IERWQAEII	AAV9	6.96	587/590
Seq ID 29	VPHNGLHST	AAV9	6.93	587/590
Seq ID 30	RIHDPSLVS	AAV9	6.93	587/590
Seq ID 31	IPATHPQLM	AAV9	6.89	587/590
Seq ID 32	ITTVKNVTV	AAV9	6.89	587/590
Seq ID 33	DKSVKSTAI	AAV9	6.88	587/590
Seq ID 34	IRTHEVPLQ	AAV9	6.87	587/590
Seq ID 35	SPSSTSNNN	AAV9	6.74	587/590
Seq ID 36	LSTTSQVHN	AAV9	6.70	587/590
Seq ID 37	NMHNETSMT	AAV9	6.70	587/590
Seq ID 38	NDSRKANIG	AAV9	6.68	587/590
Seq ID 39	KPPNVQDAK	AAV9	6.65	587/590
Seq ID 40	FQHMTPKPS	AAV9	6.60	587/590
Seq ID 41	KQPSRLMEW	AAV9	6.54	587/590
Seq ID 42	VYDQVKATH	AAV9	6.51	587/590
Seq ID 43	SYRNQYDDQ	AAV9	6.45	587/590

Seq ID 44	VQSTKQSVQ	AAV9	6.42	587/590
Seq ID 45	HQGKVDAQN	AAV9	6.42	587/590
Seq ID 46	IQGEIRVHT	AAV9	6.41	587/590
Seq ID 47	TQTLKVEDR	AAV9	6.38	587/590
Seq ID 48	VQSPPGIMP	AAV9	6.37	587/590
Seq ID 49	VHYAPNYTT	AAV9	6.37	587/590
Seq ID 50	YGGSETNVR	AAV9	6.29	587/590
Seq ID 51	IRTQTHPQV	AAV9	6.28	587/590
Seq ID 52	ETQVQPIQH	AAV9	6.27	587/590
Seq ID 53	FPVSSVNDV	AAV9	6.27	587/590
Seq ID 54	IQKISQAMA	AAV9	6.26	587/590
Seq ID 55	SQTQIGQPY	AAV9	6.22	587/590
Seq ID 56	AIRTNVGPV	AAV9	6.19	587/590
Seq ID 57	TQMSGQTPH	AAV9	6.16	587/590
Seq ID 58	PAKSVMIPY	AAV9	6.15	587/590
Seq ID 59	QRVSQTNSF	AAV9	6.14	587/590
Seq ID 60	AFAGANYAAWAVNVAA	AAV2	6.10	R588A/589
Seq ID 61	AVVRPQSTM	AAV9	6.09	587/590
Seq ID 62	PLQTPPSDN	AAV9	6.07	587/590
Seq ID 63	VTVSQQMTK	AAV9	6.07	587/590
Seq ID 64	DPFEGRIST	AAV9	6.05	587/590
Seq ID 65	NNPTGGIAL	AAV9	6.05	587/590
Seq ID 66	ARYTHLVAIQNKEEIA	AAV2	6.02	R588A/589
Seq ID 67	IVTGGVLKP	AAV9	6.00	587/590
Seq ID 68	THMSTQASI	AAV9	6.00	587/590
Seq ID 69	AVPGEEEQKFEVEKYA	AAV2	5.97	R588A/589
Seq ID 70	ATDTSHLVV	AAV9	5.96	587/590
Seq ID 71	YVNIMDDMD	AAV9	5.96	587/590
Seq ID 72	IRPDKQGGV	AAV9	5.95	587/590
Seq ID 73	NQTESQWKG	AAV9	5.94	587/590
Seq ID 74	TNEGLYKDN	AAV9	5.94	587/590
Seq ID 75	IMVGNQTVM	AAV9	5.92	587/590
Seq ID 76	IWAEKGLDT	AAV9	5.91	587/590
Seq ID 77	MPSQGYQQV	AAV9	5.90	587/590
Seq ID 78	NTFGHNVAP	AAV9	5.87	587/590
Seq ID 79	ASRTVSDSIKKLITSA	AAV2	5.87	R588A/589
Seq ID 80	NHTSTPPQQ	AAV9	5.86	587/590
Seq ID 81	NAHAIPVE	AAV9	5.83	587/590
Seq ID 82	KSTNTHEIG	AAV9	5.83	587/590
Seq ID 83	NTRVTNAHD	AAV9	5.82	587/590
Seq ID 84	AHRDACLTGSKIQVDA	AAV2	5.81	R588A/589
Seq ID 85	AVAAETGQI	AAV9	5.80	587/590
Seq ID 86	NQPSMVNGH	AAV9	5.80	587/590
Seq ID 87	PMTQQHHSM	AAV9	5.80	587/590
Seq ID 88	YEKVDSLMM	AAV9	5.79	587/590
Seq ID 89	MDVGTHGKA	AAV9	5.78	587/590

Seq ID 90	THNSQVHPS	AAV9	5.77	587/590
Seq ID 91	PTQVRQVQQ	AAV9	5.73	587/590
Seq ID 92	ITRTVNTVE	AAV9	5.71	587/590
Seq ID 93	AMIMSPFGT	AAV9	5.70	587/590
Seq ID 94	HAFPSFPAA	AAV9	5.70	587/590
Seq ID 95	KMMDNTPFY	AAV9	5.68	587/590
Seq ID 96	PQRLSVDPN	AAV9	5.67	587/590
Seq ID 97	TWGTYQHSV	AAV9	5.66	587/590
Seq ID 98	HYQQRDMSQ	AAV9	5.66	587/590
Seq ID 99	SQGHVQERM	AAV9	5.64	587/590
Seq ID 100	QPRTTGNDF	AAV9	5.64	587/590
Seq ID 101	PKGTISSQQ	AAV9	5.62	587/590
Seq ID 102	REHTAAWFA	AAV9	5.62	587/590
Seq ID 103	QLTHSNTSQ	AAV9	5.62	587/590
Seq ID 104	KDMGAGHSM	AAV9	5.60	587/590
Seq ID 105	ARGAQLAALGDTAWA	AAV9	5.60	588/589
Seq ID 106	KQAHREHEE	AAV9	5.58	587/590
Seq ID 107	KSSHPYTDE	AAV9	5.55	587/590
Seq ID 108	MPNHVAYKD	AAV9	5.53	587/590
Seq ID 109	PPTTQYPQT	AAV9	5.52	587/590
Seq ID 110	RSHTTGQDS	AAV9	5.51	587/590
Seq ID 111	SQLKASVTN	AAV9	5.51	587/590
Seq ID 112	TAPSTRFEV	AAV9	5.50	587/590
Seq ID 113	PSTLEPEVW	AAV9	5.49	587/590
Seq ID 114	YTSPQMMV	AAV9	5.49	587/590
Seq ID 115	PVPSRQVST	AAV9	5.48	587/590
Seq ID 116	LEKVQVHQN	AAV9	5.47	587/590
Seq ID 117	NQIKLQSMS	AAV9	5.46	587/590
Seq ID 118	GVMSPTPMV	AAV9	5.46	587/590
Seq ID 119	PTQRAERYF	AAV9	5.45	587/590
Seq ID 120	PTAKVVDSV	AAV9	5.45	587/590
Seq ID 121	HRIHEVQGG	AAV9	5.45	587/590
Seq ID 122	KNTTPVGQQ	AAV9	5.44	587/590
Seq ID 123	AGPPLKGAGGKERPGA	AAV2	5.44	R588A/589
Seq ID 124	IQPASGQNM	AAV9	5.42	587/590
Seq ID 125	YQNQGVNVP	AAV9	5.40	587/590
Seq ID 126	NASSQSNAN	AAV9	5.36	587/590
Seq ID 127	SNTVRGDAA	AAV9	5.36	587/590
Seq ID 128	SKKAEFGTE	AAV9	5.35	587/590
Seq ID 129	KVSSEMMVH	AAV9	5.34	587/590
Seq ID 130	TMIEQRMDQ	AAV9	5.34	587/590
Seq ID 131	PPHIYHHMS	AAV9	5.33	587/590
Seq ID 132	MVNKAPTGA	AAV9	5.31	587/590
Seq ID 133	KSPVARGDT	AAV9	5.31	587/590
Seq ID 134	LLKQRQLMD	AAV9	5.29	587/590
Seq ID 135	KMKQIELVE	AAV9	5.29	587/590

Seq ID 136	RAPNRVNDE	AAV9	5.28	587/590
Seq ID 137	TMNQAPPAQ	AAV9	5.27	587/590
Seq ID 138	LVKEDEHWI	AAV9	5.26	587/590
Seq ID 139	MIGQRDNNS	AAV9	5.25	587/590
Seq ID 140	TSHMVSHAV	AAV9	5.24	587/590
Seq ID 141	IQDEEAKYT	AAV9	5.23	587/590
Seq ID 142	TGGSKFPYM	AAV9	5.23	587/590
Seq ID 143	VEGSAQMIK	AAV9	5.21	587/590
Seq ID 144	FTDISKEPS	AAV9	5.21	587/590
Seq ID 145	TERPMMQQL	AAV9	5.20	587/590
Seq ID 146	VSLGHDKPV	AAV9	5.19	587/590
Seq ID 147	TQRTTHISDM	AAV9	5.16	587/590
Seq ID 148	TSYSTHASS	AAV9	5.15	587/590
Seq ID 149	NTKSADHEY	AAV9	5.13	587/590
Seq ID 150	RDPLREQRP	AAV9	5.13	587/590
Seq ID 151	LGQRTVQAQ	AAV9	5.12	587/590
Seq ID 152	VHDMTHQVN	AAV9	5.12	587/590
Seq ID 153	DYPEYHDIW	AAV9	5.11	587/590
Seq ID 154	QTQQGNYPK	AAV9	5.11	587/590
Seq ID 155	QASVGTVRV	AAV9	5.10	587/590
Seq ID 156	SPAHQRGVD	AAV9	5.08	587/590
Seq ID 157	QMYGEKSVS	AAV9	5.06	587/590
Seq ID 158	NTAVQRGSV	AAV9	5.06	587/590
Seq ID 159	KTIQQTQDV	AAV9	5.06	587/590
Seq ID 160	QMOTLGDDI	AAV9	5.05	587/590
Seq ID 161	SHTGQTREL	AAV9	5.04	587/590
Seq ID 162	KRQNTESAF	AAV9	5.04	587/590
Seq ID 163	NFDPLSVAE	AAV9	5.02	587/590
Seq ID 164	KILQQEPLM	AAV9	4.99	587/590
Seq ID 165	IVHAVIQST	AAV9	4.99	587/590
Seq ID 166	TMDHNPQIT	AAV9	4.99	587/590
Seq ID 167	KQPTPTNLW	AAV9	4.98	587/590
Seq ID 168	EQGNPGVSI	AAV9	4.97	587/590
Seq ID 169	IHSRVQQVT	AAV9	4.96	587/590
Seq ID 170	PQSQYRPAN	AAV9	4.95	587/590
Seq ID 171	YRRDQENAI	AAV9	4.95	587/590
Seq ID 172	TANDAIVAT	AAV9	4.94	587/590
Seq ID 173	ALYVGSKTKEGVVHGA	AAV9	4.94	588/589
Seq ID 174	MASTNVGTS	AAV9	4.93	587/590
Seq ID 175	AIQASDTYI	AAV9	4.93	587/590
Seq ID 176	NMQPRIVNA	AAV9	4.93	587/590
Seq ID 177	QSDKEQFKH	AAV9	4.92	587/590
Seq ID 178	SVINQQAKA	AAV9	4.91	587/590
Seq ID 179	NVPGSLKIQ	AAV9	4.91	587/590
Seq ID 180	RKDNIPMMV	AAV9	4.91	587/590
Seq ID 181	NKVHGTIQD	AAV9	4.90	587/590

Seq ID 182	SRKDKSEAE	AAV9	4.90	587/590
Seq ID 183	HAQASQTQF	AAV9	4.89	587/590
Seq ID 184	HLGHHDGAA	AAV9	4.89	587/590
Seq ID 185	QPQMGVMVQ	AAV9	4.89	587/590
Seq ID 186	ANLVRNIDA	AAV9	4.88	588/589
Seq ID 187	SDIKKRNAV	AAV9	4.88	587/590
Seq ID 188	RVMTNSIDV	AAV9	4.88	587/590
Seq ID 189	KHQQQLAEK	AAV9	4.88	587/590
Seq ID 190	QQTPQTHPV	AAV9	4.87	587/590
Seq ID 191	IHNAHVPHQ	AAV9	4.86	587/590
Seq ID 192	VSRTPH TDF	AAV9	4.85	587/590
Seq ID 193	MQMKGQQPP	AAV9	4.84	587/590
Seq ID 194	HQSGQVPNI	AAV9	4.84	587/590
Seq ID 195	QLTGVASGH	AAV9	4.84	587/590
Seq ID 196	PEQSPQMMF	AAV9	4.83	587/590
Seq ID 197	NTTPQASLM	AAV9	4.82	587/590
Seq ID 198	DEFGAYMPI	AAV9	4.82	587/590
Seq ID 199	PKLIQQVNT	AAV9	4.81	587/590
Seq ID 200	KPGPAQVQW	AAV9	4.81	587/590
Seq ID 201	PLKDVQLSH	AAV9	4.80	587/590
Seq ID 202	KDPFYRSEN	AAV9	4.80	587/590
Seq ID 203	SQPGNQLKM	AAV9	4.79	587/590
Seq ID 204	MQNTMRLQD	AAV9	4.79	587/590
Seq ID 205	ILVKNKDEI	AAV9	4.79	587/590
Seq ID 206	PVHGQLQGQ	AAV9	4.79	587/590
Seq ID 207	PTLPGVGMR	AAV9	4.77	587/590
Seq ID 208	PPQAAQITT	AAV9	4.77	587/590
Seq ID 209	TKVQQQDSW	AAV9	4.77	587/590
Seq ID 210	IMTSHTVAV	AAV9	4.77	587/590
Seq ID 211	HPHMAGQQM	AAV9	4.76	587/590
Seq ID 212	PVQTQHAVV	AAV9	4.75	587/590
Seq ID 213	QIGHKQEYN	AAV9	4.75	587/590
Seq ID 214	HEQQIRRD T	AAV9	4.75	587/590
Seq ID 215	DRFKTVQNE	AAV9	4.75	587/590
Seq ID 216	AAFQQTDIT	AAV9	4.74	587/590
Seq ID 217	ERSAVVMIA	AAV9	4.73	587/590
Seq ID 218	QYIQGRQPI	AAV9	4.73	587/590
Seq ID 219	LREHAYPDV	AAV9	4.73	587/590
Seq ID 220	KLMDQGVTA	AAV9	4.72	587/590
Seq ID 221	TSQKQATH T	AAV9	4.72	587/590
Seq ID 222	VPNNKNPQV	AAV9	4.72	587/590
Seq ID 223	NVVIVMIFM	AAV9	4.72	587/590
Seq ID 224	AISYRG TWSTAESGAA	AAV2	4.72	R588A/589
Seq ID 225	NTTSQTGNV	AAV9	4.71	587/590
Seq ID 226	PQESQPENE	AAV9	4.71	587/590
Seq ID 227	TMGSRQTPI	AAV9	4.71	587/590

Seq ID 228	TQVVSGQEI	AAV9	4.68	587/590
Seq ID 229	PEELKSKQT	AAV9	4.68	587/590
Seq ID 230	INKYSQYTT	AAV9	4.68	587/590
Seq ID 231	QPTQGTLR	AAV9	4.68	587/590
Seq ID 232	NQVHTKDDS	AAV9	4.68	587/590
Seq ID 233	YITQIHEDD	AAV9	4.67	587/590
Seq ID 234	HIGGSGNTM	AAV9	4.67	587/590
Seq ID 235	HQNHPEHAV	AAV9	4.65	587/590
Seq ID 236	LKGSVQQAP	AAV9	4.65	587/590
Seq ID 237	PLIPRQEV	AAV9	4.64	587/590
Seq ID 238	TLVTQSDSS	AAV9	4.64	587/590
Seq ID 239	LKIDVTKIT	AAV9	4.62	587/590
Seq ID 240	PSHVGFSTV	AAV9	4.62	587/590
Seq ID 241	LYRDQGNIT	AAV9	4.62	587/590
Seq ID 242	SVKQMDATH	AAV9	4.61	587/590
Seq ID 243	QFDRVAQDK	AAV9	4.61	587/590
Seq ID 244	YPTGTPPAT	AAV9	4.61	587/590
Seq ID 245	DRVQSTSPH	AAV9	4.61	587/590
Seq ID 246	KTQKPYQED	AAV9	4.61	587/590
Seq ID 247	SQVAEQRGI	AAV9	4.60	587/590
Seq ID 248	SESMHGVS	AAV9	4.60	587/590
Seq ID 249	TITDQQSHG	AAV9	4.60	587/590
Seq ID 250	TRHVVTGGY	AAV9	4.59	587/590
Seq ID 251	QQNMKLQVY	AAV9	4.59	587/590
Seq ID 252	SKFTYYDPW	AAV9	4.59	587/590
Seq ID 253	MAVQHITTQ	AAV9	4.58	587/590
Seq ID 254	SSMQGASGV	AAV9	4.58	587/590
Seq ID 255	MKYSTQTQS	AAV9	4.58	587/590
Seq ID 256	IKQPQSFAQ	AAV9	4.57	587/590
Seq ID 257	TPVAQANKN	AAV9	4.57	587/590
Seq ID 258	QDVMTSPMQ	AAV9	4.57	587/590
Seq ID 259	PQVLGQDEA	AAV9	4.56	587/590
Seq ID 260	TDTVDTGSM	AAV9	4.56	587/590
Seq ID 261	AQEGARQKLHELQEKA	AAV9	4.55	588/589
Seq ID 262	ATSEYGRAY	AAV9	4.54	587/590
Seq ID 263	LKGPQQQAI	AAV9	4.54	587/590
Seq ID 264	VFREAGNVH	AAV9	4.54	587/590
Seq ID 265	PKQVSDIMF	AAV9	4.53	587/590
Seq ID 266	HMMDGGVPY	AAV9	4.53	587/590
Seq ID 267	IRAASTGHM	AAV9	4.53	587/590
Seq ID 268	PDGYHVEMF	AAV9	4.52	587/590
Seq ID 269	QAQSNNIYF	AAV9	4.52	587/590
Seq ID 270	TMNGQSKNF	AAV9	4.52	587/590
Seq ID 271	HQARREVEY	AAV9	4.52	587/590
Seq ID 272	GDQGRVVS	AAV9	4.52	587/590
Seq ID 273	ACCPLAEESDNVDSAA	AAV2	4.51	R588A/589

Seq ID 274	QQNQSIFNI	AAV9	4.51	587/590
Seq ID 275	TSDAVKTDQ	AAV9	4.51	587/590
Seq ID 276	TQAPDVLPV	AAV9	4.51	587/590
Seq ID 277	TTDTAKATY	AAV9	4.50	587/590
Seq ID 278	IDEHSEHYV	AAV9	4.49	587/590
Seq ID 279	PINSRIVDP	AAV9	4.49	587/590
Seq ID 280	PDQRGHMYA	AAV9	4.49	587/590
Seq ID 281	FLMSHSEVQ	AAV9	4.49	587/590
Seq ID 282	FIQQSNERN	AAV9	4.48	587/590
Seq ID 283	NPTRDAKPP	AAV9	4.48	587/590
Seq ID 284	RWGRAQEDE	AAV9	4.47	587/590
Seq ID 285	PRNMQPMTD	AAV9	4.46	587/590
Seq ID 286	MVSQREINQ	AAV9	4.45	587/590
Seq ID 287	MSSSTRMAV	AAV9	4.45	587/590
Seq ID 288	PLNQHQKIS	AAV9	4.45	587/590
Seq ID 289	DNASHVHMVQ	AAV9	4.44	587/590
Seq ID 290	DMKRVDYMQ	AAV9	4.44	587/590
Seq ID 291	NHLVDRITQ	AAV9	4.43	587/590
Seq ID 292	VIQASSITA	AAV9	4.43	587/590
Seq ID 293	AQAMTNKNK	AAV9	4.43	587/590
Seq ID 294	INFKQEVHQ	AAV9	4.43	587/590
Seq ID 295	AYAQLPHEK	AAV9	4.43	587/590
Seq ID 296	AVTIQNWCKRGRKQCA	AAV2	4.42	R588A/589
Seq ID 297	NPQNSGMAM	AAV9	4.42	587/590
Seq ID 298	SRDRDTAYA	AAV9	4.41	587/590
Seq ID 299	PHNSPGMTR	AAV9	4.41	587/590
Seq ID 300	KMMPSQMQD	AAV9	4.40	587/590
Seq ID 301	NHAPVHERM	AAV9	4.39	587/590
Seq ID 302	RALKQIDAD	AAV9	4.39	587/590
Seq ID 303	QRVEGFIQD	AAV9	4.38	587/590
Seq ID 304	AKTDSCQGDSGGPLVA	AAV2	4.37	R588A/589
Seq ID 305	TSASVQSAM	AAV9	4.37	587/590
Seq ID 306	NVTTHAPTI	AAV9	4.37	587/590
Seq ID 307	RVQTPDHDH	AAV9	4.37	587/590
Seq ID 308	QVTKEFASF	AAV9	4.37	587/590
Seq ID 309	ASVTPQYLY	AAV9	4.37	587/590
Seq ID 310	VTQKTDNTL	AAV9	4.36	587/590
Seq ID 311	VKMGIQAIA	AAV9	4.35	587/590
Seq ID 312	PLDNYLASM	AAV9	4.35	587/590
Seq ID 313	DENGGVPRI	AAV9	4.35	587/590
Seq ID 314	HWQQPSIDG	AAV9	4.34	587/590
Seq ID 315	TPSQGSHGS	AAV9	4.33	587/590
Seq ID 316	HNGMNQVDK	AAV9	4.33	587/590
Seq ID 317	PHMHNMATP	AAV9	4.32	587/590
Seq ID 318	IQVRDRTPE	AAV9	4.31	587/590
Seq ID 319	APDAHTRMP	AAV9	4.31	587/590

Seq ID 320	GAVSHHQM	AAV9	4.31	587/590
Seq ID 321	NVQRTGVGN	AAV9	4.31	587/590
Seq ID 322	PDMLOQKMY	AAV9	4.31	587/590
Seq ID 323	NYFASSDQM	AAV9	4.30	587/590
Seq ID 324	PRQGLAHM	AAV9	4.30	587/590
Seq ID 325	SQQVSKQMQ	AAV9	4.30	587/590
Seq ID 326	KRNQEGNGV	AAV9	4.29	587/590
Seq ID 327	PMHSSHNDK	AAV9	4.28	587/590
Seq ID 328	TLQPQHIAK	AAV9	4.28	587/590
Seq ID 329	SAGVVISVV	AAV9	4.28	587/590
Seq ID 330	PLVPRNTPQ	AAV9	4.28	587/590
Seq ID 331	PNQTQMLNK	AAV9	4.27	587/590
Seq ID 332	PMSSEYRPS	AAV9	4.27	587/590
Seq ID 333	ESAHSEFKV	AAV9	4.27	587/590
Seq ID 334	PQRVQEQT	AAV9	4.27	587/590
Seq ID 335	MVQQSLKPA	AAV9	4.26	587/590
Seq ID 336	EQQPAQYHG	AAV9	4.25	587/590
Seq ID 337	TRNAQTTP	AAV9	4.25	587/590
Seq ID 338	PARSGVQIV	AAV9	4.25	587/590
Seq ID 339	DVFTRQSEG	AAV9	4.24	587/590
Seq ID 340	SMHTHQGGQ	AAV9	4.24	587/590
Seq ID 341	VNQNVRMED	AAV9	4.24	587/590
Seq ID 342	LPQAKMADM	AAV9	4.24	587/590
Seq ID 343	RMMDNSIHT	AAV9	4.24	587/590
Seq ID 344	MEATAEHRI	AAV9	4.24	587/590
Seq ID 345	DARAHTQQV	AAV9	4.24	587/590
Seq ID 346	IKDMEPQLH	AAV9	4.22	587/590
Seq ID 347	ALITILGTVKPNANRA	AAV9	4.22	588/589
Seq ID 348	NHQARTGEF	AAV9	4.21	587/590
Seq ID 349	PKNHPVSAV	AAV9	4.20	587/590
Seq ID 350	KFPTEDKYI	AAV9	4.20	587/590
Seq ID 351	SPVATQKMV	AAV9	4.20	587/590
Seq ID 352	DLAEHTRFK	AAV9	4.20	587/590
Seq ID 353	SNTQPRPQQ	AAV9	4.19	587/590
Seq ID 354	TIDITPRKL	AAV9	4.18	587/590
Seq ID 355	PAFVDENPP	AAV9	4.18	587/590
Seq ID 356	VSQETRITI	AAV9	4.17	587/590
Seq ID 357	EHTGGQFRL	AAV9	4.17	587/590
Seq ID 358	MLGKSDQVW	AAV9	4.16	587/590
Seq ID 359	PQRDMVNMK	AAV9	4.15	587/590
Seq ID 360	NSRPGAAMA	AAV9	4.14	587/590
Seq ID 361	TQQAPHNAY	AAV9	4.14	587/590
Seq ID 362	PNITGGAIM	AAV9	4.12	587/590
Seq ID 363	PDQKMMFKL	AAV9	4.11	587/590
Seq ID 364	LKHATVEST	AAV9	4.11	587/590
Seq ID 365	QLSRDTRQD	AAV9	4.11	587/590

Seq ID 366	PDSKPHAYH	AAV9	4.11	587/590
Seq ID 367	MQPPAQQRT	AAV9	4.11	587/590
Seq ID 368	VTIFDMFDQ	AAV9	4.10	587/590
Seq ID 369	IMAYTGQPV	AAV9	4.10	587/590
Seq ID 370	RTEYEMSTR	AAV9	4.10	587/590
Seq ID 371	QAQRKTEFI	AAV9	4.10	587/590
Seq ID 372	QGNETKPNS	AAV9	4.10	587/590
Seq ID 373	RMASQGQDM	AAV9	4.10	587/590
Seq ID 374	PKDGVPMQ	AAV9	4.08	587/590
Seq ID 375	TIAPAIANL	AAV9	4.08	587/590
Seq ID 376	RTHQSSPDS	AAV9	4.08	587/590
Seq ID 377	PTTDMQSNI	AAV9	4.08	587/590
Seq ID 378	HATSQKYET	AAV9	4.07	587/590
Seq ID 379	ALGQARSDA	AAV9	4.07	588/589
Seq ID 380	PIATAYKTG	AAV9	4.07	587/590
Seq ID 381	HFKPTQDTS	AAV9	4.06	587/590
Seq ID 382	RPNTKAMQE	AAV9	4.06	587/590
Seq ID 383	NMPQGRVAM	AAV9	4.06	587/590
Seq ID 384	KTINTPNIL	AAV9	4.05	587/590
Seq ID 385	SRIQHDGAQ	AAV9	4.05	587/590
Seq ID 386	HPPMPNNTK	AAV9	4.04	587/590
Seq ID 387	RIMPQMQHD	AAV9	4.04	587/590
Seq ID 388	AVILELDKTVEHLPTA	AAV2	4.03	R588A/589
Seq ID 389	HSTARSGEF	AAV9	4.03	587/590
Seq ID 390	SQPQHMNVS	AAV9	4.03	587/590
Seq ID 391	PGGSYSHVV	AAV9	4.03	587/590
Seq ID 392	TVTHAHPTT	AAV9	4.02	587/590
Seq ID 393	IVATAPRVA	AAV9	4.02	587/590
Seq ID 394	VRTSVAIE	AAV9	4.02	587/590
Seq ID 395	MIVPTPMNQ	AAV9	4.01	587/590
Seq ID 396	IQVMHSTTH	AAV9	4.01	587/590
Seq ID 397	QEPTYKNEV	AAV9	4.00	587/590
Seq ID 398	VVPTMNNTR	AAV9	4.00	587/590
Seq ID 399	RETTVYPLQ	AAV9	4.00	587/590
Seq ID 400	RITTESTIH	AAV9	4.00	587/590
Seq ID 401	AEEVAARRARVWCAA	AAV2	3.99	R588A/589
Seq ID 402	DPVRRKMQV	AAV9	3.99	587/590
Seq ID 403	PYSSKTQDP	AAV9	3.98	587/590
Seq ID 404	WPETKQEKs	AAV9	3.97	587/590
Seq ID 405	PNTQHLKAE	AAV9	3.97	587/590
Seq ID 406	WQSTGKQSI	AAV9	3.97	587/590
Seq ID 407	KASTDPHSR	AAV9	3.97	587/590
Seq ID 408	KPTGTIQGY	AAV9	3.95	587/590
Seq ID 409	HLGTAIVQP	AAV9	3.95	587/590
Seq ID 410	PKFSHATSE	AAV9	3.94	587/590
Seq ID 411	IRDGIQMHV	AAV9	3.94	587/590

Seq ID 412	TTNQERLQS	AAV9	3.94	587/590
Seq ID 413	QIKVPPLDQ	AAV9	3.94	587/590
Seq ID 414	LHHERGPSA	AAV9	3.92	587/590
Seq ID 415	KPLGQAQVQ	AAV9	3.91	587/590
Seq ID 416	TPASATRDS	AAV9	3.91	587/590
Seq ID 417	PQQTQVSGQ	AAV9	3.91	587/590
Seq ID 418	ERSSQSIIQ	AAV9	3.90	587/590
Seq ID 419	YHEWRHIPT	AAV9	3.89	587/590
Seq ID 420	PLQASGTAY	AAV9	3.88	587/590
Seq ID 421	TNNGVRSII	AAV9	3.88	587/590
Seq ID 422	VQPEITPGQ	AAV9	3.88	587/590
Seq ID 423	QDDHNKVQQ	AAV9	3.87	587/590
Seq ID 424	PIVKQNTDT	AAV9	3.86	587/590
Seq ID 425	HTLPRLQEE	AAV9	3.86	587/590
Seq ID 426	QPTQGTVRA	AAV9	3.86	587/590
Seq ID 427	TRPQGPLSP	AAV9	3.86	587/590
Seq ID 428	TYAOPHQNQ	AAV9	3.84	587/590
Seq ID 429	IQMEKQQQV	AAV9	3.84	587/590
Seq ID 430	TQTPPDAS	AAV9	3.84	587/590
Seq ID 431	SGAQEKWEM	AAV9	3.84	587/590
Seq ID 432	ASDTEKEDRSPAIFA	AAV9	3.83	588/589
Seq ID 433	PNYQTKMSF	AAV9	3.83	587/590
Seq ID 434	RPGAAVAPA	AAV9	3.82	587/590
Seq ID 435	LAGSHVSTQ	AAV9	3.82	587/590
Seq ID 436	LPPGNQTN	AAV9	3.82	587/590
Seq ID 437	NHQHDIWF	AAV9	3.82	587/590
Seq ID 438	ISEDGSNRK	AAV9	3.81	587/590
Seq ID 439	SMGIHPTNA	AAV9	3.81	587/590
Seq ID 440	TPLAMASQK	AAV9	3.81	587/590
Seq ID 441	NVTSNTIQF	AAV9	3.80	587/590
Seq ID 442	NYNTVPQPK	AAV9	3.80	587/590
Seq ID 443	PRVLQGVQV	AAV9	3.79	587/590
Seq ID 444	TGTRTSAQQ	AAV9	3.79	587/590
Seq ID 445	NHHRPDVfV	AAV9	3.79	587/590
Seq ID 446	PGPNERQIM	AAV9	3.78	587/590
Seq ID 447	PHDRLPQEV	AAV9	3.78	587/590
Seq ID 448	PNAGVMDEE	AAV9	3.78	587/590
Seq ID 449	TAHYRTAET	AAV9	3.78	587/590
Seq ID 450	RPQSSATTH	AAV9	3.77	587/590
Seq ID 451	IAHFQPKDT	AAV9	3.76	587/590
Seq ID 452	FAHPEKGFF	AAV9	3.76	587/590
Seq ID 453	QAYAKTAQL	AAV9	3.75	587/590
Seq ID 454	TTSVSVMPK	AAV9	3.75	587/590
Seq ID 455	ASVDTEQRR	AAV9	3.75	587/590
Seq ID 456	WHEAIVTG	AAV9	3.74	587/590
Seq ID 457	VDNDIEWKF	AAV9	3.74	587/590

Seq ID 458	NRVGSQAPT	AAV9	3.73	587/590
Seq ID 459	AAVIVANPREIIVKA	AAV2	3.72	R588A/589
Seq ID 460	PTTPQMVSL	AAV9	3.72	587/590
Seq ID 461	ALKNFAKYFLHQSHEA	AAV2	3.71	R588A/589
Seq ID 462	KYVNVEVQT	AAV9	3.71	587/590
Seq ID 463	LLDAGTSGK	AAV9	3.71	587/590
Seq ID 464	NAPAQQKMM	AAV9	3.70	587/590
Seq ID 465	VDDHAHRQQ	AAV9	3.70	587/590
Seq ID 466	PVKLANPTN	AAV9	3.70	587/590
Seq ID 467	HALVHQGAV	AAV9	3.70	587/590
Seq ID 468	VFQKSHSTE	AAV9	3.69	587/590
Seq ID 469	FKQRDSNET	AAV9	3.69	587/590
Seq ID 470	EQMSQRVGF	AAV9	3.69	587/590
Seq ID 471	RQAGQFPDS	AAV9	3.69	587/590
Seq ID 472	ESQANAHNA	AAV9	3.69	587/590
Seq ID 473	PPDSKSLNQ	AAV9	3.69	587/590
Seq ID 474	PEQPSQSQY	AAV9	3.69	587/590
Seq ID 475	DGIHTSVQM	AAV9	3.69	587/590
Seq ID 476	RFDLQEGQS	AAV9	3.69	587/590
Seq ID 477	DRDRAMMNI	AAV9	3.69	587/590
Seq ID 478	YPPEAQMEM	AAV9	3.68	587/590
Seq ID 479	TAVTTHNGS	AAV9	3.68	587/590
Seq ID 480	EWALDQYGA	AAV9	3.68	587/590
Seq ID 481	ITQSNERMT	AAV9	3.68	587/590
Seq ID 482	NITHQTMLQ	AAV9	3.67	587/590
Seq ID 483	MMNGSQQFQ	AAV9	3.67	587/590
Seq ID 484	QQTTRGVQQ	AAV9	3.66	587/590
Seq ID 485	LVNPDPMQY	AAV9	3.66	587/590
Seq ID 486	HTHDMDMTP	AAV9	3.66	587/590
Seq ID 487	PQTKNTMDD	AAV9	3.66	587/590
Seq ID 488	DPERQTRPY	AAV9	3.66	587/590
Seq ID 489	TKARSDPLE	AAV9	3.65	587/590
Seq ID 490	RVNDQPYQM	AAV9	3.65	587/590
Seq ID 491	RPSNVDSAT	AAV9	3.65	587/590
Seq ID 492	RMSNDQKSF	AAV9	3.64	587/590
Seq ID 493	SMTSAFDRI	AAV9	3.64	587/590
Seq ID 494	IHDKQMNNQ	AAV9	3.63	587/590
Seq ID 495	NEYFPYEDL	AAV9	3.63	587/590
Seq ID 496	SIVPTANQD	AAV9	3.63	587/590
Seq ID 497	IFEQAHTNK	AAV9	3.62	587/590
Seq ID 498	AGDTRSLQV	AAV9	3.62	587/590
Seq ID 499	LQNQTKPVI	AAV9	3.62	587/590
Seq ID 500	QGDIVQHFF	AAV9	3.61	587/590
Seq ID 501	EIQTYKSIV	AAV9	3.61	587/590
Seq ID 502	KAPSIVQGT	AAV9	3.61	587/590
Seq ID 503	QTPQHGTVL	AAV9	3.61	587/590

Seq ID 504	KLMTMYDGQ	AAV9	3.60	587/590
Seq ID 505	LWTNQPSAW	AAV9	3.60	587/590
Seq ID 506	HSDQMRQMF	AAV9	3.60	587/590
Seq ID 507	EWQNEATPA	AAV9	3.60	587/590
Seq ID 508	RPERDPMHI	AAV9	3.60	587/590
Seq ID 509	AVWQAANTH	AAV9	3.60	587/590
Seq ID 510	RTATTQGGF	AAV9	3.57	587/590
Seq ID 511	PTNLVEAGE	AAV9	3.57	587/590
Seq ID 512	TRMNQTPLQ	AAV9	3.57	587/590
Seq ID 513	PSFTQDRDR	AAV9	3.56	587/590
Seq ID 514	SSAAHTVTY	AAV9	3.56	587/590
Seq ID 515	SHPQPFMKW	AAV9	3.56	587/590
Seq ID 516	QQGVREAFI	AAV9	3.56	587/590
Seq ID 517	AQSPLVSSSDSPRPA	AAV2	3.55	R588A/589
Seq ID 518	DSAVRQNPF	AAV9	3.55	587/590
Seq ID 519	KSNSMQEAH	AAV9	3.55	587/590
Seq ID 520	PRQLSSIPS	AAV9	3.54	587/590
Seq ID 521	DPSAQKQNY	AAV9	3.54	587/590
Seq ID 522	TGAFDDHDI	AAV9	3.54	587/590
Seq ID 523	NGTHLVTRA	AAV9	3.54	587/590
Seq ID 524	TGGKVQLGS	AAV9	3.53	587/590
Seq ID 525	KQLKTMNDF	AAV9	3.53	587/590
Seq ID 526	PHDTRIAVD	AAV9	3.53	587/590
Seq ID 527	ERHIAHTWT	AAV9	3.53	587/590
Seq ID 528	YRPHPQQHP	AAV9	3.53	587/590
Seq ID 529	YNLPQPKEI	AAV9	3.53	587/590
Seq ID 530	DTQQQPPYK	AAV9	3.52	587/590
Seq ID 531	QSNQVKQMD	AAV9	3.52	587/590
Seq ID 532	IEVKQQQNG	AAV9	3.51	587/590
Seq ID 533	DQTHNIMQK	AAV9	3.51	587/590
Seq ID 534	VQEEGWLYA	AAV9	3.50	587/590
Seq ID 535	KQMVAQMSM	AAV9	3.50	587/590
Seq ID 536	SINGQQHDY	AAV9	3.50	587/590
Seq ID 537	TPDMFKSPN	AAV9	3.50	587/590
Seq ID 538	GNHSVHHQQ	AAV9	3.50	587/590
Seq ID 539	ENSRTTTVG	AAV9	3.49	587/590
Seq ID 540	TFVVGQSGK	AAV9	3.49	587/590
Seq ID 541	APLRPQTGE	AAV9	3.49	587/590
Seq ID 542	QTSSSTHHA	AAV9	3.49	587/590
Seq ID 543	KIAATALSS	AAV9	3.49	587/590
Seq ID 544	PESGQSKMH	AAV9	3.48	587/590
Seq ID 545	VISVGQMAK	AAV9	3.48	587/590
Seq ID 546	AERPQQGMH	AAV9	3.48	587/590
Seq ID 547	TQQNQIIQR	AAV9	3.47	587/590
Seq ID 548	ARQAQEKFGKDKSPKA	AAV2	3.47	R588A/589
Seq ID 549	VTAVTTPSH	AAV9	3.47	587/590

Seq ID 550	SQVRGPETT	AAV9	3.47	587/590
Seq ID 551	PLNHQQIQR	AAV9	3.46	587/590
Seq ID 552	AVVPRPHEI	AAV9	3.46	587/590
Seq ID 553	TPNMEDNRQ	AAV9	3.46	587/590
Seq ID 554	HRVTGVNDV	AAV9	3.46	587/590
Seq ID 555	FTGNQGAQN	AAV9	3.46	587/590
Seq ID 556	PRLAETSSQ	AAV9	3.45	587/590
Seq ID 557	SPRQSDPAH	AAV9	3.45	587/590
Seq ID 558	MNDDQQPPP	AAV9	3.44	587/590
Seq ID 559	QMKPLPQAM	AAV9	3.43	587/590
Seq ID 560	YSRHENISY	AAV9	3.43	587/590
Seq ID 561	TEGERVGML	AAV9	3.43	587/590
Seq ID 562	NHVPVLWAD	AAV9	3.43	587/590
Seq ID 563	TLAPLATT	AAV9	3.43	587/590
Seq ID 564	NQRDVTNLT	AAV9	3.43	587/590
Seq ID 565	QQNNTVPNQ	AAV9	3.43	587/590
Seq ID 566	EKNMHTGVH	AAV9	3.42	587/590
Seq ID 567	VTLQGATPN	AAV9	3.42	587/590
Seq ID 568	PTKTSTGQM	AAV9	3.42	587/590
Seq ID 569	FNVDQHRNS	AAV9	3.42	587/590
Seq ID 570	PMTLLKDIQ	AAV9	3.42	587/590
Seq ID 571	DPTRPIETV	AAV9	3.42	587/590
Seq ID 572	ERKQQLSEM	AAV9	3.42	587/590
Seq ID 573	NQEQFGMIV	AAV9	3.42	587/590
Seq ID 574	TTQIMVGTK	AAV9	3.41	587/590
Seq ID 575	MYAKTEVQW	AAV9	3.41	587/590
Seq ID 576	PVGHQMDVY	AAV9	3.41	587/590
Seq ID 577	QVFQDRTSL	AAV9	3.40	587/590
Seq ID 578	LKDNQQATF	AAV9	3.40	587/590
Seq ID 579	AGNTHTLIN	AAV9	3.40	587/590
Seq ID 580	KVPPQHLTA	AAV9	3.40	587/590
Seq ID 581	GIVTATRVQ	AAV9	3.40	587/590
Seq ID 582	NIAHHQGSN	AAV9	3.39	587/590
Seq ID 583	PAMPGAAAR	AAV9	3.39	587/590
Seq ID 584	VQSITPPQS	AAV9	3.39	587/590
Seq ID 585	QATHQGQNH	AAV9	3.39	587/590
Seq ID 586	PTNAPGVTE	AAV9	3.39	587/590
Seq ID 587	MHRAQAIAE	AAV9	3.39	587/590
Seq ID 588	AQASEKMMK	AAV9	3.39	587/590
Seq ID 589	RMNIPPNGT	AAV9	3.38	587/590
Seq ID 590	RPSDINSGD	AAV9	3.38	587/590
Seq ID 591	MQPKSAQNV	AAV9	3.38	587/590
Seq ID 592	LAASMQGAH	AAV9	3.38	587/590
Seq ID 593	TSIITQAAN	AAV9	3.37	587/590
Seq ID 594	SDREETFNM	AAV9	3.37	587/590
Seq ID 595	NQYNMQPSK	AAV9	3.37	587/590

Seq ID 596	WVSEEHFLT	AAV9	3.37	587/590
Seq ID 597	QSATSVTSQ	AAV9	3.37	587/590
Seq ID 598	HARQSYNDP	AAV9	3.36	587/590
Seq ID 599	AMNVISHDGTPA	AAV2	3.36	R588A/589
Seq ID 600	STIMSEAEF	AAV9	3.36	587/590
Seq ID 601	HANTNVLEK	AAV9	3.36	587/590
Seq ID 602	KPQVTPAVH	AAV9	3.36	587/590
Seq ID 603	AMPDRTMMR	AAV9	3.36	587/590
Seq ID 604	VAIGQTKTL	AAV9	3.34	587/590
Seq ID 605	PTDYSVKSV	AAV9	3.34	587/590
Seq ID 606	IGHHKEMKE	AAV9	3.34	587/590
Seq ID 607	ASQAIHYNA	AAV9	3.34	587/590
Seq ID 608	QVRMEGAEY	AAV9	3.34	587/590
Seq ID 609	MKERHEHFE	AAV9	3.34	587/590
Seq ID 610	GQVLMAGTR	AAV9	3.34	587/590
Seq ID 611	TVSMPVSHA	AAV9	3.33	587/590
Seq ID 612	NHDRVNVQP	AAV9	3.33	587/590
Seq ID 613	EELGILNLQ	AAV9	3.33	587/590
Seq ID 614	ANGNFQVLK	AAV9	3.33	587/590
Seq ID 615	RQYNTESMH	AAV9	3.33	587/590
Seq ID 616	MKVSAQVQS	AAV9	3.32	587/590
Seq ID 617	NVSQQKMVQ	AAV9	3.31	587/590
Seq ID 618	RQQNQDKFS	AAV9	3.31	587/590
Seq ID 619	MSSRTMEIH	AAV9	3.31	587/590
Seq ID 620	HEMIKQSGP	AAV9	3.31	587/590
Seq ID 621	QDTRAGKF	AAV9	3.30	587/590
Seq ID 622	KWEQRGMAH	AAV9	3.30	587/590
Seq ID 623	TKQHTEMQQ	AAV9	3.29	587/590
Seq ID 624	PMQALQNML	AAV9	3.29	587/590
Seq ID 625	KVAFQQQIE	AAV9	3.29	587/590
Seq ID 626	QVPRQEVNE	AAV9	3.28	587/590
Seq ID 627	HLEREHKWD	AAV9	3.28	587/590
Seq ID 628	IQRKIQDLA	AAV9	3.28	587/590
Seq ID 629	IKGTDSMQQ	AAV9	3.28	587/590
Seq ID 630	TMVSGEARQ	AAV9	3.28	587/590
Seq ID 631	TMVASRQPP	AAV9	3.28	587/590
Seq ID 632	QQRQHQEIT	AAV9	3.27	587/590
Seq ID 633	NPESMEAYI	AAV9	3.27	587/590
Seq ID 634	TSQNGKMSV	AAV9	3.27	587/590
Seq ID 635	SRTSTQPQE	AAV9	3.26	587/590
Seq ID 636	RYAVKGETD	AAV9	3.26	587/590
Seq ID 637	VALYPNHAE	AAV9	3.26	587/590
Seq ID 638	QQTTHIDS	AAV9	3.26	587/590
Seq ID 639	SSMQEASQI	AAV9	3.26	587/590
Seq ID 640	KMNSPNQER	AAV9	3.25	587/590
Seq ID 641	MTNRTPASN	AAV9	3.25	587/590

Seq ID 642	IGVRPMISP	AAV9	3.25	587/590
Seq ID 643	RQADSRTIE	AAV9	3.25	587/590
Seq ID 644	EMRNHPAVQ	AAV9	3.25	587/590
Seq ID 645	MRTNEPHKE	AAV9	3.24	587/590
Seq ID 646	PTIQRQGMN	AAV9	3.24	587/590
Seq ID 647	DIDPEDIST	AAV9	3.23	587/590
Seq ID 648	EIKMQSTQA	AAV9	3.23	587/590
Seq ID 649	QNFP SQNAA	AAV9	3.23	587/590
Seq ID 650	YRTGPDEIQ	AAV9	3.23	587/590
Seq ID 651	IQHTSHHE	AAV9	3.23	587/590
Seq ID 652	IISTQEGHI	AAV9	3.22	587/590
Seq ID 653	PEGDNTFMI	AAV9	3.22	587/590
Seq ID 654	RANA EYLS D	AAV9	3.22	587/590
Seq ID 655	EVSLPSNVK	AAV9	3.22	587/590
Seq ID 656	RMDINRATD	AAV9	3.22	587/590
Seq ID 657	HPSPNTAYV	AAV9	3.22	587/590
Seq ID 658	SYHSWFPMG	AAV9	3.21	587/590
Seq ID 659	AGDRQHMAA	AAV9	3.21	587/590
Seq ID 660	QPKKWGADY	AAV9	3.21	587/590
Seq ID 661	LKQDSRPTY	AAV9	3.21	587/590
Seq ID 662	VSSYQLKSD	AAV9	3.21	587/590
Seq ID 663	RGHSVSDNA	AAV9	3.21	587/590
Seq ID 664	HQAQNQMFK	AAV9	3.20	587/590
Seq ID 665	QASN FITVP	AAV9	3.20	587/590
Seq ID 666	VEPHYQQQW	AAV9	3.20	587/590
Seq ID 667	TQGRS QEAT	AAV9	3.20	587/590
Seq ID 668	ATSSRTTLA	AAV9	3.20	588/589
Seq ID 669	PSSIGKHDN	AAV9	3.19	587/590
Seq ID 670	RHSGDSIPE	AAV9	3.19	587/590
Seq ID 671	ARPA TTQSN	AAV9	3.19	587/590
Seq ID 672	PAPSGNTMA	AAV9	3.19	587/590
Seq ID 673	KSPSMSVVL	AAV9	3.18	587/590
Seq ID 674	IPGPNGQIP	AAV9	3.18	587/590
Seq ID 675	PQDYHMSEH	AAV9	3.18	587/590
Seq ID 676	ATHLRVIYERMNQSLA	AAV9	3.18	588/589
Seq ID 677	AHGKREVALHLHPDHA	AAV2	3.18	R588A/589
Seq ID 678	PHTHAQMNL	AAV9	3.18	587/590
Seq ID 679	TVPSQQPGT	AAV9	3.18	587/590
Seq ID 680	AEYKDCHLAQVPSHTA	AAV2	3.17	R588A/589
Seq ID 681	AVGALIQRGFIRPKDA	AAV2	3.17	R588A/589
Seq ID 682	TETDPMQRM	AAV9	3.17	587/590
Seq ID 683	HRQVAGEST	AAV9	3.17	587/590
Seq ID 684	SQSPTRIIQ	AAV9	3.17	587/590
Seq ID 685	RLAIPDGIT	AAV9	3.17	587/590
Seq ID 686	RPPQNPQTI	AAV9	3.17	587/590
Seq ID 687	VELMRTHST	AAV9	3.17	587/590

Seq ID 688	HQPQYSKSD	AAV9	3.16	587/590
Seq ID 689	ATMQCAHTA	AAV2	3.16	R588A/589
Seq ID 690	KMGGVAAKI	AAV9	3.16	587/590
Seq ID 691	TMNKSADRG	AAV9	3.16	587/590
Seq ID 692	EVDDFVSYG	AAV9	3.16	587/590
Seq ID 693	PMSQKVQSA	AAV9	3.15	587/590
Seq ID 694	IHSKANDVL	AAV9	3.15	587/590
Seq ID 695	AVVSPANAA	AAV9	3.15	587/590
Seq ID 696	RQTQTASEY	AAV9	3.14	587/590
Seq ID 697	MESHPQAPQ	AAV9	3.14	587/590
Seq ID 698	TFRESEMIM	AAV9	3.14	587/590
Seq ID 699	HHTPQNMVN	AAV9	3.13	587/590
Seq ID 700	KTQQMTPVT	AAV9	3.13	587/590
Seq ID 701	IAPQQTYWK	AAV9	3.13	587/590
Seq ID 702	EVHSKVMHP	AAV9	3.13	587/590
Seq ID 703	NKSTSTVAW	AAV9	3.13	587/590
Seq ID 704	ADSAQAMTK	AAV9	3.12	587/590
Seq ID 705	MESRKPNDI	AAV9	3.12	587/590
Seq ID 706	NVAQTMIRV	AAV9	3.11	587/590
Seq ID 707	HPRDHEHVD	AAV9	3.11	587/590
Seq ID 708	RVNGSQKES	AAV9	3.11	587/590
Seq ID 709	YSRASSETA	AAV9	3.11	587/590
Seq ID 710	NWGQTQAKQ	AAV9	3.11	587/590
Seq ID 711	AQEMSKDLEEVKAKVA	AAV2	3.11	R588A/589
Seq ID 712	REMRASQVE	AAV9	3.10	587/590
Seq ID 713	QYIQEHVAK	AAV9	3.10	587/590
Seq ID 714	QVAQTTLPI	AAV9	3.10	587/590
Seq ID 715	NTVQNMAHQ	AAV9	3.10	587/590
Seq ID 716	TQSREMDTQ	AAV9	3.10	587/590
Seq ID 717	DDAAHHGFD	AAV9	3.10	587/590
Seq ID 718	AATPSPVLPDIVMEAA	AAV2	3.10	R588A/589
Seq ID 719	QQASGNNLR	AAV9	3.10	587/590
Seq ID 720	AKVVTDSMS	AAV9	3.09	587/590
Seq ID 721	SQVVSQGSQ	AAV9	3.09	587/590
Seq ID 722	FQHRANSME	AAV9	3.09	587/590
Seq ID 723	ANRGTEWDA	AAV9	3.09	588/589
Seq ID 724	TIDEVDIGY	AAV9	3.08	587/590
Seq ID 725	LQYKAMQVS	AAV9	3.08	587/590
Seq ID 726	AIPVCEAFQCTALSNA	AAV2	3.08	R588A/589
Seq ID 727	TEDSPQMTQ	AAV9	3.08	587/590
Seq ID 728	SGSMTPTTV	AAV9	3.08	587/590
Seq ID 729	LPMPQSQGI	AAV9	3.08	587/590
Seq ID 730	SYTPQSQT	AAV9	3.08	587/590
Seq ID 731	SASKSFPTA	AAV9	3.08	587/590
Seq ID 732	PSQPMKFIN	AAV9	3.08	587/590
Seq ID 733	VEAQHKPAY	AAV9	3.07	587/590

Seq ID 734	IPSPVTAYW	AAV9	3.07	587/590
Seq ID 735	NYLSTSVPR	AAV9	3.07	587/590
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Seq ID 740	KPQGVNVTY	AAV9	3.06	587/590
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Seq ID 742	AAEPAPDFSDYSEMAA	AAV9	3.05	588/589
Seq ID 743	QRQGGMEAK	AAV9	3.05	587/590
Seq ID 744	TASVKQQNT	AAV9	3.05	587/590
Seq ID 745	HRNTESGDQ	AAV9	3.05	587/590
Seq ID 746	FPKSYEQVQ	AAV9	3.05	587/590
Seq ID 747	QGASQRVAI	AAV9	3.05	587/590
Seq ID 748	HPMAKDVVK	AAV9	3.04	587/590
Seq ID 749	REQKLYKEP	AAV9	3.04	587/590
Seq ID 750	TEQQWYGRM	AAV9	3.04	587/590
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Seq ID 752	QRTAVNEMQ	AAV9	3.04	587/590
Seq ID 753	PQNAQRVDT	AAV9	3.04	587/590
Seq ID 754	KDDDKVGIV	AAV9	3.04	587/590
Seq ID 755	APAPAAPPSTPAAPKA	AAV2	3.04	R588A/589
Seq ID 756	NHAVMHTVS	AAV9	3.04	587/590
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Seq ID 758	DIQHATKRE	AAV9	3.03	587/590
Seq ID 759	ATQAHTMMY	AAV9	3.03	587/590
Seq ID 760	QGTSEASRY	AAV9	3.03	587/590
Seq ID 761	RNSHGMSSES	AAV9	3.03	587/590
Seq ID 762	PNSAHNNSY	AAV9	3.02	587/590
Seq ID 763	TTGASKDKV	AAV9	3.02	587/590
Seq ID 764	DRTGVWAGE	AAV9	3.02	587/590
Seq ID 765	VQTLDRGSQ	AAV9	3.02	587/590
Seq ID 766	DATAHSLIQ	AAV9	3.02	587/590
Seq ID 767	IGQAPEVND	AAV9	3.01	587/590
Seq ID 768	HYAKVTEQA	AAV9	3.01	587/590
Seq ID 769	DPSVRSNMI	AAV9	3.01	587/590
Seq ID 770	MSKVSTQDR	AAV9	3.00	587/590
Seq ID 771	AQDRISQWA	AAV2	3.00	R588A/589
Seq ID 772	AHLAQPATLSQTIVPA	AAV2	3.00	R588A/589
Seq ID 773	NEKIRELPK	AAV9	2.99	587/590
Seq ID 774	QMTKHETYI	AAV9	2.99	587/590
Seq ID 775	GAQQYSQVS	AAV9	2.99	587/590
Seq ID 776	IQDDPMTSM	AAV9	2.98	587/590
Seq ID 777	VPTVERNLSL	AAV9	2.98	587/590
Seq ID 778	KLVMQTQTEY	AAV9	2.98	587/590
Seq ID 779	GGVPMKALI	AAV9	2.97	587/590

Seq ID 780	IQSPQQAMR	AAV9	2.97	587/590
Seq ID 781	SFHGPIKNY	AAV9	2.97	587/590
Seq ID 782	NTKDNAGKD	AAV9	2.97	587/590
Seq ID 783	ADFSDLYYHTMNNKHA	AAV2	2.97	R588A/589
Seq ID 784	QKQIMHPES	AAV9	2.97	587/590
Seq ID 785	PQPQMGHSM	AAV9	2.96	587/590
Seq ID 786	QLHTGIQNS	AAV9	2.96	587/590
Seq ID 787	AFEVMEDHAGTYGLGA	AAV2	2.96	R588A/589
Seq ID 788	SYVQPTAIM	AAV9	2.95	587/590
Seq ID 789	IQATRNVGCV	AAV9	2.95	587/590
Seq ID 790	MILVVLQSV	AAV9	2.95	587/590
Seq ID 791	KMFSSEQF	AAV9	2.95	587/590
Seq ID 792	TTDRDKMAL	AAV9	2.95	587/590
Seq ID 793	KAINTMIEA	AAV9	2.94	587/590
Seq ID 794	HMTNGTPMM	AAV9	2.94	587/590
Seq ID 795	MQNSVKQVW	AAV9	2.94	587/590
Seq ID 796	SQPKMQETG	AAV9	2.93	587/590
Seq ID 797	TESHSITPM	AAV9	2.93	587/590
Seq ID 798	QVSQGVHGO	AAV9	2.92	587/590
Seq ID 799	TTQMMPMVA	AAV9	2.92	587/590
Seq ID 800	KLTVTRRMF	AAV9	2.92	587/590
Seq ID 801	AGIATSGSA	AAV9	2.91	588/589
Seq ID 802	TPNMQMSY	AAV9	2.91	587/590
Seq ID 803	FNDQPQKIF	AAV9	2.91	587/590
Seq ID 804	PTSVHGQML	AAV9	2.91	587/590
Seq ID 805	SQTHQVGYP	AAV9	2.90	587/590
Seq ID 806	QGTATRPD	AAV9	2.90	587/590
Seq ID 807	AGGKVQIINKKLDLSA	AAV2	2.89	R588A/589
Seq ID 808	ASLSITEDA	AAV2	2.89	R588A/589
Seq ID 809	TSKPPALQG	AAV9	2.89	587/590
Seq ID 810	KVMEKQGM	AAV9	2.88	587/590
Seq ID 811	KTVESPPQQ	AAV9	2.88	587/590
Seq ID 812	AGPSVGRAKGQDAPLA	AAV9	2.88	588/589
Seq ID 813	RHPSPVNVL	AAV9	2.88	587/590
Seq ID 814	YQNDRMRGT	AAV9	2.87	587/590
Seq ID 815	LINAHQPQK	AAV9	2.87	587/590
Seq ID 816	AGHAIVENAVRSSLKGA	AAV2	2.87	R588A/589
Seq ID 817	GIGTHMTMV	AAV9	2.86	587/590
Seq ID 818	RTLHVDNSP	AAV9	2.86	587/590
Seq ID 819	ADLENLRDLLHVGGGA	AAV2	2.86	R588A/589
Seq ID 820	QEQANQRPN	AAV9	2.86	587/590
Seq ID 821	VSAQSMRNP	AAV9	2.85	587/590
Seq ID 822	TLQKQTYNP	AAV9	2.85	587/590
Seq ID 823	FLDSNHSMT	AAV9	2.85	587/590
Seq ID 824	TDYYSTDDY	AAV9	2.84	587/590
Seq ID 825	AVLTQTMGK	AAV9	2.84	587/590

Seq ID 826	PAPHSVVQM	AAV9	2.84	587/590
Seq ID 827	RPNASDIKG	AAV9	2.84	587/590
Seq ID 828	PQRNTGIVQ	AAV9	2.84	587/590
Seq ID 829	IVSQTPVAV	AAV9	2.83	587/590
Seq ID 830	PTTRIGEHP	AAV9	2.83	587/590
Seq ID 831	RQPTDSYSK	AAV9	2.83	587/590
Seq ID 832	TVGGKTYAD	AAV9	2.83	587/590
Seq ID 833	LKNPPLGNQ	AAV9	2.83	587/590
Seq ID 834	LSQSQSQTY	AAV9	2.82	587/590
Seq ID 835	PPTAQAAQYD	AAV9	2.82	587/590
Seq ID 836	NDQLHISLR	AAV9	2.82	587/590
Seq ID 837	AKNQYVEED	AAV9	2.82	587/590
Seq ID 838	QARANAFPD	AAV9	2.82	587/590
Seq ID 839	NGNFAYDHP	AAV9	2.82	587/590
Seq ID 840	ILQSNTRGI	AAV9	2.82	587/590
Seq ID 841	TQPQQHNEP	AAV9	2.82	587/590
Seq ID 842	QRHNENVQM	AAV9	2.82	587/590
Seq ID 843	AQVLRIRKRANSFLEA	AAV2	2.82	R588A/589
Seq ID 844	QLRDVQLQH	AAV9	2.82	587/590
Seq ID 845	YAKQSTQQM	AAV9	2.81	587/590
Seq ID 846	TQVLRDKQP	AAV9	2.80	587/590
Seq ID 847	QNKIEFRPE	AAV9	2.80	587/590
Seq ID 848	SSHASMSST	AAV9	2.79	587/590
Seq ID 849	RVVEQGRGI	AAV9	2.79	587/590
Seq ID 850	HRNPTVVVD	AAV9	2.79	587/590
Seq ID 851	APWNSATVLQQTYHAA	AAV2	2.79	R588A/589
Seq ID 852	MWNVTSGAE	AAV9	2.78	587/590
Seq ID 853	KTQQALVLQ	AAV9	2.78	587/590
Seq ID 854	QVHQESMFG	AAV9	2.78	587/590
Seq ID 855	QLNTTKPIA	AAV9	2.78	587/590
Seq ID 856	EQYAIKOPT	AAV9	2.78	587/590
Seq ID 857	ALGKTAETH	AAV9	2.77	587/590
Seq ID 858	KVFHTPEMN	AAV9	2.77	587/590
Seq ID 859	ASQTAPIVT	AAV9	2.77	587/590
Seq ID 860	TLKKTDDVW	AAV9	2.77	587/590
Seq ID 861	AHEALSPFYSERLKEA	AAV2	2.77	R588A/589
Seq ID 862	QINGSHRIV	AAV9	2.77	587/590
Seq ID 863	ATAQDLFTA	AAV2	2.76	R588A/589
Seq ID 864	ATAQDLFTA	AAV9	2.76	588/589
Seq ID 865	SQHTSDMES	AAV9	2.76	587/590
Seq ID 866	YRTATTTNS	AAV9	2.76	587/590
Seq ID 867	PASKQFTPD	AAV9	2.76	587/590
Seq ID 868	TATRQEVHH	AAV9	2.76	587/590
Seq ID 869	TTTGVMVAK	AAV9	2.75	587/590
Seq ID 870	NPVFHQSV A	AAV9	2.75	587/590
Seq ID 871	KPVSSQH TP	AAV9	2.75	587/590

Seq ID 872	TMATAHQTD	AAV9	2.75	587/590
Seq ID 873	VVSGVPMSQ	AAV9	2.75	587/590
Seq ID 874	MTFGMQQNK	AAV9	2.74	587/590
Seq ID 875	YGQAVVMQN	AAV9	2.74	587/590
Seq ID 876	LFHKHPDEM	AAV9	2.74	587/590
Seq ID 877	RMRDQDVT	AAV9	2.74	587/590
Seq ID 878	MKQTGGSSF	AAV9	2.73	587/590
Seq ID 879	LQASSGAMF	AAV9	2.73	587/590
Seq ID 880	NVSTTASQV	AAV9	2.73	587/590
Seq ID 881	IMQTSVGRD	AAV9	2.73	587/590
Seq ID 882	KLAGVVAIH	AAV9	2.73	587/590
Seq ID 883	EIKGAADSH	AAV9	2.72	587/590
Seq ID 884	VQQGNPMQR	AAV9	2.72	587/590
Seq ID 885	HRWVQLWRV	AAV9	2.72	587/590
Seq ID 886	RAETHKYNP	AAV9	2.72	587/590
Seq ID 887	RDPAINHDD	AAV9	2.72	587/590
Seq ID 888	PQSQGMQQR	AAV9	2.72	587/590
Seq ID 889	GIRQDQEYF	AAV9	2.71	587/590
Seq ID 890	ANCRIPA	AAV2	2.71	R588A/589
Seq ID 891	GTTMKVQMS	AAV9	2.71	587/590
Seq ID 892	NTHSSHIMV	AAV9	2.71	587/590
Seq ID 893	KQREPGNVG	AAV9	2.71	587/590
Seq ID 894	IYFNDAEQI	AAV9	2.70	587/590
Seq ID 895	NHTAKAAPL	AAV9	2.70	587/590
Seq ID 896	QHVVGQFPQ	AAV9	2.69	587/590
Seq ID 897	RIERQHNDQ	AAV9	2.69	587/590
Seq ID 898	AEAKRHRPLIALPTQA	AAV2	2.69	R588A/589
Seq ID 899	EPHTSSQQR	AAV9	2.69	587/590
Seq ID 900	AEMYCAPLKPAHSARA	AAV2	2.69	R588A/589
Seq ID 901	DPHQORMAQQ	AAV9	2.69	587/590
Seq ID 902	PSITNRQGA	AAV9	2.68	587/590
Seq ID 903	ADEPARKGKVHIPFPA	AAV2	2.68	R588A/589
Seq ID 904	LLTPQSRSS	AAV9	2.67	587/590
Seq ID 905	LTLLQGQAKQ	AAV9	2.67	587/590
Seq ID 906	QEDDQRSDR	AAV9	2.67	587/590
Seq ID 907	PTNPGEVPV	AAV9	2.66	587/590
Seq ID 908	MLSNEDGTN	AAV9	2.66	587/590
Seq ID 909	PMEMTTSELF	AAV9	2.65	587/590
Seq ID 910	MPTQSRQYI	AAV9	2.65	587/590
Seq ID 911	SKTQHTNPE	AAV9	2.65	587/590
Seq ID 912	QDSFFQRWA	AAV9	2.64	587/590
Seq ID 913	ITIDVQSAK	AAV9	2.64	587/590
Seq ID 914	PQQSHVVSQ	AAV9	2.64	587/590
Seq ID 915	VQVGTSVGK	AAV9	2.64	587/590
Seq ID 916	SAQTSHPIIM	AAV9	2.64	587/590
Seq ID 917	PQEMMALVY	AAV9	2.63	587/590

Seq ID 918	QHRYMRPHT	AAV9	2.63	587/590
Seq ID 919	NMAQHGLQ	AAV9	2.63	587/590
Seq ID 920	RHGLTTPDF	AAV9	2.62	587/590
Seq ID 921	TTMQRTMDV	AAV9	2.62	587/590
Seq ID 922	PKSHGAHDV	AAV9	2.62	587/590
Seq ID 923	AIENAVRSSLKVATSA	AAV9	2.62	588/589
Seq ID 924	PMVDAMVSV	AAV9	2.62	587/590
Seq ID 925	TEQPEPFVF	AAV9	2.62	587/590
Seq ID 926	LDAVPKNIK	AAV9	2.61	587/590
Seq ID 927	TGMSQATSR	AAV9	2.61	587/590
Seq ID 928	PTRPSSETM	AAV9	2.61	587/590
Seq ID 929	RIEGSHPPP	AAV9	2.61	587/590
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Seq ID 931	MLVGVPQSK	AAV9	2.60	587/590
Seq ID 932	QRQQPQFFF	AAV9	2.59	587/590
Seq ID 933	ARMQASALA	AAV2	2.59	R588A/589
Seq ID 934	DWEAKARVA	AAV9	2.59	587/590
Seq ID 935	PIASTITNR	AAV9	2.58	587/590
Seq ID 936	ENSQPIRPS	AAV9	2.58	587/590
Seq ID 937	AHMNVQNGKWSDPSA	AAV2	2.58	R588A/589
Seq ID 938	PHQVPRDPV	AAV9	2.58	587/590
Seq ID 939	TTSTNREVS	AAV9	2.57	587/590
Seq ID 940	PSGVMQDPV	AAV9	2.57	587/590
Seq ID 941	AKSHELQVA	AAV2	2.57	R588A/589
Seq ID 942	AVNQVHHQM	AAV9	2.57	587/590
Seq ID 943	SVGRQQQDI	AAV9	2.57	587/590
Seq ID 944	VAMIKQSSI	AAV9	2.57	587/590
Seq ID 945	DILIWQHSD	AAV9	2.56	587/590
Seq ID 946	FTTKHVNEQ	AAV9	2.56	587/590
Seq ID 947	AKPYSGRRPDAILGA	AAV2	2.56	R588A/589
Seq ID 948	QSMADPRAM	AAV9	2.56	587/590
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Seq ID 950	LQHSNQDQE	AAV9	2.55	587/590
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Seq ID 952	VTDFVDVYD	AAV9	2.55	587/590
Seq ID 953	EYDQGVTFN	AAV9	2.55	587/590
Seq ID 954	QTYSMQHL	AAV9	2.54	587/590
Seq ID 955	FKTDRDML	AAV9	2.54	587/590
Seq ID 956	AIPVPVDGMEYHWGNA	AAV2	2.54	R588A/589
Seq ID 957	PASKNVQPM	AAV9	2.53	587/590
Seq ID 958	RLEISSQI	AAV9	2.53	587/590
Seq ID 959	IQGLPSMVH	AAV9	2.52	587/590
Seq ID 960	NIAQNLLME	AAV9	2.52	587/590
Seq ID 961	HPQPSGHFS	AAV9	2.52	587/590
Seq ID 962	IPRQGSQTT	AAV9	2.52	587/590
Seq ID 963	DVLGQMGKM	AAV9	2.52	587/590

Seq ID 964	TYSSPSIGT	AAV9	2.52	587/590
Seq ID 965	EHKDFQVSG	AAV9	2.52	587/590
Seq ID 966	EVRPKQDFT	AAV9	2.51	587/590
Seq ID 967	ARYEAVSFMDVNSTWA	AAV2	2.51	R588A/589
Seq ID 968	PYTQKTGSV	AAV9	2.51	587/590
Seq ID 969	NFVNNQPGY	AAV9	2.51	587/590
Seq ID 970	SGLNMKTSV	AAV9	2.51	587/590
Seq ID 971	AQHTLKHFEHVRMVDA	AAV2	2.50	R588A/589
Seq ID 972	AQHTLKHFEHVRMVDA	AAV9	2.50	588/589
Seq ID 973	KENPQHGIY	AAV9	2.50	587/590
Seq ID 974	KSPTPDINT	AAV9	2.49	587/590
Seq ID 975	LTSSKSDPA	AAV9	2.49	587/590
Seq ID 976	ARMQASQVA	AAV2	2.49	R588A/589
Seq ID 977	RYHRDTIDM	AAV9	2.49	587/590
Seq ID 978	ASLSITKPA	AAV2	2.48	R588A/589
Seq ID 979	ASSPGSPGTPGSRRA	AAV2	2.48	R588A/589
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Seq ID 981	HETQVKGMQ	AAV9	2.45	587/590
Seq ID 982	TPRATPSMP	AAV9	2.44	587/590
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Seq ID 984	TTNTQGAQV	AAV9	2.43	587/590
Seq ID 985	HYGWQQVPD	AAV9	2.43	587/590
Seq ID 986	HPGSSMVPT	AAV9	2.42	587/590
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Seq ID 992	ATYQPLFTA	AAV2	2.39	R588A/589
Seq ID 993	ATYQPLFTA	AAV9	2.39	588/589
Seq ID 994	AQSSDIENA	AAV2	2.38	R588A/589
Seq ID 995	QVAIQPQEE	AAV9	2.38	587/590
Seq ID 996	RAVQNVTTM	AAV9	2.37	587/590
Seq ID 997	PSTLVMQSV	AAV9	2.37	587/590
Seq ID 998	QQQLDDIP	AAV9	2.35	587/590
Seq ID 999	WEKHIMIDY	AAV9	2.34	587/590
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Seq ID 1002	AGDAIENAVRSSLKVA	AAV2	2.32	R588A/589
Seq ID 1003	RTDKSQYQP	AAV9	2.32	587/590
Seq ID 1004	ADGGFIYEAGLAPYKA	AAV2	2.31	R588A/589
Seq ID 1005	ARMKDNTTP	AAV9	2.31	587/590
Seq ID 1006	STITPMRQI	AAV9	2.30	587/590
Seq ID 1007	QTPIAPPPI	AAV9	2.30	587/590
Seq ID 1008	AQPEHRSER	AAV9	2.29	587/590
Seq ID 1009	ASRANISHA	AAV2	2.29	R588A/589

Seq ID 1010	AAAAGAVVGGLGGYMA	AAV2	2.29	R588A/589
Seq ID 1011	PQMRQLYHS	AAV9	2.29	587/590
Seq ID 1012	LEFHSQAMV	AAV9	2.29	587/590
Seq ID 1013	AQKTYQEGD	AAV9	2.29	587/590
Seq ID 1014	AMFSDLYYLTMNNKHA	AAV2	2.28	R588A/589
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Seq ID 1017	ANAVIPA	AAV2	2.26	R588A/589
Seq ID 1018	KRERGMQDY	AAV9	2.25	587/590
Seq ID 1019	GPFTPAGMM	AAV9	2.25	587/590
Seq ID 1020	RKMPQAIDV	AAV9	2.25	587/590
Seq ID 1021	GSDPAGFKM	AAV9	2.25	587/590
Seq ID 1022	DAQSIQVSI	AAV9	2.24	587/590
Seq ID 1023	KVNEVMQKD	AAV9	2.24	587/590
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Seq ID 1025	AAAIPA	AAV2	2.24	R588A/589
Seq ID 1026	ARYADGHAIENAVRSA	AAV2	2.23	R588A/589
Seq ID 1027	SEHDNHQQT	AAV9	2.23	587/590
Seq ID 1028	PRVQGNDQA	AAV9	2.22	587/590
Seq ID 1029	AVAVHHTPA	AAV2	2.22	R588A/589
Seq ID 1030	ADVRDPRGA	AAV2	2.21	R588A/589
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Seq ID 1032	NVNETKGSW	AAV9	2.21	587/590
Seq ID 1033	AGHAIENAVKSSLKVA	AAV2	2.19	R588A/589
Seq ID 1034	ALDWIHGHIRDKEAPA	AAV2	2.19	R588A/589
Seq ID 1035	SPKYFTPTM	AAV9	2.16	587/590
Seq ID 1036	KSQVQPQGT	AAV9	2.16	587/590
Seq ID 1037	QMDTRIPQR	AAV9	2.16	587/590
Seq ID 1038	AFRALSTGEKGFGYKA	AAV2	2.15	R588A/589
Seq ID 1039	ATCEAVRCDAVHQPPA	AAV2	2.14	R588A/589
Seq ID 1040	ERSSQYEKG	AAV9	2.14	587/590
Seq ID 1041	IRPGTAMAP	AAV9	2.14	587/590
Seq ID 1042	SPHSVQGS	AAV9	2.13	587/590
Seq ID 1043	QQAQKVAGV	AAV9	2.13	587/590
Seq ID 1044	PRDISTAMV	AAV9	2.13	587/590
Seq ID 1045	PRVTQDLVG	AAV9	2.12	587/590
Seq ID 1046	QQVVTRHEM	AAV9	2.11	587/590
Seq ID 1047	ARMQAKAVA	AAV2	2.10	R588A/589
Seq ID 1048	ANPRIPA	AAV2	2.10	R588A/589
Seq ID 1049	MVEHNHHVM	AAV9	2.09	587/590
Seq ID 1050	AQSSDISPA	AAV2	2.09	R588A/589
Seq ID 1051	ARPQASAVA	AAV2	2.09	R588A/589
Seq ID 1052	NDFDMPGEI	AAV9	2.09	587/590
Seq ID 1053	NRNPTMTGP	AAV9	2.08	587/590
Seq ID 1054	ANAGIPA	AAV2	2.08	R588A/589
Seq ID 1055	ADFSHLYYLTMNNKHA	AAV2	2.08	R588A/589

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Seq ID 1058	QGHSMPTYG	AAV9	2.06	587/590
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Seq ID 1067	AYKSSCAFSCEEGFEA	AAV2	2.04	R588A/589
Seq ID 1068	VTVQPHVDI	AAV9	2.03	587/590
Seq ID 1069	MEDKYAYEM	AAV9	2.03	587/590
Seq ID 1070	ASARSPSEA	AAV2	2.03	R588A/589
Seq ID 1071	QHQDRTPSN	AAV9	2.02	587/590
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Seq ID 1078	ASVTTTVSA	AAV9	2.00	587/590
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Seq ID 1080	RVTNVPNAV	AAV9	1.99	587/590
Seq ID 1081	MLPQASAHK	AAV9	1.97	587/590
Seq ID 1082	ATKEADLPEPSEKQPA	AAV2	1.96	R588A/589
Seq ID 1083	ARGKRGQDAMYEYMAA	AAV2	1.96	R588A/589
Seq ID 1084	PNPKSHQWP	AAV9	1.96	587/590
Seq ID 1085	ADGAETEVDCNRCVCA	AAV2	1.95	R588A/589
Seq ID 1086	SDTNTAPQE	AAV9	1.95	587/590
Seq ID 1087	ASKSTTDNDIALHLA	AAV2	1.94	R588A/589
Seq ID 1088	KYISTGGEW	AAV9	1.93	587/590
Seq ID 1089	AGDSCVTIMSKDKPTA	AAV2	1.92	R588A/589
Seq ID 1090	AVLEGDSCVTIMSKDA	AAV2	1.92	R588A/589
Seq ID 1091	AELPGFLQSGKDKDAA	AAV2	1.91	R588A/589
Seq ID 1092	QQMSSHQPM	AAV9	1.88	587/590
Seq ID 1093	AYHEREQGQ	AAV9	1.88	587/590
Seq ID 1094	PKHERVGD	AAV9	1.88	587/590
Seq ID 1095	MENADVNDG	AAV9	1.88	587/590
Seq ID 1096	IIEHVSQY	AAV9	1.87	587/590
Seq ID 1097	NQEKQQSNT	AAV9	1.86	587/590
Seq ID 1098	KVIHMDDSY	AAV9	1.86	587/590
Seq ID 1099	NITINQREH	AAV9	1.85	587/590
Seq ID 1100	AGGCVTITAEGKPSMA	AAV2	1.85	R588A/589
Seq ID 1101	QVKQSSQLN	AAV9	1.85	587/590

Seq ID 1102	AADRSSPGA	AAV2	1.84	R588A/589
Seq ID 1103	NAPRGYMPD	AAV9	1.83	587/590
Seq ID 1104	IATPLQKQM	AAV9	1.82	587/590
Seq ID 1105	DVHHQYSQI	AAV9	1.82	587/590
Seq ID 1106	HHRDNSQSN	AAV9	1.79	587/590
Seq ID 1107	AGHGECVETINNYTCA	AAV2	1.79	R588A/589
Seq ID 1108	FQWQEETDT	AAV9	1.78	587/590
Seq ID 1109	AHAHRSDALQLGLGKA	AAV2	1.78	R588A/589
Seq ID 1110	MTTPPQSSP	AAV9	1.77	587/590
Seq ID 1111	ANSTWRTVDRLSATAA	AAV2	1.76	R588A/589
Seq ID 1112	TEGRQPVGF	AAV9	1.73	587/590
Seq ID 1113	PQEEGPSQF	AAV9	1.73	587/590
Seq ID 1114	PMNYSHGAL	AAV9	1.72	587/590
Seq ID 1115	ASSSERAHQVLRIRKA	AAV2	1.72	R588A/589
Seq ID 1116	AILRQQQHFLFGSNVTA	AAV2	1.72	R588A/589
Seq ID 1117	QKPQPQQDP	AAV9	1.71	587/590
Seq ID 1118	HTAATSTKD	AAV9	1.71	587/590
Seq ID 1119	SVKAVMPFP	AAV9	1.71	587/590
Seq ID 1120	ALIFRHHRQ	AAV9	1.70	587/590
Seq ID 1121	PMEPEHMWG	AAV9	1.70	587/590
Seq ID 1122	EKDVMRVVQ	AAV9	1.70	587/590
Seq ID 1123	ARCRAIDGDVTF CRPA	AAV2	1.70	R588A/589
Seq ID 1124	ASVGGVFNSLGKGIHA	AAV2	1.68	R588A/589
Seq ID 1125	VASHHFQPQ	AAV9	1.67	587/590
Seq ID 1126	TNKQMAYST	AAV9	1.67	587/590
Seq ID 1127	ATPSLPTPTREPKKA	AAV2	1.66	R588A/589
Seq ID 1128	YMEDLD PES	AAV9	1.66	587/590
Seq ID 1129	TMIQAKQLP	AAV9	1.66	587/590
Seq ID 1130	PPRVNDHAT	AAV9	1.66	587/590
Seq ID 1131	AMFDSSNYHGQDLLFA	AAV2	1.65	R588A/589
Seq ID 1132	HPTVQTHSQ	AAV9	1.65	587/590
Seq ID 1133	LGSSAGVSF	AAV9	1.64	587/590
Seq ID 1134	AGLTTRPGSGLTNIKA	AAV2	1.62	R588A/589
Seq ID 1135	AGHFSGSGA	AAV2	1.62	R588A/589
Seq ID 1136	RVQVGPVSS	AAV9	1.61	587/590
Seq ID 1137	SKINPQTPL	AAV9	1.61	587/590
Seq ID 1138	QRDQRVTPQ	AAV9	1.61	587/590
Seq ID 1139	SPAGYQANK	AAV9	1.60	587/590
Seq ID 1140	MTHAQQLPQ	AAV9	1.60	587/590
Seq ID 1141	AFKDSAIGFSRVPPRA	AAV2	1.60	R588A/589
Seq ID 1142	MTLKREIMS	AAV9	1.60	587/590
Seq ID 1143	IPMQGEQMR	AAV9	1.60	587/590
Seq ID 1144	AQETHYMTR	AAV9	1.59	587/590
Seq ID 1145	AVRHSSDFA	AAV9	1.58	588/589
Seq ID 1146	ALSSSMSMA	AAV2	1.58	R588A/589
Seq ID 1147	ANPRFNENRRVIVCA	AAV2	1.57	R588A/589

Seq ID 1148	AAIENAVRSSLKVATA	AAV9	1.57	588/589
Seq ID 1149	RQGGNIMEK	AAV9	1.56	587/590
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Seq ID 1151	KPSQTHNDM	AAV9	1.55	587/590
Seq ID 1152	AKVAVVRTPPKSPSSA	AAV2	1.54	R588A/589
Seq ID 1153	HDQGHAAQK	AAV9	1.53	587/590
Seq ID 1154	AMAAAMGNS	AAV9	1.53	587/590
Seq ID 1155	GDTQPRMQY	AAV9	1.52	587/590
Seq ID 1156	EYPSEIVYS	AAV9	1.50	587/590
Seq ID 1157	TWQHTTETS	AAV9	1.49	587/590
Seq ID 1158	TGGAYPVIV	AAV9	1.49	587/590
Seq ID 1159	AGYGSSRRAPQTGIA	AAV2	1.48	R588A/589
Seq ID 1160	AVADSRSPA	AAV2	1.47	R588A/589
Seq ID 1161	AGIVSWGRGCALKDKA	AAV2	1.45	R588A/589
Seq ID 1162	AWESDDFTA	AAV2	1.44	R588A/589
Seq ID 1163	SVDQSHDPN	AAV9	1.43	587/590
Seq ID 1164	ARNLPLPA	AAV2	1.43	R588A/589
Seq ID 1165	ARNLPLPA	AAV9	1.43	588/589
Seq ID 1166	TDLADSEWR	AAV9	1.41	587/590
Seq ID 1167	AAFTTLRGAQRLAAA	AAV2	1.38	R588A/589
Seq ID 1168	VSNPQPPSR	AAV9	1.34	587/590
Seq ID 1169	APSLPTPTREPCKVA	AAV2	1.34	R588A/589
Seq ID 1170	PTHTQGRES	AAV9	1.33	587/590
Seq ID 1171	AQNAKNGNLPEFGDAA	AAV2	1.30	R588A/589
Seq ID 1172	KNAVMAPGN	AAV9	1.29	587/590
Seq ID 1173	ALVPIATQTYEAWLGA	AAV9	1.27	588/589
Seq ID 1174	IPMRIETDP	AAV9	1.25	587/590
Seq ID 1175	QARDSPKGW	AAV9	1.24	587/590
Seq ID 1176	AHRERMSQVMREWEEA	AAV2	1.23	R588A/589
Seq ID 1177	SRVSQNEHP	AAV9	1.20	587/590
Seq ID 1178	QRNEKSEFI	AAV9	1.19	587/590
Seq ID 1179	QTLPEVTKW	AAV9	1.17	587/590
Seq ID 1180	VKGWQVTER	AAV9	1.16	587/590
Seq ID 1181	APTTVESHGNYSTQIA	AAV2	1.16	R588A/589
Seq ID 1182	PRQGPSTNL	AAV9	1.14	587/590
Seq ID 1183	AEATDGMLKIQFSAQA	AAV2	1.13	R588A/589
Seq ID 1184	ALYRQKVEPLRAELQA	AAV9	1.09	588/589
Seq ID 1185	RPLTTEAIV	AAV9	1.07	587/590
Seq ID 1186	KPGSQQIMD	AAV9	1.06	587/590
Seq ID 1187	AHQLLGDLHQEGPPLA	AAV2	1.06	R588A/589
Seq ID 1188	MEQLVTFKT	AAV9	1.03	587/590
Seq ID 1189	GASMQTALW	AAV9	1.01	587/590
Seq ID 1190	AAFRCLAENAGDVAFA	AAV2	0.95	R588A/589
Seq ID 1191	IQTQLPPGK	AAV9	0.93	587/590
Seq ID 1192	NTVHQAQIM	AAV9	0.92	587/590
Seq ID 1193	PISNVNQSR	AAV9	0.91	587/590

Seq ID 1194	APDLVQEACESELNEA	AAV2	0.90	R588A/589
Seq ID 1195	AKIQVLVEPDHFKVAA	AAV2	0.90	R588A/589
Seq ID 1196	AREWFMDLNLWPSSAA	AAV2	0.87	R588A/589
Seq ID 1197	AEFSSNTVKLTSGHLA	AAV9	0.85	588/589
Seq ID 1198	AFTYKSSCAFSCEEGA	AAV2	0.84	R588A/589
Seq ID 1199	PYPTQASMK	AAV9	0.84	587/590
Seq ID 1200	KPTNSGQEH	AAV9	0.82	587/590
Seq ID 1201	LSTGPPEKI	AAV9	0.76	587/590
Seq ID 1202	APQLHVMSA	AAV9	0.74	587/590
Seq ID 1203	TASKMQDSK	AAV9	0.68	587/590
Seq ID 1204	AFTSSSGQKAMNGSRA	AAV2	0.64	R588A/589
Seq ID 1205	AVAEFSEATAELTVSA	AAV2	0.64	R588A/589
Seq ID 1206	INQNKAHDA	AAV9	0.60	587/590
Seq ID 1207	AARLSKELQAAQARLA	AAV2	0.56	R588A/589
Seq ID 1208	ATKPGYVDSIQKGIQA	AAV2	0.55	R588A/589
Seq ID 1209	PTTAPSMVL	AAV9	0.49	587/590
Seq ID 1210	AGGFVYIAGKCGLVPA	AAV2	0.47	R588A/589
Seq ID 1211	ANPTAKRQFVQSAKEA	AAV2	0.44	R588A/589
Seq ID 1212	ALALGRFWDYLRWVQA	AAV2	0.42	R588A/589
Seq ID 1213	ALRVIYERMNQSLSLA	AAV2	0.41	R588A/589
Seq ID 1214	VTMTQATNR	AAV9	0.41	587/590
Seq ID 1215	ALLQYNHRVKKLNEIA	AAV2	0.33	R588A/589
Seq ID 1216	ALLGKINLKALAALAA	AAV2	0.31	R588A/589
Seq ID 1217	RQRVSYMDD	AAV9	0.20	587/590
Seq ID 1218	ADMGQQRVD	AAV9	0.20	587/590
Seq ID 1219	ATGVLLRALAGVPVAA	AAV2	0.13	R588A/589
Seq ID 1220	SIKKDPPTV	AAV9	0.10	587/590
Seq ID 1221	PGKTMLGNH	AAV9	0.10	587/590
Seq ID 1222	HQGDTLQYV	AAV9	0.08	587/590
Seq ID 1223	ALGLGKHNYCRNPDA	AAV2	-0.05	R588A/589
Seq ID 1224	QERQANKSY	AAV9	-0.07	587/590
Seq ID 1225	QQTRGVLEN	AAV9	-0.10	587/590
Seq ID 1226	ASMRVVPMA	AAV2	-0.21	R588A/589
Seq ID 1227	ASSTDKRDA	AAV2	-0.22	R588A/589
Seq ID 1228	ALIGGSIVA	AAV2	-0.26	R588A/589
Seq ID 1229	LLHTGTSSH	AAV9	-0.38	587/590
Seq ID 1230	TQHQAQVPR	AAV9	-0.53	587/590
Seq ID 1231	AAGLFGAAEGQAFHLA	AAV2	-0.61	R588A/589
Seq ID 1232	AENEHAHFQKAKERLA	AAV2	-0.62	R588A/589

[0160] Seq ID 1233: AAV2 R588A

MAADGYLPDWLEDTLSEGIRQWWKLKPGPPPKPAERHKDDSRGLVLPGYKYLGPF
 NGLDKGEPVNEADAAALEHDKAYDRQLDSGDNPYLKYNHADADEFQERLKEDTSFG
 GNLGRAVFQAKKRVLEPLGLVEEPVKTAPGKKRPVEHSPVEPDSSSGTGKAGQQPAR
 KRLNFGQTGDADSVDPDQPLGQPPAAPSGLGTNTMATGSGAPMADNNEGADGVGN
 SSGNWHCDSTWMGDRVITTSTRTWALPTYNNHLYKQISSQSGASNDNHYFGYSTPW

GYFDFNRFHCHFSRDLWQRLINNNWGFRPKRLNFKLFNIQVKEVTQNDGTTTIANNL
TSTVQVFTDSEYQLPYVLGSAHQGCLPPFPADVFMVPQYGYLTLNNGSQAVGRSSFY
CLEYFPSQMLRTGNNFTFSYTFEDVPFHSSYAHSQSLDRLMNPLIDQYLYYLSRTNTP
SGTTTQSRQLQFSQAGASDIRDQSRNWLPGPCYRQQRVSKTSADNNNSEYSWTGATK
YHLNGRDSLVPNPGPAMASHKDDEEKFFPQSGVLIFGKQGSEKTNVDIEKVMITDEEEI
RTTNPVATEQYGSVSTNLQRGNRQAATADVNTQGVLPGMVWQDRDVYLGQPIWAKI
PHTDGHFHPSPMLMGFGFLKHPPPQILIKNTVPANPSTTFSAAKFASFITQYSTGQVSV
EIEWELQKENS KRWNPEIQYTSN YNKS VNVDFTVDTNGVYSEPRPIGTRYLTRNL

[0161] Seq ID 1234: AAV9
MAADGYLPDWLEDNLSEGIREWWALKPGAPQPKANQQHQDNARGLVLPGYKYLGP
GNGLDKGEPVNAADAAALEHDKAYDQQLKAGDNPYLKYNHADAEFQERLKEDTSF
GGNLGRAVFQAKKRLLLEPLGLVEEAAKTAPGKKRPVEQSPQEPDSSAGIGKSGAQPA
KKRLNFGQTGDTESVPDPQPIGEPPAAPSGVGSALTMASSGGGAPVADNNEGADGVGSS
SGNWHCDSQWLGDRTVTTSTRTWALPTYNNHLYKQISNSTSGGSSNDNAYFGYSTPW
GYFDFNRFHCHFSRDLWQRLINNNWGFRPKRLNFKLFNIQVKEVTDNNGVKTIANN
LTSTVQVFTDSDYQLPYVLGSAHEGCLPPFPADVFMIPQYGYLTLNDGSQAVGRSSFY
CLEYFPSQMLRTGNNFQFSYEFENVPFHSSYAHSQSLDRLMNPLIDQYLYYLSKTING
SGQNQQTLKFSVAGPSNMAVQGRNYIPGPSYRQQRVSTTVTQNNNSEFAWPGASSW
ALNGRNSLMNPGPAMASHKEGEDRFFPLSGSLIFGKQGTGRDNVDADKVMITNEEEI
KTTNPVATESYQVATNHQSAQAQAQTGWVQNQGILPGMVWQDRDVYLGQPIWAK
IPHTDGNFHPSPMLMGFGFMKHPPPQILIKNTVPADPPTAFNKDKLNSFITQYSTGQVS
VEIEWELQKENS KRWNPEIQYTSN YKYKSN NVEFAVNTEGVYSEPRPIGTRYLTRNL

Example 3. Results from round 3 library evaluation

[0162] The 1,236 capsid variants selected for further evaluation from the round 2 library were administered to three cynomolgus macaques in a final selection to nominate lead capsids. The fold change enrichment in brain wide CNS transduction was determined by next-generation sequencing and normalized to the abundance in the administered test article. The average log2 fold enrichment across all CNS tissue samples and all cynomolgus macaques is shown in Table 2. Enrichment in neuronal mRNA expression was assessed using the neuron specific human synapsin 1 (hSyn1) promoter. Enrichment in mRNA expression in all CNS cells was assessed using the ubiquitous cytomegalovirus (CMV) promoter. #N/A indicates that the capsid was not detected. Many of the capsid variants exhibited substantial improvement over AAV9 in CNS transduction. These data are plotted in FIGs. 7 and 8.

Table 2.

Sequence ID	Peptide Sequence	Parent Capsid	Peptide Insertion Site	Round 3 Log2FC Data	
				CMV	hSyn1
Seq ID 1	NFRQSEMLN	AAV9	587/590	0.58	-0.30
Seq ID 2	QRNTDHITP	AAV9	587/590	1.24	0.23

Seq ID 3	MQFDPQKPD	AAV9	587/590	-1.80	0.07
Seq ID 4	TMSSNDNMR	AAV9	587/590	0.96	1.69
Seq ID 5	VKESVQKAA	AAV9	587/590	-0.57	-2.72
Seq ID 6	ILNVSKPDN	AAV9	587/590	-0.70	-3.62
Seq ID 7	SQAAQLPTQ	AAV9	587/590	1.24	-0.82
Seq ID 8	QVMAIDAAI	AAV9	587/590	-2.56	-0.05
Seq ID 9	NDTARERAI	AAV9	587/590	-0.38	-1.74
Seq ID 10	SMAAKVTAE	AAV9	587/590	0.46	-0.06
Seq ID 11	TLGHQHSPi	AAV9	587/590	0.64	-0.22
Seq ID 12	TVPSSGKQH	AAV9	587/590	-2.24	-2.87
Seq ID 13	AMVQISTPL	AAV9	587/590	-1.12	-1.36
Seq ID 14	VQVTGTVRF	AAV9	587/590	1.75	1.07
Seq ID 15	MIAQKTVVH	AAV9	587/590	-0.86	-0.52
Seq ID 16	NTHFQGQPP	AAV9	587/590	0.06	-0.04
Seq ID 17	MDMQATGKN	AAV9	587/590	0.45	-0.24
Seq ID 18	NLAHTRQPQ	AAV9	587/590	-1.41	-2.65
Seq ID 19	LDIPPMNSS	AAV9	587/590	1.37	0.75
Seq ID 20	QHSTPSWPS	AAV9	587/590	-1.07	0.15
Seq ID 21	AFTRHNGTGGKSIY GA	AAV2	R588A/589	#N/A	-2.68
Seq ID 22	ARGARDEFT	AAV9	587/590	-0.73	-0.58
Seq ID 23	RPSNDKAMM	AAV9	587/590	-2.20	-2.79
Seq ID 24	AQVHMTMPQ	AAV9	587/590	-1.54	-2.46
Seq ID 25	ARQTFQHHL	AAV9	587/590	0.94	-0.15
Seq ID 26	HQTDAPTDW	AAV9	587/590	-1.94	-0.05
Seq ID 27	ANMISEPRISYGND A	AAV9	588/589	-0.49	-2.25
Seq ID 28	IERWQAEII	AAV9	587/590	-1.69	-3.67
Seq ID 29	VPHNGLHST	AAV9	587/590	1.05	0.77
Seq ID 30	RIHDPSLVS	AAV9	587/590	-1.69	-2.00
Seq ID 31	IPATHPQLM	AAV9	587/590	0.56	0.47
Seq ID 32	ITTVKNVTV	AAV9	587/590	-1.52	-2.47
Seq ID 33	DKSVKSTAI	AAV9	587/590	-1.59	-2.09
Seq ID 34	IRTHEVPLQ	AAV9	587/590	-3.37	1.02
Seq ID 35	SPSSTSNNN	AAV9	587/590	1.48	0.89
Seq ID 36	LSTTSQVHN	AAV9	587/590	0.86	0.44
Seq ID 37	NMHNETSMT	AAV9	587/590	1.19	0.73
Seq ID 38	NDSRKANIG	AAV9	587/590	0.25	0.77
Seq ID 39	KPPNVQDAK	AAV9	587/590	-0.57	-0.28
Seq ID 40	FQHMTPKPS	AAV9	587/590	-0.13	-1.99
Seq ID 41	KQPSRLMEW	AAV9	587/590	-4.42	-4.01
Seq ID 42	VYDQVKATH	AAV9	587/590	0.48	-0.88
Seq ID 43	SYRNQYDDQ	AAV9	587/590	#N/A	-2.74
Seq ID 44	VQSTKQSVQ	AAV9	587/590	0.27	-1.31
Seq ID 45	HQGKVDAQN	AAV9	587/590	0.17	-0.22
Seq ID 46	IQGEIRVHT	AAV9	587/590	0.89	0.60

Seq ID 47	TQTLKVEDR	AAV9	587/590	-1.45	-0.80
Seq ID 48	VQSPPGIMP	AAV9	587/590	-0.07	1.19
Seq ID 49	VHYAPNYTT	AAV9	587/590	0.48	0.41
Seq ID 50	YGGSETNVR	AAV9	587/590	1.42	-0.10
Seq ID 51	IRTQTHPQV	AAV9	587/590	-2.44	-1.08
Seq ID 52	ETQVQPIQH	AAV9	587/590	-0.63	0.42
Seq ID 53	FPVSSVNDV	AAV9	587/590	0.55	0.97
Seq ID 54	IQKISQAMA	AAV9	587/590	-2.97	-0.97
Seq ID 55	SQTQIGQPY	AAV9	587/590	-0.48	-0.04
Seq ID 56	AIRTNVGPV	AAV9	587/590	-1.74	-1.93
Seq ID 57	TQMSGQTPH	AAV9	587/590	-1.88	-0.71
Seq ID 58	PAKSVMIPY	AAV9	587/590	#N/A	-0.42
Seq ID 59	QRVSQTNSF	AAV9	587/590	-2.59	-1.34
Seq ID 60	AFAGANYAAWAVN VAA	AAV2	R588A/589	-0.70	-0.12
Seq ID 61	AVVRPQSTM	AAV9	587/590	-0.92	-1.39
Seq ID 62	PLQTPPSDN	AAV9	587/590	-0.61	-0.44
Seq ID 63	VTVSQQMTK	AAV9	587/590	-0.49	-0.47
Seq ID 64	DPFEGRIST	AAV9	587/590	#N/A	-3.86
Seq ID 65	NNPTGGIAL	AAV9	587/590	1.05	0.27
Seq ID 66	ARYTHLVAIQNKEEI A	AAV2	R588A/589	#N/A	-2.52
Seq ID 67	IVTGGVLKP	AAV9	587/590	-1.45	-0.25
Seq ID 68	THMSTQASI	AAV9	587/590	-0.04	-1.01
Seq ID 69	AVPGEEEQKFEVEK YA	AAV2	R588A/589	-2.90	-4.36
Seq ID 70	ATDTSHLVV	AAV9	587/590	0.91	0.53
Seq ID 71	YVNIMDDMD	AAV9	587/590	8.69	9.33
Seq ID 72	IRPDKQGGV	AAV9	587/590	-1.69	-1.75
Seq ID 73	NQTESQWKG	AAV9	587/590	0.59	0.91
Seq ID 74	TNEGLYKDN	AAV9	587/590	-3.99	-2.21
Seq ID 75	IMVGNQTVM	AAV9	587/590	1.63	0.24
Seq ID 76	IWAEKGLDT	AAV9	587/590	-1.54	-3.66
Seq ID 77	MPSQGYQQV	AAV9	587/590	0.58	0.26
Seq ID 78	NTFGHNVAP	AAV9	587/590	-0.24	-0.75
Seq ID 79	ASRTVSDSIKKLITS A	AAV2	R588A/589	-2.15	-1.88
Seq ID 80	NHTSTPPQQ	AAV9	587/590	0.24	-0.02
Seq ID 81	NAHAPIPVE	AAV9	587/590	-1.33	-0.81
Seq ID 82	KSTNTHEIG	AAV9	587/590	-5.25	-3.12
Seq ID 83	NTRVTNAHD	AAV9	587/590	-1.15	-1.07
Seq ID 84	AHRDACLTGSKIQV DA	AAV2	R588A/589	-1.20	-1.03
Seq ID 85	AVAAETGQI	AAV9	587/590	-1.76	-1.20
Seq ID 86	NQPSMVNGH	AAV9	587/590	-0.97	-3.21
Seq ID 87	PMTQQHHSM	AAV9	587/590	-3.85	-1.63
Seq ID 88	YEKVDSLMM	AAV9	587/590	-0.94	-0.65

Seq ID 89	MDVGTHGKA	AAV9	587/590	0.84	-0.45
Seq ID 90	THNSQVHPS	AAV9	587/590	0.24	-0.48
Seq ID 91	PTQVRQVQQ	AAV9	587/590	-1.19	-2.43
Seq ID 92	ITRTVNTVE	AAV9	587/590	-0.57	-1.27
Seq ID 93	AMIMSPFGT	AAV9	587/590	1.39	#N/A
Seq ID 94	HAFPSFPAA	AAV9	587/590	-1.65	-0.66
Seq ID 95	KMMDNTPFY	AAV9	587/590	0.59	-1.73
Seq ID 96	PQRLSVDPN	AAV9	587/590	-2.16	-1.57
Seq ID 97	TWGTYQHSV	AAV9	587/590	-1.65	-0.29
Seq ID 98	HYQQRDMSQ	AAV9	587/590	-2.07	-1.31
Seq ID 99	SQGHVQERM	AAV9	587/590	0.95	0.21
Seq ID 100	QPRTTGNDF	AAV9	587/590	-0.54	-0.86
Seq ID 101	PKGTISSQQ	AAV9	587/590	-2.30	-2.47
Seq ID 102	REHTAAWFA	AAV9	587/590	-0.96	-1.00
Seq ID 103	QLTHSNTSQ	AAV9	587/590	0.68	-0.28
Seq ID 104	KDMGAGHSM	AAV9	587/590	-1.84	-2.14
Seq ID 105	ARGAQRLAALGDT AWA	AAV9	588/589	1.65	-0.41
Seq ID 106	KQAHREHEE	AAV9	587/590	-3.26	-2.73
Seq ID 107	KSSHPYTDE	AAV9	587/590	-0.69	-1.04
Seq ID 108	MPNHVAYKD	AAV9	587/590	-1.11	-0.39
Seq ID 109	PPTTQYPQT	AAV9	587/590	-2.73	-5.78
Seq ID 110	RSHTTGQDS	AAV9	587/590	-1.91	-1.22
Seq ID 111	SQLKASVTN	AAV9	587/590	0.37	-0.72
Seq ID 112	TAPSTRFEV	AAV9	587/590	-0.50	-0.72
Seq ID 113	PSTLEPEVW	AAV9	587/590	-2.88	-2.44
Seq ID 114	YTSPQMMV	AAV9	587/590	0.66	0.18
Seq ID 115	PVPSRQVST	AAV9	587/590	-2.76	-3.23
Seq ID 116	LEKVQVHQN	AAV9	587/590	-0.75	0.68
Seq ID 117	NQIKLQSMS	AAV9	587/590	-0.18	-1.61

Seq ID 118	GVMSPTPMV	AAV9	587/590	-0.22	-0.65
Seq ID 119	PTQRAERYF	AAV9	587/590	-2.54	-3.00
Seq ID 120	PTAKVVDSV	AAV9	587/590	0.42	0.36
Seq ID 121	HRIHEVQGG	AAV9	587/590	-0.44	-0.99
Seq ID 122	KNTTPVGQQ	AAV9	587/590	-0.75	-1.11
Seq ID 123	AGPPLKGAGGKERPGA	AAV2	R588A/589	-0.72	-5.99
Seq ID 124	IQPASGQNM	AAV9	587/590	0.51	0.10
Seq ID 125	YQNQGVNVP	AAV9	587/590	1.37	0.67
Seq ID 126	NASSQSNAN	AAV9	587/590	1.44	0.02
Seq ID 127	SNTVRGDAA	AAV9	587/590	-1.06	-1.09
Seq ID 128	SKKAEFGTE	AAV9	587/590	1.35	0.99
Seq ID 129	KVSSEMMVH	AAV9	587/590	-1.14	-0.62
Seq ID 130	TMIEQRMDQ	AAV9	587/590	-1.28	0.08
Seq ID 131	PPHIYHHMS	AAV9	587/590	1.30	-0.02
Seq ID 132	MVNKAPTGA	AAV9	587/590	-3.74	-2.27
Seq ID 133	KSPVARGDT	AAV9	587/590	-4.07	-4.08
Seq ID 134	LLKQRQLMD	AAV9	587/590	0.29	-2.21
Seq ID 135	KMKQIELVE	AAV9	587/590	0.17	-0.69
Seq ID 136	RAPNRVNDE	AAV9	587/590	-1.43	-2.81
Seq ID 137	TMNQAPPAQ	AAV9	587/590	-1.02	-1.61
Seq ID 138	LVKEDEHWI	AAV9	587/590	-2.46	-1.42
Seq ID 139	MIGQRDNNS	AAV9	587/590	-1.65	-1.69
Seq ID 140	TSHMVSHAV	AAV9	587/590	0.25	-0.28
Seq ID 141	IQDEEAKYT	AAV9	587/590	#N/A	-3.36

Seq ID 142	TGGSKFPYM	AAV9	587/590	-1.69	-2.19
Seq ID 143	VEGSAQMIK	AAV9	587/590	0.68	0.85
Seq ID 144	FTDISKEPS	AAV9	587/590	-0.46	-2.45
Seq ID 145	TERPMMQQL	AAV9	587/590	-0.07	-0.07
Seq ID 146	VSLGHDKPV	AAV9	587/590	-1.31	-0.58
Seq ID 147	TQRTTHISDM	AAV9	587/590	-1.17	-0.47
Seq ID 148	TSYSTHASS	AAV9	587/590	0.26	-1.75
Seq ID 149	NTKSADHEY	AAV9	587/590	0.60	0.18
Seq ID 150	RDPLREQRP	AAV9	587/590	-1.28	-2.81
Seq ID 151	LGQRTVQAQ	AAV9	587/590	-3.80	-3.60
Seq ID 152	VHDMTHQVN	AAV9	587/590	-0.05	-0.29
Seq ID 153	DYPEYHDIW	AAV9	587/590	-2.39	-5.31
Seq ID 154	QTQQGNYPK	AAV9	587/590	-2.71	-3.99
Seq ID 155	QASVGTVRV	AAV9	587/590	2.08	1.88
Seq ID 156	SPAHQRGVD	AAV9	587/590	0.48	-0.10
Seq ID 157	QMYGEKSVS	AAV9	587/590	#N/A	-2.93
Seq ID 158	NTAVQRGSV	AAV9	587/590	-1.82	-2.58
Seq ID 159	KTIQQTQDV	AAV9	587/590	0.41	-1.27
Seq ID 160	QMQLGDDI	AAV9	587/590	0.05	0.04
Seq ID 161	SHTGQTREL	AAV9	587/590	-0.43	-1.27
Seq ID 162	KRQNTESAF	AAV9	587/590	-2.34	0.51
Seq ID 163	NFDPLSVAE	AAV9	587/590	-0.46	-1.93
Seq ID 164	KILQQEPLM	AAV9	587/590	0.42	-0.13
Seq ID 165	IVHAVIQST	AAV9	587/590	-0.58	-0.34

Seq ID 166	TMDHNP IQT	AAV9	587/590	-2.00	0.30
Seq ID 167	KQPTPTNLW	AAV9	587/590	-3.02	-2.83
Seq ID 168	EQGNPGVSI	AAV9	587/590	-1.30	0.34
Seq ID 169	IHSRVQQVT	AAV9	587/590	-1.00	0.15
Seq ID 170	PQSQYRPAN	AAV9	587/590	0.96	-4.50
Seq ID 171	YRRDQENAI	AAV9	587/590	-0.03	-0.40
Seq ID 172	TANDAIVAT	AAV9	587/590	0.52	0.16
Seq ID 173	ALYVGSKTKEGVV HGA	AAV9	588/589	-1.32	-2.61
Seq ID 174	MASTNVGTS	AAV9	587/590	0.55	-0.17
Seq ID 175	AIQASDTYI	AAV9	587/590	-1.14	0.59
Seq ID 176	NMQPRIVNA	AAV9	587/590	-0.75	-2.59
Seq ID 177	QSDKEQFKH	AAV9	587/590	-0.08	0.56
Seq ID 178	SVINQQAKA	AAV9	587/590	-0.82	-0.50
Seq ID 179	NVPGSLKIQ	AAV9	587/590	-2.05	-2.22
Seq ID 180	RKDNIPMMV	AAV9	587/590	1.39	0.83
Seq ID 181	NKVHGTIQD	AAV9	587/590	1.31	-0.04
Seq ID 182	SRKDKSEAE	AAV9	587/590	-0.96	-2.87
Seq ID 183	HAQASQTQF	AAV9	587/590	2.24	2.05
Seq ID 184	HLGHHDGAA	AAV9	587/590	0.51	-0.18
Seq ID 185	QPQMGVMVQ	AAV9	587/590	-1.58	-1.31
Seq ID 186	ANLVRNIDA	AAV9	588/589	1.09	-1.08
Seq ID 187	SDIKRNAV	AAV9	587/590	1.13	0.96
Seq ID 188	RVMTNSIDV	AAV9	587/590	-0.61	-0.96
Seq ID 189	KHQQQLAEK	AAV9	587/590	-1.24	-2.63

Seq ID 190	QQTPQTHPV	AAV9	587/590	-3.45	-2.26
Seq ID 191	IHNAHVPHQ	AAV9	587/590	0.01	0.36
Seq ID 192	VSRTPHITDF	AAV9	587/590	0.53	-0.96
Seq ID 193	MQMKGQQPP	AAV9	587/590	-1.49	-1.26
Seq ID 194	HQSGQVPNI	AAV9	587/590	0.30	0.28
Seq ID 195	QLTGVASGH	AAV9	587/590	-1.18	-1.50
Seq ID 196	PEQSPQMMF	AAV9	587/590	-0.70	-0.42
Seq ID 197	NTTPQASLM	AAV9	587/590	-0.21	0.00
Seq ID 198	DEFGAYMPI	AAV9	587/590	-3.39	-1.18
Seq ID 199	PKLIQQVNT	AAV9	587/590	-2.03	-2.30
Seq ID 200	KPGPAQVQW	AAV9	587/590	-1.29	-0.22
Seq ID 201	PLKDVQLSH	AAV9	587/590	-0.69	-0.83
Seq ID 202	KDPFYRSEN	AAV9	587/590	-3.59	-3.66
Seq ID 203	SQPGNQLKM	AAV9	587/590	-2.00	-1.24
Seq ID 204	MQNTMRLQD	AAV9	587/590	-0.58	-0.10
Seq ID 205	ILVKNKDEI	AAV9	587/590	0.94	-0.32
Seq ID 206	PVHGQLQGQ	AAV9	587/590	-0.73	-0.89
Seq ID 207	PTLPGVGMR	AAV9	587/590	-2.09	#N/A
Seq ID 208	PPQAAQITT	AAV9	587/590	-0.06	-0.12
Seq ID 209	TKVQQQDSW	AAV9	587/590	0.44	-0.27
Seq ID 210	IMTSHTVAV	AAV9	587/590	0.26	-1.11
Seq ID 211	HPHMAGQQM	AAV9	587/590	-1.53	0.17
Seq ID 212	PVQTQHAVV	AAV9	587/590	0.31	0.31
Seq ID 213	QIGHKQEYN	AAV9	587/590	-0.98	-1.51

Seq ID 214	HEQQIRRD	AAV9	587/590	-2.03	-2.32
Seq ID 215	DRFKTVQNE	AAV9	587/590	-2.23	-2.77
Seq ID 216	AAFQQT	AAV9	587/590	1.26	-0.75
Seq ID 217	ERSAVVMIA	AAV9	587/590	0.39	0.33
Seq ID 218	QYIQGRQPI	AAV9	587/590	-2.24	-1.77
Seq ID 219	LREHAYPDV	AAV9	587/590	-0.86	-0.90
Seq ID 220	KLMDQGVTA	AAV9	587/590	-0.61	-1.28
Seq ID 221	TSQKQATH	AAV9	587/590	-0.35	-0.90
Seq ID 222	VPNNKNPQV	AAV9	587/590	-0.44	-0.79
Seq ID 223	NVVIVMIFM	AAV9	587/590	-0.51	0.32
Seq ID 224	AISYRGTWSTAESG AA	AAV2	R588A/589	-1.37	-2.84
Seq ID 225	NTTSQTGNV	AAV9	587/590	0.51	-1.35
Seq ID 226	PQESQPENE	AAV9	587/590	#N/A	-2.16
Seq ID 227	TMGSRQTPI	AAV9	587/590	-3.10	-3.50
Seq ID 228	TQVVSGQEI	AAV9	587/590	1.39	1.03
Seq ID 229	PEELKSKQT	AAV9	587/590	-2.34	-1.89
Seq ID 230	INKYSQYTT	AAV9	587/590	-0.01	-1.03
Seq ID 231	QPTQGT	AAV9	587/590	2.80	3.07
Seq ID 232	NQVHTKDDS	AAV9	587/590	-0.56	-1.57
Seq ID 233	YITQIHEDD	AAV9	587/590	-2.68	-1.10
Seq ID 234	HIGGSGNTM	AAV9	587/590	0.84	0.27
Seq ID 235	HQNHPEHAV	AAV9	587/590	-1.68	-1.64
Seq ID 236	LKGSVQQAP	AAV9	587/590	-0.09	-1.60
Seq ID 237	PLIPRQEV	AAV9	587/590	-0.80	-0.66

Seq ID 238	TLVTQSDSS	AAV9	587/590	0.83	0.54
Seq ID 239	LKIDVTKIT	AAV9	587/590	-1.86	-1.25
Seq ID 240	PSHVGFTSV	AAV9	587/590	-1.26	-2.27
Seq ID 241	LYRDQGNIT	AAV9	587/590	-2.32	-1.35
Seq ID 242	SVKQMDATH	AAV9	587/590	0.70	0.97
Seq ID 243	QFDRVAQDK	AAV9	587/590	-1.30	-1.20
Seq ID 244	YPTGTPPAT	AAV9	587/590	1.70	0.93
Seq ID 245	DRVQSTSPH	AAV9	587/590	0.30	-0.51
Seq ID 246	KTQKPYQED	AAV9	587/590	-0.27	-2.79
Seq ID 247	SQVAEQRGI	AAV9	587/590	-0.89	-0.68
Seq ID 248	SESMHGVS	AAV9	587/590	0.43	0.79
Seq ID 249	TITDQQSHG	AAV9	587/590	0.27	-0.12
Seq ID 250	TRHVVTGGY	AAV9	587/590	-3.07	-3.34
Seq ID 251	QQNMKLQVY	AAV9	587/590	-2.87	-2.20
Seq ID 252	SKFTYYDPW	AAV9	587/590	-0.59	0.30
Seq ID 253	MAVQHTTNQ	AAV9	587/590	-1.44	-0.55
Seq ID 254	SSMQGASGV	AAV9	587/590	0.70	-0.14
Seq ID 255	MKYSTQTQS	AAV9	587/590	-1.41	-1.55
Seq ID 256	IKQPQSFAQ	AAV9	587/590	1.05	-2.51
Seq ID 257	TPVAQANKN	AAV9	587/590	-0.25	-1.05
Seq ID 258	QDVMTSPMQ	AAV9	587/590	-0.15	-2.30
Seq ID 259	PQVLGQDEA	AAV9	587/590	-2.64	-2.34
Seq ID 260	TDTVDTGSM	AAV9	587/590	-2.48	-1.49
Seq ID 261	AQEGARQKLHELQE KA	AAV9	588/589	-0.87	-4.98

Seq ID 262	ATSEYGRAY	AAV9	587/590	-0.83	-2.29
Seq ID 263	LKGPQQQAI	AAV9	587/590	-0.09	-0.98
Seq ID 264	VFREAGNVH	AAV9	587/590	0.85	0.63
Seq ID 265	PKQVSDIMF	AAV9	587/590	-1.39	-0.95
Seq ID 266	HMMDGGVPY	AAV9	587/590	0.03	-0.07
Seq ID 267	IRAASTGHM	AAV9	587/590	-0.89	-1.74
Seq ID 268	PDGYHVEMF	AAV9	587/590	-0.38	-0.80
Seq ID 269	QAQSNNIYF	AAV9	587/590	-4.37	-1.17
Seq ID 270	TMNGQSKNF	AAV9	587/590	0.38	0.14
Seq ID 271	HQARREVEY	AAV9	587/590	-0.71	-1.18
Seq ID 272	GDQGRVVSH	AAV9	587/590	-2.75	-0.57
Seq ID 273	ACCPLAEESDNVDS AA	AAV2	R588A/589	-1.11	-1.39
Seq ID 274	QQNQSIFNI	AAV9	587/590	-0.60	-0.67
Seq ID 275	TSDAVKTDQ	AAV9	587/590	-3.22	-2.36
Seq ID 276	TQAPDVLPV	AAV9	587/590	-0.46	-0.69
Seq ID 277	TTDTAKATY	AAV9	587/590	-2.59	-0.81
Seq ID 278	IDEHSEHYV	AAV9	587/590	-2.39	-1.23
Seq ID 279	PINSRIVDP	AAV9	587/590	-0.60	-1.81
Seq ID 280	PDQRGHMYA	AAV9	587/590	-2.38	-1.05
Seq ID 281	FLMSHSEVQ	AAV9	587/590	-1.71	-2.37
Seq ID 282	FIQQSNERN	AAV9	587/590	-0.83	-0.95
Seq ID 283	NPTRDAKPP	AAV9	587/590	0.40	0.87
Seq ID 284	RWGRAQEDE	AAV9	587/590	-1.26	-2.32
Seq ID 285	PRNMQPMTD	AAV9	587/590	0.75	0.56

Seq ID 286	MVSQREINQ	AAV9	587/590	0.15	-0.67
Seq ID 287	MSSSTRMAV	AAV9	587/590	-1.23	-2.62
Seq ID 288	PLNQHQKIS	AAV9	587/590	-2.00	-1.27
Seq ID 289	DNASHVHMQ	AAV9	587/590	-0.62	-0.73
Seq ID 290	DMKRVDYMQ	AAV9	587/590	-4.04	-2.77
Seq ID 291	NHLVDRTTQ	AAV9	587/590	2.23	0.06
Seq ID 292	VIQASSITA	AAV9	587/590	0.24	-0.06
Seq ID 293	AQAMTNKNK	AAV9	587/590	-1.44	0.00
Seq ID 294	INFKQEVHQ	AAV9	587/590	1.07	-0.11
Seq ID 295	AYAQLPEHK	AAV9	587/590	-0.47	-1.31
Seq ID 296	AVTIQNWCKRGRK QCA	AAV2	R588A/589	-0.91	0.46
Seq ID 297	NPQNSGMAM	AAV9	587/590	0.46	-0.23
Seq ID 298	SRDRDTAYA	AAV9	587/590	0.39	0.51
Seq ID 299	PHNSPGMTR	AAV9	587/590	0.27	-1.22
Seq ID 300	KMMPSQMQD	AAV9	587/590	-0.35	-0.82
Seq ID 301	NHAPVHERM	AAV9	587/590	#N/A	-1.17
Seq ID 302	RALKQIDAD	AAV9	587/590	-0.36	-0.43
Seq ID 303	QRVEGFIQD	AAV9	587/590	1.00	1.09
Seq ID 304	AKTDSCQGDSGGPL VA	AAV2	R588A/589	-2.21	-2.40
Seq ID 305	TSASVQSAM	AAV9	587/590	1.43	1.13
Seq ID 306	NVTTHAPTI	AAV9	587/590	1.45	0.02
Seq ID 307	RVQTPDHDH	AAV9	587/590	-1.30	-1.34
Seq ID 308	QVTKEFASF	AAV9	587/590	-0.98	-2.05
Seq ID 309	ASVTPQYLY	AAV9	587/590	-1.59	1.04

Seq ID 310	VTQKTDNTL	AAV9	587/590	1.52	2.31
Seq ID 311	VKMGIQAIA	AAV9	587/590	-0.85	-0.33
Seq ID 312	PLDNYLASM	AAV9	587/590	-1.42	-2.13
Seq ID 313	DENGGVPRI	AAV9	587/590	-3.69	-0.10
Seq ID 314	HWQQPSIDG	AAV9	587/590	-2.26	-1.22
Seq ID 315	TPSQGSHGS	AAV9	587/590	0.41	-1.70
Seq ID 316	HNGMNQVDK	AAV9	587/590	0.85	0.32
Seq ID 317	PHMHNMATP	AAV9	587/590	-2.92	-1.50
Seq ID 318	IQVRDRTPE	AAV9	587/590	0.26	0.21
Seq ID 319	APDAHTRMP	AAV9	587/590	1.69	0.37
Seq ID 320	GAVSHHQM	AAV9	587/590	0.67	-1.27
Seq ID 321	NVQRTGVGN	AAV9	587/590	-1.52	-2.72
Seq ID 322	PDMLQGKMY	AAV9	587/590	-1.67	-2.66
Seq ID 323	NYFASSDQM	AAV9	587/590	0.13	-0.10
Seq ID 324	PRQGS LAHM	AAV9	587/590	-2.61	-3.67
Seq ID 325	SQQVSKQMQ	AAV9	587/590	-3.78	-3.15
Seq ID 326	KRNQEGNGV	AAV9	587/590	-1.64	-2.15
Seq ID 327	PMHSSHNDK	AAV9	587/590	-3.60	-1.68
Seq ID 328	TLQPQHIAK	AAV9	587/590	-1.22	-2.78
Seq ID 329	SAGVVISVV	AAV9	587/590	-0.69	-0.28
Seq ID 330	PLVPRNTPQ	AAV9	587/590	-5.22	-2.68
Seq ID 331	PNQTQMLNK	AAV9	587/590	-1.71	-2.61
Seq ID 332	PMSSEYRPS	AAV9	587/590	-0.88	-1.60
Seq ID 333	ESAHSEFKV	AAV9	587/590	0.04	-1.84

Seq ID 334	PQRVQEQGT	AAV9	587/590	-2.73	-1.59
Seq ID 335	MVQQSLKPA	AAV9	587/590	-1.68	-1.97
Seq ID 336	EQQPAQYHG	AAV9	587/590	0.07	0.05
Seq ID 337	TRNAQTTP	AAV9	587/590	-1.15	-1.97
Seq ID 338	PARSGVQIV	AAV9	587/590	-2.79	-1.01
Seq ID 339	DVFTRQSEG	AAV9	587/590	-1.02	-0.19
Seq ID 340	SMHTHQGGQ	AAV9	587/590	0.03	-0.76
Seq ID 341	VNQNVRMED	AAV9	587/590	-1.54	-0.88
Seq ID 342	LPQAKMADM	AAV9	587/590	0.52	0.16
Seq ID 343	RMMDNSIHT	AAV9	587/590	-0.76	-0.90
Seq ID 344	MEATAEHRI	AAV9	587/590	-2.26	0.10
Seq ID 345	DARAHTQQV	AAV9	587/590	0.33	0.35
Seq ID 346	IKDMEPQLH	AAV9	587/590	0.43	0.13
Seq ID 347	ALITILGTVKPNANR A	AAV9	588/589	-1.18	-2.19
Seq ID 348	NHQARTGEF	AAV9	587/590	-0.44	-1.31
Seq ID 349	PKNHPVSAV	AAV9	587/590	-5.32	-3.54
Seq ID 350	KFPTEDKYI	AAV9	587/590	-0.67	-2.91
Seq ID 351	SPVATQKMV	AAV9	587/590	-0.25	-0.54
Seq ID 352	DLAEHTRFK	AAV9	587/590	0.28	0.21
Seq ID 353	SNTQPRPQQ	AAV9	587/590	0.33	-1.71
Seq ID 354	TIDITPRKL	AAV9	587/590	-2.36	-1.33
Seq ID 355	PAFVDENPP	AAV9	587/590	-0.59	-0.58
Seq ID 356	VSQETRITI	AAV9	587/590	0.60	0.72
Seq ID 357	EHTGGQFRL	AAV9	587/590	-0.83	-0.73

Seq ID 358	MLGKSDQVW	AAV9	587/590	-1.27	-0.56
Seq ID 359	PQRDMVNMK	AAV9	587/590	-0.83	-3.03
Seq ID 360	NSRPGAAMA	AAV9	587/590	-1.20	-2.59
Seq ID 361	TQQAPHNAY	AAV9	587/590	0.03	-1.36
Seq ID 362	PNITGGAIM	AAV9	587/590	0.59	0.22
Seq ID 363	PDQKMMFKL	AAV9	587/590	-4.98	-2.35
Seq ID 364	LKHATVEST	AAV9	587/590	-1.22	-1.06
Seq ID 365	QLSRDTRQD	AAV9	587/590	1.05	1.37
Seq ID 366	PDSKPHAYH	AAV9	587/590	-1.34	-1.47
Seq ID 367	MQPPAQQRT	AAV9	587/590	0.47	-0.11
Seq ID 368	VTIFDMFDQ	AAV9	587/590	#N/A	-0.80
Seq ID 369	IMAYTGQPV	AAV9	587/590	-0.90	-1.41
Seq ID 370	RTEYEMSTR	AAV9	587/590	-0.38	-1.46
Seq ID 371	QAQRKTEFI	AAV9	587/590	-1.34	-1.11
Seq ID 372	QGNETKPNS	AAV9	587/590	-2.22	-1.50
Seq ID 373	RMASQGQDM	AAV9	587/590	-5.99	-1.90
Seq ID 374	PKDGVPQMQ	AAV9	587/590	-3.70	-1.15
Seq ID 375	TIAPAIANL	AAV9	587/590	1.08	-0.35
Seq ID 376	RTHQSSPDS	AAV9	587/590	-1.95	-2.10
Seq ID 377	PTTDMQSNI	AAV9	587/590	-0.95	-0.26
Seq ID 378	HATSQKYET	AAV9	587/590	-0.96	-1.84
Seq ID 379	ALGQARSDA	AAV9	588/589	0.19	-0.56
Seq ID 380	PIATAYKTG	AAV9	587/590	0.21	-0.23
Seq ID 381	HFKPTQDTS	AAV9	587/590	-1.41	-2.91

Seq ID 382	RPNTKAMQE	AAV9	587/590	-2.12	0.96
Seq ID 383	NMPQGRVAM	AAV9	587/590	-1.17	-3.97
Seq ID 384	KTINTPNIL	AAV9	587/590	-1.59	-3.06
Seq ID 385	SRIQHDGAQ	AAV9	587/590	0.50	0.06
Seq ID 386	HPPMPNNTK	AAV9	587/590	-0.56	-0.59
Seq ID 387	RIMPQM QHD	AAV9	587/590	-0.07	-0.27
Seq ID 388	AVILELDKTVEHLPT A	AAV2	R588A/589	-3.67	-3.26
Seq ID 389	HSTARSGEF	AAV9	587/590	-1.15	-1.04
Seq ID 390	SQPQHMNV S	AAV9	587/590	0.80	0.31
Seq ID 391	PGGSYSHV V	AAV9	587/590	2.13	-0.54
Seq ID 392	TVTHAHPTT	AAV9	587/590	1.43	0.52
Seq ID 393	IVATAPRVA	AAV9	587/590	-2.06	-2.67
Seq ID 394	VTRTSVAIE	AAV9	587/590	-2.22	-1.79
Seq ID 395	MIVPTPMNQ	AAV9	587/590	-1.10	-1.37
Seq ID 396	IQVMHSTTH	AAV9	587/590	0.81	0.33
Seq ID 397	QEPTYKNEV	AAV9	587/590	-2.47	-2.48
Seq ID 398	VVPTMNNTR	AAV9	587/590	-1.63	-2.01
Seq ID 399	RETTVYPLQ	AAV9	587/590	0.22	0.29
Seq ID 400	RITTESTIH	AAV9	587/590	-0.28	-0.65
Seq ID 401	AEEVAARRARVW CAA	AAV2	R588A/589	-1.12	-1.93
Seq ID 402	DPVRRKMQV	AAV9	587/590	-0.63	-0.45
Seq ID 403	PYSSKTQDP	AAV9	587/590	-0.96	-0.57
Seq ID 404	WPETKQ EKS	AAV9	587/590	-1.24	-1.61
Seq ID 405	PNTQHLKAE	AAV9	587/590	-2.49	-3.80

Seq ID 406	WQSTGKQSI	AAV9	587/590	-2.14	-1.88
Seq ID 407	KASTDPHSR	AAV9	587/590	1.38	-1.38
Seq ID 408	KPTGTIQGY	AAV9	587/590	-0.37	-0.14
Seq ID 409	HLGTAIVQP	AAV9	587/590	0.34	-0.23
Seq ID 410	PKFSHATSE	AAV9	587/590	-1.22	-2.68
Seq ID 411	IRDGIQMHV	AAV9	587/590	3.45	3.59
Seq ID 412	TTNQERLQS	AAV9	587/590	0.18	-0.42
Seq ID 413	QIKVPPLDQ	AAV9	587/590	-2.18	-2.89
Seq ID 414	LHHERGPSA	AAV9	587/590	-0.76	-0.93
Seq ID 415	KPLGQAQVQ	AAV9	587/590	-0.82	-1.08
Seq ID 416	TPASATRDS	AAV9	587/590	-1.63	-1.17
Seq ID 417	PQQTQVSGQ	AAV9	587/590	-5.19	-1.77
Seq ID 418	ERSSQSIIQ	AAV9	587/590	-2.96	-1.78
Seq ID 419	YHEWRHIPT	AAV9	587/590	-1.07	-1.80
Seq ID 420	PLQASGTAY	AAV9	587/590	0.01	0.03
Seq ID 421	TNNGVRSII	AAV9	587/590	-0.46	-1.04
Seq ID 422	VQPEITPGQ	AAV9	587/590	#N/A	-4.83
Seq ID 423	QDDHNVVQQ	AAV9	587/590	-1.22	-1.17
Seq ID 424	PIVKQNTDT	AAV9	587/590	0.81	-0.44
Seq ID 425	HTLPRLQEE	AAV9	587/590	-1.63	-2.36
Seq ID 426	QPTQGTVRA	AAV9	587/590	3.48	3.38
Seq ID 427	TRPQGPLSP	AAV9	587/590	0.05	-1.34
Seq ID 428	TYAQPHQNN	AAV9	587/590	-2.42	-1.68
Seq ID 429	IQMEQKQQV	AAV9	587/590	0.03	-0.69

Seq ID 430	TQTPPQDAS	AAV9	587/590	0.02	0.59
Seq ID 431	SGAQEKWEM	AAV9	587/590	-0.10	-0.11
Seq ID 432	ASDTEKEDRSPSAIF A	AAV9	588/589	-2.66	-2.02
Seq ID 433	PNYQTKMSF	AAV9	587/590	-3.32	-3.07
Seq ID 434	RPGAAVAPA	AAV9	587/590	-2.06	-3.65
Seq ID 435	LAGSHVSTQ	AAV9	587/590	1.71	0.92
Seq ID 436	LPPGNQTNN	AAV9	587/590	0.39	-1.21
Seq ID 437	NHQHDIEWF	AAV9	587/590	-4.07	-1.21
Seq ID 438	ISEDGSNRK	AAV9	587/590	-2.91	-0.11
Seq ID 439	SMGIHPTNA	AAV9	587/590	1.25	0.46
Seq ID 440	TPLAMASQK	AAV9	587/590	0.91	1.07
Seq ID 441	NVTSNTIQF	AAV9	587/590	0.05	0.97
Seq ID 442	NYNTVPQPK	AAV9	587/590	-0.29	-1.65
Seq ID 443	PRVLQGVQV	AAV9	587/590	-2.14	-2.14
Seq ID 444	TGTRTSAQQ	AAV9	587/590	0.17	0.05
Seq ID 445	NHHRPDV FV	AAV9	587/590	-2.04	-1.43
Seq ID 446	PGPNERQIM	AAV9	587/590	-1.53	-2.08
Seq ID 447	PHDRLPQEV	AAV9	587/590	0.58	-1.37
Seq ID 448	PNAGVMDEE	AAV9	587/590	-1.40	-1.81
Seq ID 449	TAHYRTAET	AAV9	587/590	0.17	-0.84
Seq ID 450	RPQSSATTH	AAV9	587/590	-2.72	-2.67
Seq ID 451	IAHFQPKDT	AAV9	587/590	-1.46	-1.49
Seq ID 452	FAHPEKGFF	AAV9	587/590	-0.52	-1.00
Seq ID 453	QAYAKTAQL	AAV9	587/590	-0.42	-1.69

Seq ID 454	TTSVSVMPK	AAV9	587/590	-1.54	-1.30
Seq ID 455	ASVDTEQRR	AAV9	587/590	1.29	0.74
Seq ID 456	WHEAIVTG	AAV9	587/590	0.11	-0.93
Seq ID 457	VDNDIEWKF	AAV9	587/590	#N/A	-4.65
Seq ID 458	NRVGSQAPT	AAV9	587/590	-3.57	-2.84
Seq ID 459	AAVIVANPREEIVK A	AAV2	R588A/589	-1.36	-2.73
Seq ID 460	PTTPQMVSL	AAV9	587/590	-1.27	-1.58
Seq ID 461	ALKNFAKYFLHQSH EA	AAV2	R588A/589	-2.60	-2.06
Seq ID 462	KYVNVEVQT	AAV9	587/590	-1.37	0.72
Seq ID 463	LLDAGTSGK	AAV9	587/590	1.40	0.45
Seq ID 464	NAPAQQKMM	AAV9	587/590	-1.02	-1.77
Seq ID 465	VDDHAHRQQ	AAV9	587/590	0.60	-2.37
Seq ID 466	PVKLANPTN	AAV9	587/590	0.27	-2.00
Seq ID 467	HALVHQGAV	AAV9	587/590	0.55	0.25
Seq ID 468	VFQKSHSTE	AAV9	587/590	-0.43	-0.59
Seq ID 469	FKQRDSNET	AAV9	587/590	1.24	-0.66
Seq ID 470	EQMSQRVGF	AAV9	587/590	#N/A	-3.13
Seq ID 471	RQAGQFPDS	AAV9	587/590	-3.22	-2.62
Seq ID 472	ESQANAHNA	AAV9	587/590	-1.28	-4.83
Seq ID 473	PPDSKSLNQ	AAV9	587/590	-0.51	-0.19
Seq ID 474	PEQPSQSQY	AAV9	587/590	-0.21	-1.54
Seq ID 475	DGIHTSVQM	AAV9	587/590	0.82	1.20
Seq ID 476	RFDLQEGQS	AAV9	587/590	0.88	0.07
Seq ID 477	DRDRAMMNI	AAV9	587/590	-0.43	-1.53

Seq ID 478	YPPEAQMEM	AAV9	587/590	-2.42	-2.77
Seq ID 479	TAVTTHNGS	AAV9	587/590	-0.73	-2.53
Seq ID 480	EWALDQYGA	AAV9	587/590	#N/A	-2.16
Seq ID 481	ITQSNERMT	AAV9	587/590	-0.64	-2.82
Seq ID 482	NITHQTMLQ	AAV9	587/590	0.68	1.49
Seq ID 483	MMNGSQQFQ	AAV9	587/590	-0.65	-0.37
Seq ID 484	QQTTEGRVQQ	AAV9	587/590	-1.50	-3.52
Seq ID 485	LVNPDPMQY	AAV9	587/590	0.18	-0.64
Seq ID 486	HTHDMDMTP	AAV9	587/590	-2.20	-0.24
Seq ID 487	PQTKNTMDD	AAV9	587/590	-0.07	-0.32
Seq ID 488	DPERQTRPY	AAV9	587/590	-3.11	-3.81
Seq ID 489	TKARSDPLE	AAV9	587/590	-2.29	-1.89
Seq ID 490	RVNDQPYQM	AAV9	587/590	-0.21	-0.36
Seq ID 491	RPSNVDSAT	AAV9	587/590	0.90	0.64
Seq ID 492	RMSNDQKSF	AAV9	587/590	-1.26	-1.91
Seq ID 493	SMTSAFDRI	AAV9	587/590	-0.80	-1.65
Seq ID 494	IHDKQMNNQ	AAV9	587/590	-0.93	-0.10
Seq ID 495	NEYFPYEDL	AAV9	587/590	-4.76	-2.77
Seq ID 496	SIVPTANQD	AAV9	587/590	-2.01	-1.82
Seq ID 497	IFEQAHTNK	AAV9	587/590	-3.74	-1.91
Seq ID 498	AGDTRSLQV	AAV9	587/590	0.86	0.07
Seq ID 499	LQNQTKPVI	AAV9	587/590	-0.73	-1.53
Seq ID 500	QGDIVQHFF	AAV9	587/590	-0.09	-0.90
Seq ID 501	EIQTYKSIV	AAV9	587/590	-0.58	-2.00

Seq ID 502	KAPSIVQGT	AAV9	587/590	-3.59	-2.57
Seq ID 503	QTPQHGTVL	AAV9	587/590	-0.22	-1.00
Seq ID 504	KLMTMYDGQ	AAV9	587/590	-3.23	-1.30
Seq ID 505	LWTNQPSAW	AAV9	587/590	-0.95	-1.59
Seq ID 506	HSDQMRQMF	AAV9	587/590	0.32	-0.14
Seq ID 507	EWQNEATPA	AAV9	587/590	-2.42	-2.88
Seq ID 508	RPERDPMHI	AAV9	587/590	-0.21	0.31
Seq ID 509	AVWQAANTH	AAV9	587/590	-0.35	-2.32
Seq ID 510	RTATTQGGF	AAV9	587/590	-2.09	-2.27
Seq ID 511	PTNLVEAGE	AAV9	587/590	-0.19	-2.10
Seq ID 512	TRMNQTPLQ	AAV9	587/590	-5.17	-2.79
Seq ID 513	PSFTQDRDR	AAV9	587/590	-1.63	-2.28
Seq ID 514	SSAAHTVTY	AAV9	587/590	1.41	1.22
Seq ID 515	SHPQPFMKW	AAV9	587/590	-1.14	-1.38
Seq ID 516	QQGVREAFI	AAV9	587/590	0.60	-0.51
Seq ID 517	AQSPLVSSSDSPRP A	AAV2	R588A/589	-0.95	-1.67
Seq ID 518	DSAVRQNPF	AAV9	587/590	-0.67	-0.85
Seq ID 519	KSNSMQEAH	AAV9	587/590	-1.01	-1.15
Seq ID 520	PRQLSSIPS	AAV9	587/590	-2.70	-3.58
Seq ID 521	DPSAQKQNY	AAV9	587/590	1.79	1.41
Seq ID 522	TGAFDDHDI	AAV9	587/590	-1.29	-0.96
Seq ID 523	NGTHLVTRA	AAV9	587/590	-0.28	0.16
Seq ID 524	TGGKVQLGS	AAV9	587/590	-0.65	-2.50
Seq ID 525	KQLKTMNDF	AAV9	587/590	-5.41	-1.97

Seq ID 526	PHDTRIAVD	AAV9	587/590	-0.32	-0.33
Seq ID 527	ERHIAHTWT	AAV9	587/590	1.55	0.16
Seq ID 528	YRPHPQQHP	AAV9	587/590	#N/A	-2.38
Seq ID 529	YNLPQPKEI	AAV9	587/590	-0.58	-1.41
Seq ID 530	DTQQQPPYK	AAV9	587/590	0.49	0.34
Seq ID 531	QSNQVKQMD	AAV9	587/590	0.99	-1.67
Seq ID 532	IEVKQQQNG	AAV9	587/590	0.05	0.15
Seq ID 533	DQTHNIMQK	AAV9	587/590	0.76	0.55
Seq ID 534	VQEEGWLYA	AAV9	587/590	-5.17	-1.59
Seq ID 535	KQMVAQMSM	AAV9	587/590	-0.21	-2.49
Seq ID 536	SINGQQHDY	AAV9	587/590	-2.97	-3.33
Seq ID 537	TPDMFKSPN	AAV9	587/590	#N/A	-2.47
Seq ID 538	GNHSVHHQQ	AAV9	587/590	-2.13	-3.51
Seq ID 539	ENSRTTTVG	AAV9	587/590	-0.03	-0.78
Seq ID 540	TFVVGQSGK	AAV9	587/590	-1.98	-2.43
Seq ID 541	APLRPQTGE	AAV9	587/590	-2.28	-1.25
Seq ID 542	QTSSSTHHA	AAV9	587/590	-2.32	-2.06
Seq ID 543	KIAATALSS	AAV9	587/590	-0.60	-2.60
Seq ID 544	PESGQSKMH	AAV9	587/590	0.32	-0.04
Seq ID 545	VISVGQMAK	AAV9	587/590	-0.72	-1.58
Seq ID 546	AERPQQGMH	AAV9	587/590	-0.08	-0.11
Seq ID 547	TQQNQIQR	AAV9	587/590	-1.31	-1.13
Seq ID 548	ARQAQEKFGKDKSP KA	AAV2	R588A/589	#N/A	-1.50
Seq ID 549	VTAVTTPSH	AAV9	587/590	0.03	-0.97

Seq ID 550	SQVRGPETT	AAV9	587/590	-1.48	-2.54
Seq ID 551	PLNHQQIQR	AAV9	587/590	-2.15	-2.20
Seq ID 552	AVVPRPHEI	AAV9	587/590	-0.23	-1.45
Seq ID 553	TPNMEDNRQ	AAV9	587/590	-2.08	-0.21
Seq ID 554	HRVTGVNDV	AAV9	587/590	-1.63	-0.74
Seq ID 555	FTGNQGAQN	AAV9	587/590	1.46	-0.34
Seq ID 556	PRLAETSSQ	AAV9	587/590	-0.20	-1.30
Seq ID 557	SPRQSDPAH	AAV9	587/590	-1.33	-0.63
Seq ID 558	MNDDQQPPP	AAV9	587/590	-0.11	-1.64
Seq ID 559	QMKPLPQAM	AAV9	587/590	-4.08	-2.65
Seq ID 560	YSRHENISY	AAV9	587/590	-2.91	-3.89
Seq ID 561	TEGERVGML	AAV9	587/590	0.27	0.45
Seq ID 562	NHVPVLWAD	AAV9	587/590	-0.16	-2.45
Seq ID 563	TLAPLATT	AAV9	587/590	0.21	0.65
Seq ID 564	NQRDVTNLT	AAV9	587/590	1.75	2.12
Seq ID 565	QQNNTVPNQ	AAV9	587/590	0.05	-0.98
Seq ID 566	EKNMHTGVH	AAV9	587/590	0.31	0.28
Seq ID 567	VTLQGATPN	AAV9	587/590	1.23	0.24
Seq ID 568	PTKTSTGQM	AAV9	587/590	-0.94	-3.07
Seq ID 569	FNVDQHRNS	AAV9	587/590	-1.07	-0.74
Seq ID 570	PMTLLKDIQ	AAV9	587/590	-1.29	-1.55
Seq ID 571	DPTRPIETV	AAV9	587/590	0.13	-1.83
Seq ID 572	ERKQQLSEM	AAV9	587/590	-0.42	-1.96
Seq ID 573	NQEQFGMIV	AAV9	587/590	-0.61	-0.51

Seq ID 574	TTQIMVGTK	AAV9	587/590	-0.15	-0.81
Seq ID 575	MYAKTEVQW	AAV9	587/590	0.27	0.26
Seq ID 576	PVGHQMDVY	AAV9	587/590	-0.46	-0.17
Seq ID 577	QVFQDRTSL	AAV9	587/590	-0.01	-0.75
Seq ID 578	LKDNQQATF	AAV9	587/590	-2.46	-1.38
Seq ID 579	AGNTHTLIN	AAV9	587/590	-0.73	-0.37
Seq ID 580	KVPPQHLLTA	AAV9	587/590	-0.97	-2.15
Seq ID 581	GIVTATRVQ	AAV9	587/590	-2.67	-2.21
Seq ID 582	NIAHHQGSN	AAV9	587/590	-1.45	-1.73
Seq ID 583	PAMPGAAAR	AAV9	587/590	-2.38	-2.00
Seq ID 584	VQSITPPQS	AAV9	587/590	0.48	0.39
Seq ID 585	QATHQGQNH	AAV9	587/590	0.51	-1.57
Seq ID 586	PTNAPGVTE	AAV9	587/590	-0.60	0.66
Seq ID 587	MHRAQAIAE	AAV9	587/590	-3.45	-2.20
Seq ID 588	AQASEKMMK	AAV9	587/590	-0.48	-0.82
Seq ID 589	RMNIPPNGT	AAV9	587/590	-0.83	-1.98
Seq ID 590	RPSDINSGD	AAV9	587/590	0.34	-0.67
Seq ID 591	MQPKSAQNV	AAV9	587/590	-2.22	-2.85
Seq ID 592	LAASMQGAH	AAV9	587/590	-1.42	-0.94
Seq ID 593	TSIITQAAN	AAV9	587/590	0.26	-1.38
Seq ID 594	SDREETFNM	AAV9	587/590	0.09	-0.48
Seq ID 595	NQYNMQPSK	AAV9	587/590	-2.98	-2.90
Seq ID 596	WVSEEHFLT	AAV9	587/590	1.95	-0.85
Seq ID 597	QSATSVTSQ	AAV9	587/590	0.46	-0.77

Seq ID 598	HARQSYNDP	AAV9	587/590	-0.97	-2.18
Seq ID 599	AMNVISHDGTPA	AAV2	R588A/589	-2.24	-1.85
Seq ID 600	STIMSEAEF	AAV9	587/590	-2.01	-1.75
Seq ID 601	HANTNVLEK	AAV9	587/590	-0.44	-0.32
Seq ID 602	KPQVTPAVH	AAV9	587/590	-1.22	-1.90
Seq ID 603	AMPDRTMMR	AAV9	587/590	-2.88	-2.71
Seq ID 604	VAIGQTKTL	AAV9	587/590	0.53	-1.51
Seq ID 605	PTDYSVKSV	AAV9	587/590	-1.83	-1.14
Seq ID 606	IGHHKEMKE	AAV9	587/590	-1.36	-0.07
Seq ID 607	ASQAIHYNA	AAV9	587/590	-0.14	-0.28
Seq ID 608	QVRMEGAEY	AAV9	587/590	0.66	1.09
Seq ID 609	MKERHEHFE	AAV9	587/590	0.49	0.44
Seq ID 610	GQVLMAGTR	AAV9	587/590	-0.59	-1.10
Seq ID 611	TVSMPVSHA	AAV9	587/590	1.29	0.71
Seq ID 612	NHDRVNVQP	AAV9	587/590	-1.67	-1.31
Seq ID 613	EELGILNLQ	AAV9	587/590	-0.70	-1.82
Seq ID 614	ANGNFQVLK	AAV9	587/590	0.86	0.18
Seq ID 615	RQYNTESMH	AAV9	587/590	0.03	-0.06
Seq ID 616	MKVSAQVQS	AAV9	587/590	-3.03	-2.79
Seq ID 617	NVSQQKMVQ	AAV9	587/590	-0.30	-2.02
Seq ID 618	RQQNQDKFS	AAV9	587/590	-1.18	-3.69
Seq ID 619	MSSRTMEIH	AAV9	587/590	-0.76	-0.62
Seq ID 620	HEMIKQSGP	AAV9	587/590	-1.55	-1.21
Seq ID 621	QDTRAGKF	AAV9	587/590	-0.02	0.98

Seq ID 622	KWEQRGMAH	AAV9	587/590	-1.85	0.14
Seq ID 623	TKQHTEMQQ	AAV9	587/590	-2.48	-0.97
Seq ID 624	PMQALQNML	AAV9	587/590	-0.42	-1.64
Seq ID 625	KVAFQQQIE	AAV9	587/590	-0.07	-1.08
Seq ID 626	QVPRQEVNE	AAV9	587/590	-0.58	-0.33
Seq ID 627	HLERHKWD	AAV9	587/590	-0.92	-1.58
Seq ID 628	IQRKIQDLA	AAV9	587/590	-3.99	-0.34
Seq ID 629	IKGTDSMQQ	AAV9	587/590	1.26	1.22
Seq ID 630	TMVSGEARQ	AAV9	587/590	0.93	0.87
Seq ID 631	TMVASRQPP	AAV9	587/590	-1.76	-3.61
Seq ID 632	QQRQHQEIT	AAV9	587/590	-0.23	0.07
Seq ID 633	NPESMEAYI	AAV9	587/590	-1.39	-0.86
Seq ID 634	TSQNGKMSV	AAV9	587/590	-1.71	-2.28
Seq ID 635	SRTSTQPQE	AAV9	587/590	-1.03	-1.44
Seq ID 636	RYAVKGETD	AAV9	587/590	-1.26	-1.18
Seq ID 637	VALYPNHAE	AAV9	587/590	0.53	0.78
Seq ID 638	QQTQIHDS	AAV9	587/590	1.33	0.19
Seq ID 639	SSMQEASQI	AAV9	587/590	0.00	-0.55
Seq ID 640	KMNSPNQER	AAV9	587/590	-3.27	-4.41
Seq ID 641	MTNRTPASN	AAV9	587/590	-2.99	-2.57
Seq ID 642	IGVRPMISP	AAV9	587/590	-2.77	-2.74
Seq ID 643	RQADSRTIE	AAV9	587/590	-1.81	-1.98
Seq ID 644	EMRNHPAVQ	AAV9	587/590	-3.41	-1.01
Seq ID 645	MRTNEPHKE	AAV9	587/590	1.15	0.22

Seq ID 646	PTIQRQGMN	AAV9	587/590	-2.11	-3.15
Seq ID 647	DIDPEDIST	AAV9	587/590	-3.71	-1.11
Seq ID 648	EIKMQSTQA	AAV9	587/590	-1.94	-1.00
Seq ID 649	QNFP SQNAA	AAV9	587/590	-1.44	-1.06
Seq ID 650	YRTGPDEIQ	AAV9	587/590	0.93	-0.12
Seq ID 651	IQHTSHHE	AAV9	587/590	0.58	-0.48
Seq ID 652	IISTQEGHI	AAV9	587/590	0.17	0.44
Seq ID 653	PEGDN T FMI	AAV9	587/590	-0.91	-0.91
Seq ID 654	RANA EYLS D	AAV9	587/590	-0.10	-0.02
Seq ID 655	EVSLPSNVK	AAV9	587/590	0.71	0.16
Seq ID 656	RMDINRATD	AAV9	587/590	0.31	-0.38
Seq ID 657	HPSPNTAYV	AAV9	587/590	0.37	0.24
Seq ID 658	SYHSWFPMG	AAV9	587/590	0.78	-0.93
Seq ID 659	AGDRQHMAA	AAV9	587/590	-0.73	-1.44
Seq ID 660	QPKKWGADY	AAV9	587/590	-1.74	-0.07
Seq ID 661	LKQDSRPTY	AAV9	587/590	-0.58	-1.90
Seq ID 662	VSSYQLKSD	AAV9	587/590	-1.94	-1.35
Seq ID 663	RGHSVSDNA	AAV9	587/590	-0.65	-0.54
Seq ID 664	HQAQNQMFK	AAV9	587/590	-0.56	0.01
Seq ID 665	QASN FITVP	AAV9	587/590	-1.50	-0.76
Seq ID 666	VEPHYQQQW	AAV9	587/590	-2.24	-1.38
Seq ID 667	TQGRSQEAT	AAV9	587/590	0.02	0.28
Seq ID 668	ATSSRTTLA	AAV9	588/589	-1.10	-2.47
Seq ID 669	PSSIGKHDN	AAV9	587/590	-0.93	-1.03

Seq ID 670	RHSGDSIPE	AAV9	587/590	-0.04	-0.97
Seq ID 671	ARPATTQSN	AAV9	587/590	-1.54	-3.12
Seq ID 672	PAPSGNTMA	AAV9	587/590	-0.38	-0.66
Seq ID 673	KSPSMSVVL	AAV9	587/590	-3.55	-2.92
Seq ID 674	IPGPNGQIP	AAV9	587/590	-3.16	-2.75
Seq ID 675	PQDYHMSEH	AAV9	587/590	-1.56	-2.23
Seq ID 676	ATHLRVIYERMNQS LA	AAV9	588/589	-1.82	-0.28
Seq ID 677	AHGKREVALHLHPD HA	AAV2	R588A/589	-3.05	-3.03
Seq ID 678	PHTHAQMNL	AAV9	587/590	-0.67	-1.21
Seq ID 679	TVPSQQPGT	AAV9	587/590	-0.51	-1.16
Seq ID 680	AEYKDCHLAQVPSH TA	AAV2	R588A/589	#N/A	-2.75
Seq ID 681	AVGALIQRGFIRPKD A	AAV2	R588A/589	-1.61	-2.44
Seq ID 682	TETDPMQRM	AAV9	587/590	-1.63	-0.97
Seq ID 683	HRQVAGEST	AAV9	587/590	-0.05	-0.56
Seq ID 684	SQSPTRIIQ	AAV9	587/590	-1.11	-0.92
Seq ID 685	RLAIPDGIT	AAV9	587/590	0.46	-0.95
Seq ID 686	RPPQNPQTI	AAV9	587/590	-0.16	0.19
Seq ID 687	VELMRTHST	AAV9	587/590	#N/A	-4.21
Seq ID 688	HQPQYSKSD	AAV9	587/590	-3.16	-2.97
Seq ID 689	ATMQCAHTA	AAV2	R588A/589	-2.05	-2.28
Seq ID 690	KMGGVAAKI	AAV9	587/590	0.73	-1.08
Seq ID 691	TMNKSADRG	AAV9	587/590	-0.34	-1.99
Seq ID 692	EVDDFVSYG	AAV9	587/590	-2.48	-2.81
Seq ID 693	PMSQKVQSA	AAV9	587/590	-1.85	-1.62

Seq ID 694	IHSKANDVL	AAV9	587/590	0.59	0.30
Seq ID 695	AVVSPANAA	AAV9	587/590	0.10	-0.37
Seq ID 696	RQTQTASEY	AAV9	587/590	-2.90	-2.82
Seq ID 697	MESHPQAPQ	AAV9	587/590	-2.83	-1.63
Seq ID 698	TFRESEMIM	AAV9	587/590	0.63	0.83
Seq ID 699	HHTPQNMVN	AAV9	587/590	-2.31	-2.10
Seq ID 700	KTQQMTPVT	AAV9	587/590	-0.96	-3.19
Seq ID 701	IAPQQTYWK	AAV9	587/590	1.06	-0.36
Seq ID 702	EVHSKVMHP	AAV9	587/590	-0.04	0.08
Seq ID 703	NKSTSTVAW	AAV9	587/590	-0.51	-1.52
Seq ID 704	ADSAQAMTK	AAV9	587/590	0.52	0.44
Seq ID 705	MESRKPNDI	AAV9	587/590	-2.78	-2.43
Seq ID 706	NVAQTMIRV	AAV9	587/590	-1.72	-0.45
Seq ID 707	HPRDHEHVD	AAV9	587/590	-2.94	-0.54
Seq ID 708	RVNGSQKES	AAV9	587/590	#N/A	-6.87
Seq ID 709	YSRASSETA	AAV9	587/590	-2.49	-2.11
Seq ID 710	NWGQTQAKQ	AAV9	587/590	0.28	-0.72
Seq ID 711	AQEMSKDLEEVKA KVA	AAV2	R588A/589	-1.12	-1.00
Seq ID 712	REMRASQVE	AAV9	587/590	-3.73	-2.67
Seq ID 713	QYIQEHVAK	AAV9	587/590	1.04	0.43
Seq ID 714	QVAQTTLPI	AAV9	587/590	-0.50	-0.55
Seq ID 715	NTVQNMAHQ	AAV9	587/590	0.14	-0.22
Seq ID 716	TQSREMDTQ	AAV9	587/590	1.48	0.17
Seq ID 717	DDAAHHGFD	AAV9	587/590	-1.91	-0.69

Seq ID 718	AATPSPVLPDIVME AA	AAV2	R588A/589	-4.48	-2.69
Seq ID 719	QQASGNNLR	AAV9	587/590	-1.34	-1.83
Seq ID 720	AKVVTDSMS	AAV9	587/590	-1.04	-0.38
Seq ID 721	SQVVVSQGSQ	AAV9	587/590	0.12	-0.67
Seq ID 722	FQHRANSME	AAV9	587/590	-2.53	-2.21
Seq ID 723	ANRGTEWDA	AAV9	588/589	0.28	-0.70
Seq ID 724	TIDEVDIGY	AAV9	587/590	-0.94	-1.57
Seq ID 725	LQYKAMQVS	AAV9	587/590	-3.20	-0.27
Seq ID 726	AIPVCEAFQCTALSN A	AAV2	R588A/589	-0.41	-1.60
Seq ID 727	TEDSPQMTQ	AAV9	587/590	-0.55	-1.84
Seq ID 728	SGSMTPTTV	AAV9	587/590	1.07	0.86
Seq ID 729	LPMPYSQGI	AAV9	587/590	-2.70	-1.29
Seq ID 730	SYTPQSQT	AAV9	587/590	-0.23	-1.84
Seq ID 731	SASKSFPTA	AAV9	587/590	-0.47	-0.38
Seq ID 732	PSQPMKFIN	AAV9	587/590	-1.85	-0.78
Seq ID 733	VEAQHKPAY	AAV9	587/590	0.36	-1.25
Seq ID 734	IPSPVTAYW	AAV9	587/590	-3.11	1.06
Seq ID 735	NYLSTSVPR	AAV9	587/590	-2.13	-2.35
Seq ID 736	TNSVKMPPS	AAV9	587/590	-0.57	-3.55
Seq ID 737	PQEDVKSVM	AAV9	587/590	-2.96	-1.49
Seq ID 738	EPHNMKVEK	AAV9	587/590	-6.08	-2.50
Seq ID 739	PQKQSLHTV	AAV9	587/590	-1.39	-2.04
Seq ID 740	KPQGVNVTY	AAV9	587/590	-1.57	-2.75
Seq ID 741	FQRSEVQTI	AAV9	587/590	0.22	0.83

Seq ID 742	AAEPAPDFSDYSEM AA	AAV9	588/589	-1.62	-2.81
Seq ID 743	QRQGGMEAK	AAV9	587/590	-3.57	-2.81
Seq ID 744	TASVKQQNT	AAV9	587/590	-1.28	-2.36
Seq ID 745	HRNTESGDQ	AAV9	587/590	-1.52	-0.48
Seq ID 746	FPKSYEQVQ	AAV9	587/590	0.17	-0.47
Seq ID 747	QGASQRVAI	AAV9	587/590	-3.45	-3.63
Seq ID 748	HPMAKDVVK	AAV9	587/590	-0.79	-2.58
Seq ID 749	REQKLYKEP	AAV9	587/590	-3.51	-2.05
Seq ID 750	TEQQWYGRM	AAV9	587/590	-0.83	-2.29
Seq ID 751	APTNKTVGI	AAV9	587/590	-1.80	-2.50
Seq ID 752	QRTAVNEMQ	AAV9	587/590	-0.35	-1.05
Seq ID 753	PQNAQRVDT	AAV9	587/590	-2.00	-2.19
Seq ID 754	KDDDKVGIV	AAV9	587/590	-2.23	-1.72
Seq ID 755	APAPAAPPSTPAAPK A	AAV2	R588A/589	-4.79	-3.03
Seq ID 756	NHAVMHTVS	AAV9	587/590	0.69	1.08
Seq ID 757	MRTQAVDGF	AAV9	587/590	-1.48	-2.99
Seq ID 758	DIQHATKRE	AAV9	587/590	-0.83	-0.76
Seq ID 759	ATQAHTMMY	AAV9	587/590	0.49	0.13
Seq ID 760	QGTSEASRY	AAV9	587/590	1.13	0.69
Seq ID 761	RNSHGMSES	AAV9	587/590	-0.60	-1.23
Seq ID 762	PNSAHNNSY	AAV9	587/590	0.60	-0.40
Seq ID 763	TTGASKDKV	AAV9	587/590	-2.21	-0.75
Seq ID 764	DRTGVWAGE	AAV9	587/590	-1.02	-3.32
Seq ID 765	VQTLDRGSQ	AAV9	587/590	-2.35	-4.04

Seq ID 766	DATAHSLIQ	AAV9	587/590	-0.29	-0.42
Seq ID 767	IGQAPEVND	AAV9	587/590	-4.80	-1.98
Seq ID 768	HYAKVTEQA	AAV9	587/590	-2.00	-0.16
Seq ID 769	DPSVRSNMI	AAV9	587/590	-0.74	-1.20
Seq ID 770	MSKVSTQDR	AAV9	587/590	-3.35	-2.46
Seq ID 771	AQDRISQWA	AAV2	R588A/589	-2.45	-1.84
Seq ID 772	AHLAQPATLSQTIVP A	AAV2	R588A/589	-4.63	-2.87
Seq ID 773	NEKIRELPK	AAV9	587/590	-1.86	-1.76
Seq ID 774	QMTKHETIYI	AAV9	587/590	-3.83	-0.94
Seq ID 775	GAQQYSQVS	AAV9	587/590	1.68	-0.64
Seq ID 776	IQDDPMTSM	AAV9	587/590	-3.25	-0.66
Seq ID 777	VPTVERNLSL	AAV9	587/590	1.35	0.71
Seq ID 778	KLVMQTQTEY	AAV9	587/590	-1.71	0.16
Seq ID 779	GGVPMKALI	AAV9	587/590	-0.47	-1.29
Seq ID 780	IQSPQQAMR	AAV9	587/590	-1.29	-2.31
Seq ID 781	SFHGPIKNY	AAV9	587/590	-1.20	-0.90
Seq ID 782	NTKDNAGKD	AAV9	587/590	-0.68	-0.38
Seq ID 783	ADFSDLYYHTMNN KHA	AAV2	R588A/589	-2.15	-3.02
Seq ID 784	QKQIMHPES	AAV9	587/590	-4.18	-3.18
Seq ID 785	PQPQMGHSM	AAV9	587/590	-1.91	-1.45
Seq ID 786	QLHTGIQNS	AAV9	587/590	-0.40	-0.92
Seq ID 787	AFEVMEDHAGTYG LGA	AAV2	R588A/589	-1.99	-3.31
Seq ID 788	SYVQPTAIM	AAV9	587/590	-0.56	-1.26
Seq ID 789	IQATRNVGV	AAV9	587/590	-2.66	-2.34

Seq ID 790	MILVVLQSV	AAV9	587/590	-0.95	0.38
Seq ID 791	KMFSSEQF	AAV9	587/590	-2.04	-1.95
Seq ID 792	TTDRDKMAL	AAV9	587/590	-1.48	-1.56
Seq ID 793	KAINTMIEA	AAV9	587/590	#N/A	-1.90
Seq ID 794	HMTNGTPMM	AAV9	587/590	-0.89	-1.83
Seq ID 795	MQNSVKQVW	AAV9	587/590	-1.74	-1.11
Seq ID 796	SQPKMQETG	AAV9	587/590	0.52	0.68
Seq ID 797	TESHSITPM	AAV9	587/590	1.40	0.88
Seq ID 798	QVSQGVHGQ	AAV9	587/590	-0.80	-1.39
Seq ID 799	TTQMMPMVA	AAV9	587/590	0.20	0.43
Seq ID 800	KLTVTRRMF	AAV9	587/590	-0.34	0.91
Seq ID 801	AGIATSGSA	AAV9	588/589	0.42	-1.31
Seq ID 802	TPNMQMSY	AAV9	587/590	0.85	0.29
Seq ID 803	FNDQPQKIF	AAV9	587/590	0.45	-0.41
Seq ID 804	PTSVHGQML	AAV9	587/590	-0.44	-0.72
Seq ID 805	SQTHQVGYP	AAV9	587/590	2.23	1.64
Seq ID 806	QGTATRPD	AAV9	587/590	-4.84	-1.37
Seq ID 807	AGGKVQIINKKLDL SA	AAV2	R588A/589	-3.91	-1.47
Seq ID 808	ASLSITEDA	AAV2	R588A/589	-2.30	-0.72
Seq ID 809	TSKPPALQG	AAV9	587/590	-0.14	-0.21
Seq ID 810	KVMEKQGMR	AAV9	587/590	0.43	0.29
Seq ID 811	KTVESPPQQ	AAV9	587/590	0.78	0.19
Seq ID 812	AGPSVGRAKGQDAP LA	AAV9	588/589	-1.52	-3.98
Seq ID 813	RHPSPVNVL	AAV9	587/590	-1.67	-2.13

Seq ID 814	YQNDRMRKGT	AAV9	587/590	-5.98	-4.30
Seq ID 815	LINAHQPQK	AAV9	587/590	0.30	1.15
Seq ID 816	AGHAIVENVRSSLK GA	AAV2	R588A/589	-3.17	-2.76
Seq ID 817	GIGTHMTMV	AAV9	587/590	0.51	-0.14
Seq ID 818	RTLHVNDNSP	AAV9	587/590	0.44	0.48
Seq ID 819	ADLENLRDLLHVGG GA	AAV2	R588A/589	-4.21	-3.67
Seq ID 820	QEQANQRPN	AAV9	587/590	-4.82	-2.55
Seq ID 821	VSAQSMRNP	AAV9	587/590	-1.44	-4.21
Seq ID 822	TLQQKTYNP	AAV9	587/590	-1.46	-2.17
Seq ID 823	FLDSNHSMT	AAV9	587/590	0.66	0.67
Seq ID 824	TDYYSTDDY	AAV9	587/590	-0.57	-2.84
Seq ID 825	AVLTQTMGK	AAV9	587/590	-0.81	-1.67
Seq ID 826	PAPHSVVQM	AAV9	587/590	-0.50	-1.70
Seq ID 827	RPNASDIKG	AAV9	587/590	-2.73	-2.50
Seq ID 828	PQRNTGIVQ	AAV9	587/590	-1.85	-4.56
Seq ID 829	IVSQTPVAV	AAV9	587/590	-0.90	-2.03
Seq ID 830	PTTRIGEHP	AAV9	587/590	0.09	-0.51
Seq ID 831	RQPTDSYSK	AAV9	587/590	-1.07	-1.87
Seq ID 832	TVGGKTYAD	AAV9	587/590	0.45	-0.22
Seq ID 833	LKNPPLGNQ	AAV9	587/590	0.21	0.06
Seq ID 834	LSQSQSQTY	AAV9	587/590	0.89	0.37
Seq ID 835	PPTAQAYD	AAV9	587/590	-0.98	0.19
Seq ID 836	NDQLHISLR	AAV9	587/590	-0.54	0.37
Seq ID 837	AKNQYVEED	AAV9	587/590	-0.31	-0.17

Seq ID 838	QARANAFPD	AAV9	587/590	-1.83	-2.14
Seq ID 839	NGNFAYDHP	AAV9	587/590	-2.59	-1.81
Seq ID 840	ILQSNTRGI	AAV9	587/590	-0.70	-1.27
Seq ID 841	TQPQQHNEP	AAV9	587/590	0.22	-0.80
Seq ID 842	QRHNENVQM	AAV9	587/590	-0.16	-1.73
Seq ID 843	AQVLRIRKRANSFL EA	AAV2	R588A/589	-1.95	-3.41
Seq ID 844	QLRDVQLQH	AAV9	587/590	-0.49	-0.34
Seq ID 845	YAKQSTQQM	AAV9	587/590	-1.03	-2.49
Seq ID 846	TQVLRDKQP	AAV9	587/590	-2.24	0.00
Seq ID 847	QNKIEFRPE	AAV9	587/590	0.15	-0.06
Seq ID 848	SSHASMSST	AAV9	587/590	1.24	0.76
Seq ID 849	RVVEQGRGI	AAV9	587/590	-1.90	-0.91
Seq ID 850	HRNPTVVVD	AAV9	587/590	0.65	0.09
Seq ID 851	APWNSATVLQQTY HAA	AAV2	R588A/589	-2.24	-1.32
Seq ID 852	MWNVTSAGE	AAV9	587/590	0.21	-0.65
Seq ID 853	KTQQALVLQ	AAV9	587/590	-2.09	-0.49
Seq ID 854	QVHQESMFG	AAV9	587/590	-1.08	-1.91
Seq ID 855	QLNTTKPIA	AAV9	587/590	-2.38	-1.39
Seq ID 856	EQYAIKQPT	AAV9	587/590	-0.12	-2.37
Seq ID 857	ALGKTAETH	AAV9	587/590	0.24	-0.58
Seq ID 858	KVFHTPEMN	AAV9	587/590	-0.40	-0.04
Seq ID 859	ASQTAPIVT	AAV9	587/590	-0.08	0.12
Seq ID 860	TLKKTDDVW	AAV9	587/590	-2.76	-0.94
Seq ID 861	AHEALSPFYSERLKE A	AAV2	R588A/589	-0.40	-4.32

Seq ID 862	QINGSHRIV	AAV9	587/590	-1.70	-1.08
Seq ID 863	ATAQDLFTA	AAV2	R588A/589	-0.98	-1.73
Seq ID 864	ATAQDLFTA	AAV9	588/589	-0.98	-1.73
Seq ID 865	SQHTSDMES	AAV9	587/590	-0.71	0.30
Seq ID 866	YRTATTNS	AAV9	587/590	-1.33	-3.58
Seq ID 867	PASKQFTPD	AAV9	587/590	-2.30	-1.14
Seq ID 868	TATRQEVHH	AAV9	587/590	-0.23	-0.48
Seq ID 869	TTTGVMVAK	AAV9	587/590	-0.94	-1.85
Seq ID 870	NPVFHQSV	AAV9	587/590	-2.16	-2.10
Seq ID 871	KPVSSQHTP	AAV9	587/590	0.07	-3.14
Seq ID 872	TMATAHQTD	AAV9	587/590	-1.87	-0.93
Seq ID 873	VVSGVPMSQ	AAV9	587/590	0.79	0.42
Seq ID 874	MTFGMQQNK	AAV9	587/590	-1.21	-0.97
Seq ID 875	YGQAVVMQN	AAV9	587/590	-0.26	-0.32
Seq ID 876	LFHKHPDEM	AAV9	587/590	-2.73	-4.19
Seq ID 877	RMRDQDVTS	AAV9	587/590	0.78	-0.32
Seq ID 878	MKQTGGSSF	AAV9	587/590	-1.46	-2.78
Seq ID 879	LQASSGAMF	AAV9	587/590	0.13	-0.80
Seq ID 880	NVSTTASQV	AAV9	587/590	1.45	0.12
Seq ID 881	IMQTSVGRD	AAV9	587/590	-2.67	-1.43
Seq ID 882	KLAVVVAIH	AAV9	587/590	0.89	-0.82
Seq ID 883	EIKGAADSH	AAV9	587/590	-0.59	-0.68
Seq ID 884	VQQGNPMQR	AAV9	587/590	-0.76	-0.80
Seq ID 885	HRWVQLWRV	AAV9	587/590	0.65	-0.34

Seq ID 886	RAETHKYNP	AAV9	587/590	0.93	2.99
Seq ID 887	RDPAINHMQ	AAV9	587/590	0.24	-0.84
Seq ID 888	PQSQGMQQR	AAV9	587/590	-2.78	-3.07
Seq ID 889	GIRQDQEYF	AAV9	587/590	-0.68	-1.24
Seq ID 890	ANCRIPA	AAV2	R588A/589	-6.26	-2.51
Seq ID 891	GTTMKVQMS	AAV9	587/590	-2.51	-2.68
Seq ID 892	NTHSSHIMV	AAV9	587/590	-0.32	-1.41
Seq ID 893	KQREPGNVG	AAV9	587/590	-4.49	-2.95
Seq ID 894	IYFNDAEQI	AAV9	587/590	-0.86	-1.43
Seq ID 895	NHTAKAAPL	AAV9	587/590	-0.92	-1.89
Seq ID 896	QHVGQFPQ	AAV9	587/590	-2.18	-2.06
Seq ID 897	RIERQHNDQ	AAV9	587/590	-0.09	-2.18
Seq ID 898	AEAKRHRPLIALPTQ A	AAV2	R588A/589	-1.98	-0.91
Seq ID 899	EPHTSSQQR	AAV9	587/590	-0.83	-0.17
Seq ID 900	AEMYCAPLKPAHSA RA	AAV2	R588A/589	-2.07	-1.14
Seq ID 901	DPHQRMQQ	AAV9	587/590	1.42	0.00
Seq ID 902	PSITNRQGA	AAV9	587/590	-2.45	-3.19
Seq ID 903	ADEPARKGKVHIPP PA	AAV2	R588A/589	0.20	-0.88
Seq ID 904	LLTPQSRSS	AAV9	587/590	-2.95	-2.57
Seq ID 905	LTLQGQAKQ	AAV9	587/590	-0.39	-0.08
Seq ID 906	QEDDQRSDR	AAV9	587/590	-2.83	-2.94
Seq ID 907	PTNPGEVPV	AAV9	587/590	-0.87	-1.95
Seq ID 908	MLSNEGTN	AAV9	587/590	-4.58	-1.32
Seq ID 909	PMEMTTSELF	AAV9	587/590	-3.10	-2.71

Seq ID 910	MPTQSRQYI	AAV9	587/590	0.29	-2.17
Seq ID 911	SKTQHTNPE	AAV9	587/590	0.26	-0.72
Seq ID 912	QDSFFQRWA	AAV9	587/590	1.52	0.00
Seq ID 913	ITIDVQSAK	AAV9	587/590	-1.28	-1.52
Seq ID 914	PQQSHVVSQ	AAV9	587/590	-1.07	-3.34
Seq ID 915	VQVGTSVGK	AAV9	587/590	-2.16	-2.65
Seq ID 916	SAQTSHPIIM	AAV9	587/590	1.95	1.07
Seq ID 917	PQEMMALVY	AAV9	587/590	-2.21	-0.89
Seq ID 918	QHRYMRPHT	AAV9	587/590	-0.77	-1.36
Seq ID 919	NMAQHGLQ	AAV9	587/590	1.17	0.20
Seq ID 920	RHGLTTPDF	AAV9	587/590	-3.37	-2.39
Seq ID 921	TTMQRTMDV	AAV9	587/590	-0.25	-2.15
Seq ID 922	PKSHGAHDV	AAV9	587/590	-1.19	-1.54
Seq ID 923	AIENAVRSSLKVATS A	AAV9	588/589	-2.39	-2.56
Seq ID 924	PMVDAMVSV	AAV9	587/590	-0.79	-0.56
Seq ID 925	TEQPEPFVF	AAV9	587/590	-1.15	-1.59
Seq ID 926	LDAVPKNIK	AAV9	587/590	-0.62	-0.82
Seq ID 927	TGMSQATSR	AAV9	587/590	-1.02	-1.39
Seq ID 928	PTRPSSETM	AAV9	587/590	-1.27	-2.83
Seq ID 929	RIEGSHPPP	AAV9	587/590	-1.76	0.04
Seq ID 930	VKGHQEFAN	AAV9	587/590	-0.13	-0.14
Seq ID 931	MLVGVPQSK	AAV9	587/590	-0.17	-0.55
Seq ID 932	QRQQPQPF	AAV9	587/590	-3.54	-1.88
Seq ID 933	ARMQASALA	AAV2	R588A/589	-3.59	-5.23

Seq ID 934	DWEAKARVA	AAV9	587/590	-1.43	-0.20
Seq ID 935	PIASTITNR	AAV9	587/590	-1.72	-2.26
Seq ID 936	ENSQPIRPS	AAV9	587/590	-0.51	-2.39
Seq ID 937	AHMNVQNGKWDS DPSA	AAV2	R588A/589	-2.97	-2.93
Seq ID 938	PHQVPRDPV	AAV9	587/590	-2.04	-2.06
Seq ID 939	TTSTNREVS	AAV9	587/590	1.42	-0.03
Seq ID 940	PSGVMQDPV	AAV9	587/590	-0.24	-0.45
Seq ID 941	AKSHELQVA	AAV2	R588A/589	-0.08	-1.18
Seq ID 942	AVNQVHHQM	AAV9	587/590	-1.02	-1.19
Seq ID 943	SVGRQQQDI	AAV9	587/590	-1.74	-2.01
Seq ID 944	VAMIKQSSI	AAV9	587/590	0.01	-0.79
Seq ID 945	DILIWQHSD	AAV9	587/590	1.39	-1.35
Seq ID 946	FTTKHVNEQ	AAV9	587/590	-2.90	-1.47
Seq ID 947	AKPYSGRRPDAIRL GA	AAV2	R588A/589	0.17	-0.78
Seq ID 948	QSMADPRAM	AAV9	587/590	0.18	-1.70
Seq ID 949	AHLASNLSA	AAV2	R588A/589	-2.35	-3.13
Seq ID 950	LQHSNQDQE	AAV9	587/590	0.25	0.44
Seq ID 951	NPWDQTKAM	AAV9	587/590	-4.40	-2.87
Seq ID 952	VTDFVFDVYD	AAV9	587/590	-1.82	-2.56
Seq ID 953	EYDQGVTFN	AAV9	587/590	-2.12	-1.90
Seq ID 954	QTYSMQHL	AAV9	587/590	-2.97	-1.07
Seq ID 955	FKTDRDSML	AAV9	587/590	0.43	0.21
Seq ID 956	AIPVPVDGMEYHW GNA	AAV2	R588A/589	-0.63	-2.96
Seq ID 957	PASKNVQPM	AAV9	587/590	-1.04	-1.85

Seq ID 958	RLEISSQI	AAV9	587/590	-1.26	-2.91
Seq ID 959	IQGLPSMVH	AAV9	587/590	-1.63	-1.07
Seq ID 960	NIAQNLLME	AAV9	587/590	-1.11	-0.96
Seq ID 961	HPQPSGHFS	AAV9	587/590	0.30	-0.43
Seq ID 962	IPRQGSQTT	AAV9	587/590	-3.31	-2.57
Seq ID 963	DVLGQMGKM	AAV9	587/590	1.16	0.50
Seq ID 964	TYSSPSIGT	AAV9	587/590	-2.09	-2.97
Seq ID 965	EHKDFQVSG	AAV9	587/590	-0.60	-0.60
Seq ID 966	EVRPKQDFT	AAV9	587/590	-1.45	-0.30
Seq ID 967	ARYEAVSFMDVNST WA	AAV2	R588A/589	0.01	-0.74
Seq ID 968	PYTQKTGSV	AAV9	587/590	-1.35	-1.58
Seq ID 969	NFVNNQPGY	AAV9	587/590	-3.09	-3.40
Seq ID 970	SGLNMKTSV	AAV9	587/590	-2.85	-1.77
Seq ID 971	AQHTLKHFEHVRM VDA	AAV2	R588A/589	-5.46	-3.11
Seq ID 972	AQHTLKHFEHVRM VDA	AAV9	588/589	-5.46	-3.11
Seq ID 973	KENPQHGIY	AAV9	587/590	0.23	-0.47
Seq ID 974	KSPTPDINT	AAV9	587/590	-3.67	-3.36
Seq ID 975	LTSSKSDPA	AAV9	587/590	-0.70	-0.50
Seq ID 976	ARMQASQVA	AAV2	R588A/589	-3.14	-3.17
Seq ID 977	RYHRDTIDM	AAV9	587/590	-3.07	-1.55
Seq ID 978	ASLSITKPA	AAV2	R588A/589	-3.34	-2.90
Seq ID 979	ASSPGSPGTPGSRSR A	AAV2	R588A/589	-0.44	-2.64
Seq ID 980	ADRIPA	AAV2	R588A/589	-3.23	-4.11
Seq ID 981	HETQVKGMQ	AAV9	587/590	-0.50	-1.86

Seq ID 982	TPRATPSMP	AAV9	587/590	0.31	-0.61
Seq ID 983	RPTQHQDIN	AAV9	587/590	-1.90	-0.35
Seq ID 984	TTNTQGAQV	AAV9	587/590	1.00	0.20
Seq ID 985	HYGWQQVPD	AAV9	587/590	-4.03	-2.49
Seq ID 986	HPGSSMVPT	AAV9	587/590	-0.54	-1.73
Seq ID 987	SSVSQVTLR	AAV9	587/590	0.00	-0.38
Seq ID 988	MYAAGNVHA	AAV9	587/590	0.17	0.30
Seq ID 989	TSGVVQTIH	AAV9	587/590	0.69	-0.41
Seq ID 990	HMHPAQSEY	AAV9	587/590	-2.96	-3.00
Seq ID 991	PQKGDMHTS	AAV9	587/590	-0.37	-0.69
Seq ID 992	ATYQPLFTA	AAV2	R588A/589	-2.47	-1.22
Seq ID 993	ATYQPLFTA	AAV9	588/589	-2.47	-1.22
Seq ID 994	AQSSDIENA	AAV2	R588A/589	-1.52	-1.55
Seq ID 995	QVAIQPQEE	AAV9	587/590	-1.36	-1.15
Seq ID 996	RAVQNVTTM	AAV9	587/590	-4.05	-1.35
Seq ID 997	PSTLVMQSV	AAV9	587/590	-0.05	-0.89
Seq ID 998	QQQLDDIP	AAV9	587/590	-1.12	-2.09
Seq ID 999	WEKHIMIDY	AAV9	587/590	-2.33	-1.12
Seq ID 1000	NQSTSVNTW	AAV9	587/590	-2.74	-1.91
Seq ID 1001	TVQEADSQP	AAV9	587/590	-0.79	-1.52
Seq ID 1002	AGDAIENAVRSSLK VA	AAV2	R588A/589	-2.70	-2.21
Seq ID 1003	RTDKSQYQP	AAV9	587/590	#N/A	-1.45
Seq ID 1004	ADGGFIYEAGLAPY KA	AAV2	R588A/589	-1.18	-1.70
Seq ID 1005	ARMKDNTTP	AAV9	587/590	-0.98	-1.02

Seq ID 1006	STITPMRQI	AAV9	587/590	-1.49	-0.61
Seq ID 1007	QTPIAPPPI	AAV9	587/590	-0.22	-0.85
Seq ID 1008	AQPEHRSER	AAV9	587/590	-3.61	-3.99
Seq ID 1009	ASRANISHA	AAV2	R588A/589	-2.98	-3.72
Seq ID 1010	AAAAGAVVGGGLGG YMA	AAV2	R588A/589	#N/A	-1.92
Seq ID 1011	PQMRQLYHS	AAV9	587/590	-2.08	-0.04
Seq ID 1012	LEFHSQAMV	AAV9	587/590	-0.04	-1.80
Seq ID 1013	AQKTYQEGD	AAV9	587/590	-0.40	-0.62
Seq ID 1014	AMFSDLYLTMNN KHA	AAV2	R588A/589	0.09	-0.61
Seq ID 1015	VLDYMDIVF	AAV9	587/590	-1.15	-1.06
Seq ID 1016	ADFSDLCYLTMMNK HA	AAV2	R588A/589	-0.80	0.64
Seq ID 1017	ANAVIPA	AAV2	R588A/589	-0.49	-1.40
Seq ID 1018	KRERGMQDY	AAV9	587/590	0.31	-1.29
Seq ID 1019	GPFTPAGMM	AAV9	587/590	0.22	-0.53
Seq ID 1020	RKMPQAIDV	AAV9	587/590	-1.52	-3.58
Seq ID 1021	GSDPAGFKM	AAV9	587/590	-4.72	-2.86
Seq ID 1022	DAQSIQVSI	AAV9	587/590	-0.70	-0.66
Seq ID 1023	KVNEVMQKD	AAV9	587/590	1.22	0.08
Seq ID 1024	ATSKVLLLPPDVSA LA	AAV2	R588A/589	-0.71	-2.25
Seq ID 1025	AAAIIPA	AAV2	R588A/589	-2.53	-3.02
Seq ID 1026	ARYADGHAIENAVR SA	AAV2	R588A/589	-1.15	-2.09
Seq ID 1027	SEHDNHQQT	AAV9	587/590	-4.27	-1.18
Seq ID 1028	PRVQGNDQA	AAV9	587/590	0.06	-0.72
Seq ID 1029	AVAVHHTPA	AAV2	R588A/589	-3.34	-5.68

Seq ID 1030	ADVRDPRGA	AAV2	R588A/589	-4.58	-2.35
Seq ID 1031	ASKTSVVDLLYWR DIA	AAV2	R588A/589	#N/A	-1.24
Seq ID 1032	NVNETKGSW	AAV9	587/590	-3.04	-0.93
Seq ID 1033	AGHAIENAVKSSLK VA	AAV2	R588A/589	-3.42	-4.46
Seq ID 1034	ALDWIHGHIRDKEA PA	AAV2	R588A/589	#N/A	-0.21
Seq ID 1035	SPKYFTPTM	AAV9	587/590	0.47	1.22
Seq ID 1036	KSQVQPQGT	AAV9	587/590	#N/A	-2.75
Seq ID 1037	QMDTRIPQR	AAV9	587/590	-1.40	-2.23
Seq ID 1038	AFRALSTGEKGFGY KA	AAV2	R588A/589	#N/A	-1.23
Seq ID 1039	ATCEAVRCDAVHQP PA	AAV2	R588A/589	-1.99	-3.92
Seq ID 1040	ERSSQYEKG	AAV9	587/590	1.01	1.72
Seq ID 1041	IRPGTAMAP	AAV9	587/590	-2.50	-2.36
Seq ID 1042	SPHSVQSG	AAV9	587/590	0.49	0.50
Seq ID 1043	QQAQKVAGV	AAV9	587/590	-2.40	-4.47
Seq ID 1044	PRDISTAMV	AAV9	587/590	-2.00	-0.62
Seq ID 1045	PRVTQDLVG	AAV9	587/590	0.21	0.35
Seq ID 1046	QQVVTRHEM	AAV9	587/590	-5.91	-1.41
Seq ID 1047	ARMQAKAVA	AAV2	R588A/589	-0.76	-0.88
Seq ID 1048	ANPRIPA	AAV2	R588A/589	-3.24	-3.72
Seq ID 1049	MVEHNHHVM	AAV9	587/590	0.61	0.63
Seq ID 1050	AQSSDISPA	AAV2	R588A/589	-1.62	-1.60
Seq ID 1051	ARPQASAVA	AAV2	R588A/589	-2.30	-3.17
Seq ID 1052	NDFDMPGEI	AAV9	587/590	-1.07	-2.98
Seq ID 1053	NRNPTMTGP	AAV9	587/590	-2.18	-3.21

Seq ID 1054	ANAGIPA	AAV2	R588A/589	0.21	-0.86
Seq ID 1055	ADFSHLYYLTMMN KHA	AAV2	R588A/589	-4.66	-0.27
Seq ID 1056	ACELSGYGKHEALS PA	AAV2	R588A/589	-2.66	-1.39
Seq ID 1057	TANKSAPVS	AAV9	587/590	-0.93	-1.36
Seq ID 1058	QGHSMPTYG	AAV9	587/590	-0.52	-0.61
Seq ID 1059	EYRVTDNTQ	AAV9	587/590	-1.77	-0.08
Seq ID 1060	LVAVQQSSG	AAV9	587/590	0.65	-0.57
Seq ID 1061	ASPGGNRYPPQGGG GA	AAV9	588/589	-1.79	-3.22
Seq ID 1062	RTDQVMSTK	AAV9	587/590	-0.40	-1.67
Seq ID 1063	TSDHLFQYD	AAV9	587/590	-1.09	-1.07
Seq ID 1064	ANNRIPA	AAV2	R588A/589	-2.76	-4.27
Seq ID 1065	MHTEAIMPR	AAV9	587/590	0.20	-0.72
Seq ID 1066	SVVSVTMNQ	AAV9	587/590	-0.77	-1.23
Seq ID 1067	AYKSSCAFSCEEGFE A	AAV2	R588A/589	-2.46	-4.38
Seq ID 1068	VTVQPHVDI	AAV9	587/590	-2.21	-4.21
Seq ID 1069	MEDKYAYEM	AAV9	587/590	-1.32	-2.48
Seq ID 1070	ASARSPSEA	AAV2	R588A/589	-0.66	-2.26
Seq ID 1071	QHQRTPSN	AAV9	587/590	-3.46	-0.84
Seq ID 1072	NRQPIHKDD	AAV9	587/590	-0.50	-0.36
Seq ID 1073	TTMGSPAPM	AAV9	587/590	1.14	0.08
Seq ID 1074	KQDPRYSYQ	AAV9	587/590	-1.01	#N/A
Seq ID 1075	AQLSITKDA	AAV2	R588A/589	-1.80	-2.12
Seq ID 1076	PRAGTSIAP	AAV9	587/590	-3.40	-3.73
Seq ID 1077	AMPRNSIPA	AAV2	R588A/589	-3.80	-4.41

Seq ID 1078	ASVTTTVVSA	AAV9	587/590	1.47	0.42
Seq ID 1079	SPQGKVSQV	AAV9	587/590	-2.03	-0.58
Seq ID 1080	RVTNVPNAV	AAV9	587/590	-0.84	-2.42
Seq ID 1081	MLPQASAHK	AAV9	587/590	-1.64	-1.94
Seq ID 1082	ATKEADLPEPSEKQ PA	AAV2	R588A/589	-0.01	-1.98
Seq ID 1083	ARGKRGQDAMYEY MAA	AAV2	R588A/589	#N/A	-1.85
Seq ID 1084	PNPKSHQWP	AAV9	587/590	-4.20	-3.00
Seq ID 1085	ADGAETEVDNRC VCA	AAV2	R588A/589	-1.09	-3.72
Seq ID 1086	SDTNTAPQE	AAV9	587/590	-2.17	-1.73
Seq ID 1087	ASKSTTDNDIALHL A	AAV2	R588A/589	-3.19	-2.15
Seq ID 1088	KYISTGGEW	AAV9	587/590	-1.10	-3.20
Seq ID 1089	AGDSCVTIMSKDKP TA	AAV2	R588A/589	#N/A	-0.88
Seq ID 1090	AVLEGDSCVTIMSK DA	AAV2	R588A/589	-1.77	-2.17
Seq ID 1091	AELPGFLQSGKDKD AA	AAV2	R588A/589	-2.49	-1.82
Seq ID 1092	QQMSSHQPM	AAV9	587/590	0.03	-0.65
Seq ID 1093	AYHEREQGQ	AAV9	587/590	-0.84	-1.13
Seq ID 1094	PKHERVGDL	AAV9	587/590	-0.97	-1.25
Seq ID 1095	MENADVNDG	AAV9	587/590	-2.27	-3.15
Seq ID 1096	IIEHVSQY	AAV9	587/590	#N/A	0.29
Seq ID 1097	NQEKQQSNT	AAV9	587/590	-0.94	-1.34
Seq ID 1098	KVIHMDDSY	AAV9	587/590	-2.05	-0.86
Seq ID 1099	NITINQREH	AAV9	587/590	-3.24	-3.22
Seq ID 1100	AGGCVTITAEGKPS MA	AAV2	R588A/589	-2.89	-6.35
Seq ID 1101	QVKQSSQLN	AAV9	587/590	-0.06	-1.46

Seq ID 1102	AADRSSPGA	AAV2	R588A/589	-0.51	-2.29
Seq ID 1103	NAPRGYMPD	AAV9	587/590	-1.14	-3.35
Seq ID 1104	IATPLQKQM	AAV9	587/590	-1.26	-1.27
Seq ID 1105	DVHHQYSQI	AAV9	587/590	-1.98	-0.11
Seq ID 1106	HHRDNSQSN	AAV9	587/590	-0.04	0.04
Seq ID 1107	AGHGECVETINNYT CA	AAV2	R588A/589	-2.48	-2.57
Seq ID 1108	FQWQEETDT	AAV9	587/590	-4.98	-2.40
Seq ID 1109	AHAHRSDALQLGLG KA	AAV2	R588A/589	-0.86	-4.57
Seq ID 1110	MTTPPQSSP	AAV9	587/590	1.26	0.57
Seq ID 1111	ANSTWRTVDRLSAT AA	AAV2	R588A/589	#N/A	-2.23
Seq ID 1112	TEGRQPVGF	AAV9	587/590	-1.11	-1.58
Seq ID 1113	PQEEGPSQF	AAV9	587/590	-1.44	-2.17
Seq ID 1114	PMNYSHGAL	AAV9	587/590	-1.42	-2.71
Seq ID 1115	ASSSERAHQLRIRK A	AAV2	R588A/589	-2.88	-1.02
Seq ID 1116	AILRQQQHFLGNSV TA	AAV2	R588A/589	-1.18	0.01
Seq ID 1117	QKPQPQQDP	AAV9	587/590	-0.53	-1.53
Seq ID 1118	HTAATSTKD	AAV9	587/590	-0.50	1.45
Seq ID 1119	SVKAVMPFP	AAV9	587/590	-2.71	-1.35
Seq ID 1120	ALIFRHHRQ	AAV9	587/590	-2.45	-0.79
Seq ID 1121	PMEPEHMGW	AAV9	587/590	-3.82	-3.70
Seq ID 1122	EKDVMRVVQ	AAV9	587/590	0.13	-0.69
Seq ID 1123	ARCRAIDGDVTFCR PA	AAV2	R588A/589	-0.07	-1.07
Seq ID 1124	ASVGGVFNSLGKGI HA	AAV2	R588A/589	#N/A	-2.55
Seq ID 1125	VASHHFQPQ	AAV9	587/590	-0.23	0.20

Seq ID 1126	TNKQMAYST	AAV9	587/590	-1.58	-2.56
Seq ID 1127	ATPSLPTPPTREPKK A	AAV2	R588A/589	-2.68	-3.14
Seq ID 1128	YMEDLD PES	AAV9	587/590	-1.24	-3.44
Seq ID 1129	TMIQAKQLP	AAV9	587/590	0.91	-1.27
Seq ID 1130	PPRVNDHAT	AAV9	587/590	-0.49	-1.67
Seq ID 1131	AMFDSSNYHGQDLL FA	AAV2	R588A/589	-4.27	-0.73
Seq ID 1132	HPTVQTHSQ	AAV9	587/590	-2.65	-2.03
Seq ID 1133	LGSSAGVSF	AAV9	587/590	-1.16	-1.00
Seq ID 1134	AGLTTRPGSGLTNIK A	AAV2	R588A/589	#N/A	0.01
Seq ID 1135	AGHFSGSGA	AAV2	R588A/589	-2.45	-3.02
Seq ID 1136	RVQVG PVSS	AAV9	587/590	-3.86	-4.32
Seq ID 1137	SKINPQTPL	AAV9	587/590	-3.56	-3.29
Seq ID 1138	QRDQRVTPQ	AAV9	587/590	-2.20	-3.08
Seq ID 1139	SPAGYQANK	AAV9	587/590	0.49	0.45
Seq ID 1140	MTHAQQLPQ	AAV9	587/590	-1.09	-1.79
Seq ID 1141	AFKDSAIGFSRVPPR A	AAV2	R588A/589	-0.12	-0.79
Seq ID 1142	MTLKREIMS	AAV9	587/590	-4.91	-2.67
Seq ID 1143	IPMQGEQMR	AAV9	587/590	-0.93	-0.75
Seq ID 1144	AQETHYMTR	AAV9	587/590	-0.70	-1.69
Seq ID 1145	AVRHSSDFA	AAV9	588/589	0.04	-0.81
Seq ID 1146	ALSSSMSMA	AAV2	R588A/589	-3.38	-3.29
Seq ID 1147	ANPRFNENNR RVIV CA	AAV2	R588A/589	-0.42	-0.83
Seq ID 1148	AAIENAVRSSLKVA TA	AAV9	588/589	-2.19	-2.33
Seq ID 1149	RQGGNIMEK	AAV9	587/590	-2.06	-2.37

Seq ID 1150	PTSQLSAAH	AAV9	587/590	-0.98	-1.53
Seq ID 1151	KPSQTHNDM	AAV9	587/590	0.27	-1.63
Seq ID 1152	AKVAVVRTPPKSPS SA	AAV2	R588A/589	-1.08	-1.84
Seq ID 1153	HDQGHAAQK	AAV9	587/590	-0.93	-0.76
Seq ID 1154	AMAAAMGNS	AAV9	587/590	1.66	1.16
Seq ID 1155	GDTQPRMQY	AAV9	587/590	0.88	0.73
Seq ID 1156	EYPSEIVYS	AAV9	587/590	-0.76	-2.39
Seq ID 1157	TWQHTTETS	AAV9	587/590	-0.05	-0.10
Seq ID 1158	TGGAYPVIV	AAV9	587/590	-0.90	-0.88
Seq ID 1159	AGYGSSRRAPQTGI A	AAV2	R588A/589	-0.01	-2.72
Seq ID 1160	AVADSRSPA	AAV2	R588A/589	-0.95	-2.52
Seq ID 1161	AGIVSWGRCALKD KA	AAV2	R588A/589	-2.71	-5.17
Seq ID 1162	AWESDDFTA	AAV2	R588A/589	-3.56	-3.32
Seq ID 1163	SVDQSHDPN	AAV9	587/590	-1.01	0.13
Seq ID 1164	ARPNLPLPA	AAV2	R588A/589	-3.34	-3.84
Seq ID 1165	ARPNLPLPA	AAV9	588/589	-3.34	-3.84
Seq ID 1166	TDLADSEWR	AAV9	587/590	-1.34	-0.78
Seq ID 1167	AAFTTTLRGAQRLA AA	AAV2	R588A/589	#N/A	-0.87
Seq ID 1168	VSNPQPPSR	AAV9	587/590	0.17	0.18
Seq ID 1169	APSLPTPTREPCKV A	AAV2	R588A/589	-1.44	-1.82
Seq ID 1170	PTHTQGRES	AAV9	587/590	-2.01	-4.18
Seq ID 1171	AQNAKNGNLPEFGD AA	AAV2	R588A/589	-4.96	-3.25
Seq ID 1172	KNAVMAPGN	AAV9	587/590	-2.32	-3.51
Seq ID 1173	QALVPIATQTYEAW LGA	AAV9	588/589	1.01	#N/A

Seq ID 1174	IPMRIETDP	AAV9	587/590	0.23	-1.03
Seq ID 1175	QARDSPKGW	AAV9	587/590	3.78	3.16
Seq ID 1176	AHRERMSQVMREW EEA	AAV2	R588A/589	#N/A	-3.33
Seq ID 1177	SRVSQNEHP	AAV9	587/590	-0.83	-0.91
Seq ID 1178	QRNEKSEFI	AAV9	587/590	-4.31	-3.65
Seq ID 1179	QTLPEVTKW	AAV9	587/590	-0.26	-0.38
Seq ID 1180	VKGWQVTER	AAV9	587/590	#N/A	-0.06
Seq ID 1181	APTTVESHGNYSTQI A	AAV2	R588A/589	#N/A	-3.22
Seq ID 1182	PRQGPSTNL	AAV9	587/590	-3.69	-2.37
Seq ID 1183	AEATDGMLKIQFSA QA	AAV2	R588A/589	#N/A	-4.75
Seq ID 1184	ALYRQKVEPLRAEL QA	AAV9	588/589	-1.99	-0.92
Seq ID 1185	RPLTTEAIV	AAV9	587/590	0.68	0.08
Seq ID 1186	KPGSQQIMD	AAV9	587/590	0.03	1.63
Seq ID 1187	AHQLLGDLHQEGPP LA	AAV2	R588A/589	-1.47	-2.42
Seq ID 1188	MEQLVTFKT	AAV9	587/590	-0.05	0.04
Seq ID 1189	GASMQTALW	AAV9	587/590	1.04	-1.58
Seq ID 1190	AAFRCLAENAGDV AFA	AAV2	R588A/589	-2.71	0.65
Seq ID 1191	IQTQLPPGK	AAV9	587/590	-1.02	-1.17
Seq ID 1192	NTVHQAQIM	AAV9	587/590	0.28	0.83
Seq ID 1193	PISNVNQSR	AAV9	587/590	-6.49	-3.67
Seq ID 1194	APDLVQEACESELN EA	AAV2	R588A/589	-0.43	-1.60
Seq ID 1195	AKIQVLVEPDHFKV AA	AAV2	R588A/589	#N/A	-3.69
Seq ID 1196	AREWFMDLNLPTS SAA	AAV2	R588A/589	-1.74	-0.40
Seq ID 1197	AEFSSNTVKLTSGH LA	AAV9	588/589	-3.08	-2.61

Seq ID 1198	AFTYKSSCAFSCEEG A	AAV2	R588A/589	-2.11	#N/A
Seq ID 1199	PYPTQASMK	AAV9	587/590	-3.09	-2.63
Seq ID 1200	KPTNSGQEH	AAV9	587/590	-1.70	-3.29
Seq ID 1201	LSTGPPEKI	AAV9	587/590	0.06	0.18
Seq ID 1202	APQLHVMSA	AAV9	587/590	-0.29	-1.68
Seq ID 1203	TASKMQDSK	AAV9	587/590	-1.42	-2.93
Seq ID 1204	AFTSSSGQKAMNGS RA	AAV2	R588A/589	#N/A	-0.59
Seq ID 1205	AVAEFSEATAELTV SA	AAV2	R588A/589	-1.81	-4.01
Seq ID 1206	INQNKAHDA	AAV9	587/590	-0.12	-1.93
Seq ID 1207	AARLSKELQAAQAR LA	AAV2	R588A/589	-2.27	-0.87
Seq ID 1208	ATKPGYVDSIQKGI QA	AAV2	R588A/589	-5.83	-3.06
Seq ID 1209	PTTAPSMVL	AAV9	587/590	-1.51	-2.21
Seq ID 1210	AGGFVYIAGKCGLV PA	AAV2	R588A/589	#N/A	-3.97
Seq ID 1211	ANPTAKRQFVQSAK EA	AAV2	R588A/589	#N/A	-1.74
Seq ID 1212	ALALGRFWDYLRW VQA	AAV2	R588A/589	-0.38	-1.08
Seq ID 1213	ALRVIYERMNQSLA LA	AAV2	R588A/589	1.38	-2.89
Seq ID 1214	VTMTQATNR	AAV9	587/590	-0.96	-1.34
Seq ID 1215	ALLQYNHRVKKLN EIA	AAV2	R588A/589	-1.27	-1.96
Seq ID 1216	ALLGKINLKALAAL AA	AAV2	R588A/589	-1.28	-0.93
Seq ID 1217	RQRVSYMDD	AAV9	587/590	-2.48	-1.42
Seq ID 1218	ADMGQQRVD	AAV9	587/590	-0.40	-1.50
Seq ID 1219	ATGVLLRALAGVPV AA	AAV2	R588A/589	-3.18	-1.12
Seq ID 1220	SIKKDPPTV	AAV9	587/590	-3.77	-3.06
Seq ID 1221	PGKTMLGNH	AAV9	587/590	-1.71	-2.75

Seq ID 1222	HQGDTLQYV	AAV9	587/590	0.01	-0.17
Seq ID 1223	ALGLGKHNYCRNP DGA	AAV2	R588A/589	0.15	-0.87
Seq ID 1224	QERQANKSY	AAV9	587/590	-2.45	-4.07
Seq ID 1225	QQTRGVELN	AAV9	587/590	-0.13	-0.82
Seq ID 1226	ASMRVVPMA	AAV2	R588A/589	-2.48	-2.59
Seq ID 1227	ASSTDKRDA	AAV2	R588A/589	-0.85	-1.84
Seq ID 1228	ALIGGSIVA	AAV2	R588A/589	-2.49	-1.72
Seq ID 1229	LLHTGTSSH	AAV9	587/590	-0.03	-0.56
Seq ID 1230	TQHQAQVPR	AAV9	587/590	-1.83	-3.05
Seq ID 1231	AAGLFGAAEGQAFH LA	AAV2	R588A/589	-1.50	-3.15
Seq ID 1232	AENEHAHFQKAKER LA	AAV2	R588A/589	-4.22	-3.36

Example 4. Immunohistochemistry data showing the ability of CNSRCV300 to cross the Blood Brain Barrier

Background:

[0163] Round 2 and 3 library evaluation results highlighted the exceptional ability of the capsid CNSRCV300 to cross the blood-brain barrier and mediate transgene expression throughout the central nervous system. Based on these results, next an individual evaluation of capsid CNSRCV300 in cynomolgus macaques was conducted. CNSRCV300 was manufactured in HEK293 cells with a vector encoding the ubiquitous CAG promoter and a nuclear localized GFP reporter. CNSRCV300 was administered intravenously in three cynomolgus macaques at a dose of 2E13 vector genomes per kilogram.

Methods:

[0164] Brain tissue was collected at necropsy on Day 19 after intravenous administration of CNSRCV300. Brain slices of 4 mm thickness were designated for immunohistochemistry evaluation and placed in labelled cassettes, immersion fixed in 10% paraformaldehyde, refrigerated at 4° C for 16-24 hrs, transferred to phosphate buffered saline (1x PBS) with 0.01% sodium azide, and refrigerated at 4°C until processing.

[0165] To prepare brain slices for processing, brains were treated overnight with 20% glycerol and 2% dimethylsulfoxide to avoid freeze artifacts. Slices were embedded in a gelatin matrix. Blocks were rapidly frozen, after curing by immersion in 2-methylbutane chilled with crushed dry ice and mounted on a freezing stage of a AO 860 sliding microtome.

[0166] Blocks were sectioned coronally at 40 μ m thickness on the microtome. All sections were cut through the entire length of the specimen segment and collected sequentially into a series of 24 containers, pre-filled with Antigen Preserve solution (50% PBS, pH 7.0, 50% ethylene glycol, 1% polyvinyl pyrrolidone).

[0167] For IHC revealing GFP, free floating sections were stained. All incubation solution from the blocking serum onward used TRIS-buffered saline (TBS) with Triton-X-100 as the vehicle; all rinses were with TBS. After a hydrogen peroxide treatment and blocking serum, the sections were immune-stained with the primary antibody (Rabbit monoclonal anti-GFP antibody; 1:50; Cat # G10362) overnight at room temperature. Vehicle solutions contained Triton-X-100 for permeabilization. Following rinses, a biotinylated secondary antibody (anti-rabbit IgG) was applied. After further rinses, ABC solution (avidin-biotin-HRP complex; VECTASTAIN® Elite ABC, Vector Labs, Burlingame, CA) was applied. The sections were again rinsed, then treated with diaminobenzidine tetrahydrochloride (DAB) and Nickel sulphate to create a visible (black) reaction product. Following further rinses, the sections were mounted on gelatin-coated glass-slides and air dried.

[0168] FIGs. 15-24 show that capsid CNSRCV300 is able to cross the blood-brain barrier and mediate transgene expression throughout the central nervous system.

[0169] Seq ID 1235: CNSRCV300

MAADGYLPDWLEDNLSEGIREWALKPGAPQPKANQQHQDNARGLVLPGYKYLGP
GNGLDKGEPVNAADAAALEHDKAYDQQLKAGDNPYLKYNHADADEFQERLKEDTSF
GGNLGRAVFQAKKRLLLEPLGLVEEAAKTAPGKKRPVEQSPQEPDSSAGIGKSGAQPA
KKRLNFGQTGDTESVPDPQPIGEPPAAPSGVGSMTMASGGGAPVADNNEGADGVGSS
SGNWHCDSQWLGDRTTSTRTWALPTYNNHLYKQISNSTSGGSSNDNAYFGYSTPW
GYFDNRFHCHFSRQRLINNNWGFRPKRLNFKLFNIQVKEVTDNNGVKTIAN
LTSTVQVFTDSYQLPYVLGSAHEGCLPPFPADVFMIPQYGYLTLNDGSQAVGRSSFY
CLEYFPSQMLRTGNFQFSYEFENVPHSSYAHSQLDRLMNPLIDQYLYLSKTING
SGQNQQLKFSVAGPSNMAVQGRNYIPGPSYRQQRVSTTVTQNNNSEFAWPGASSW
ALNGRNSLMNPGPAMASHKEGEDRFFPLSGSLIFGKQGTGRDNVDADKVMITNEEEI
KTTNPVATESYQQVATNHQSAYVNIMDDMDQAQTGWVQNQGILPGMVWQDRDQV
LQGPWAKIPHTDGNFHPSPMLGGFGMKHPPQILIKNTPVPADPPTAFNKDKLNSFIT

QYSTGQVSVEIEWELQKENS KRWNPEIQYTSNYYKSNNVEFAVNTEGVYSEPRPIGT
RYLTRNL

WHAT IS CLAIMED IS:

1. An adeno-associated virus (AAV) capsid protein comprising at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of an amino acid sequence set forth in any one of SEQ ID NO: 1-1232.
2. The AAV capsid protein of claim 1, wherein the amino acid sequence comprises at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of the amino acid sequence set forth in SEQ ID NO: 71 (YVNIMDDMD).
3. The AAV capsid protein of claim 1 or claim 2, wherein the AAV capsid protein comprises serotype AAV2.
4. The AAV capsid protein of claim 3, wherein the serotype AAV2 comprises SEQ ID NO: 1233.
5. The AAV capsid protein of claim 4, wherein the amino acid sequence is inserted into the AAV2 capsid protein between amino acids 588 and 589.
6. The AAV capsid protein of claim 1 or claim 2, wherein the AAV capsid protein comprises serotype AAV9.
7. The AAV capsid protein of claim 6, wherein the serotype AAV9 comprises a sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1234.
8. The AAV capsid protein of claim 7, wherein the amino acid sequence is inserted into the AAV9 capsid protein between amino acids 587 and 590.
9. The AAV capsid protein of claim 6, wherein the AAV capsid protein comprises a sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1235.
10. The AAV capsid protein of claim 9, wherein the AAV capsid protein comprises the sequence set forth in SEQ ID NO: 1235.
11. The AAV capsid protein of claim 1, wherein the AAV capsid protein comprises an amino acid sequence set forth in any one of SEQ ID NO: 1-1232.
12. The AAV capsid protein of claim 2, wherein the AAV capsid protein comprises an amino acid sequence set forth in SEQ ID NO: 71 (YVNIMDDMD).
13. The AAV capsid protein of claim 1 or claim 2, wherein the amino acid sequence is inserted into any of the parental capsids AAV1, AAV2, AAV3B, AAV5, AAV6, AAV8, AAV9, AAV3, AAV4, AAV7, AAV11, AAVrh10, AAVrh39, or AAVrh74.
14. The AAV capsid protein of claim 13, wherein the amino acid sequence is inserted into any of the parental capsids AAV2 or AAV9.

15. The AAV capsid protein of claim 1, wherein the amino acid sequence is inserted into a surface exposed region of the AAV capsid.
16. An AAV capsid protein, comprising at least 3, 4, 5, 6, 7, 8, 9 or all contiguous amino acids of an amino acid sequence set forth in any of SEQ ID NO: 1-1232, wherein the amino acid sequence is inserted between amino acid positions 450 and 600 of the AAV capsid protein.
17. The AAV capsid protein of claim 16, wherein the amino acid sequence is inserted between amino acid positions 588 and 589 of the AAV capsid protein.
18. The AAV capsid protein of claim 17, wherein the AAV capsid protein comprises a sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1233.
19. The AAV capsid protein of any of claims 16-18, wherein the amino acid sequence comprises the sequence set forth in SEQ ID NO: 71 (YVNIMDDMD).
20. The AAV capsid protein of claim 16, wherein the amino acid sequence is inserted between amino acid positions 587 and 590 of the AAV capsid protein.
21. The AAV capsid protein of claim 20, wherein the AAV capsid protein comprises a sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1234.
22. The AAV capsid protein of claim 20 or claim 21, wherein the amino acid sequence comprises SEQ ID NO: 71 (YVNIMDDMD).
23. The AAV capsid protein of claim 19, wherein the AAV capsid protein comprises a sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1235.
24. The AAV capsid protein of claim 23, wherein the AAV capsid protein comprises the sequence set forth in SEQ ID NO: 1235.
25. A CNS-targeting molecule, comprising at least 3, 4, 5, 6, 7, 8, 9, or all contiguous amino acids of an amino acid sequence set forth in any of SEQ ID NO: 1-1232.
26. The CNS-targeting molecule of claim 25, wherein the amino acid sequence comprises at least 3, 4, 5, 6, 7, 8, or 9 contiguous amino acids of the amino acid sequence set forth in SEQ ID NO: 71 (YVNIMDDMD).
27. A CNS-targeting molecule, of claim 25 or claim 26, wherein the amino acid sequence is fused or conjugated to a small molecule, antibody, scFV, ASO, siRNA, lipid, polymer, or recombinant protein.