Claims

1. An AAV vector genome comprising, in order:
   a) a 5’ inverted terminal repeat (ITR), wherein said 5’ ITR is 141 nucleotides in length,
   b) a cytomegalovirus (CMV) sequence region, wherein said CMV sequence region is derived from the CMV gene and said CMV sequence region comprises 5’ to 3’ an enhancer region and promoter region, wherein said CMV sequence region is at least 500 nucleotides,
   c) an immediate early 1 (IE1) sequence region derived from an IE1 gene,
   d) a human beta globin (HB) sequence region derived from a HB gene,
   e) an AADC sequence region, said AADC sequence region comprising a nucleotide sequence encoding SEQ ID NO: 1,
   f) a poly(A) signal sequence region derived from the human growth hormone (hGH) gene, and
   g) a 3’ ITR, wherein said 3’ ITR is 141 nucleotides in length.

2. The AAV vector genome of claim 1, wherein the 5’ ITR and the 3’ ITR are derived from AAV2.

3. The AAV vector genome of claim 2, wherein the CMV sequence region is 507 nucleotides in length.

4. The AAV vector genome of claim 2, wherein the IE1 sequence region comprises a nucleotide sequence from IE1 exon1.

5. The AAV vector genome of claim 4, wherein the IE1 sequence region further comprises a nucleotide sequence from IE1 intron 1 or a fragment thereof.

6. The AAV vector genome of claim 5, wherein the IE1 sequence region is at least 160 nucleotides in length.

7. The AAV vector genome of claim 5, wherein the IE1 sequence region is 166 nucleotides in length.

8. The AAV vector genome of claim 2, wherein the HB sequence region comprises a nucleotide sequence from HB intron 2.

9. The AAV vector genome of claim 8, wherein the HB sequence region further comprises a nucleotide sequence from HB exon 3.

10. The AAV vector genome of claim 9, wherein the HB sequence region is 400 nucleotides in length.

11. The AAV vector genome of claim 2, wherein the poly(A) signal sequence region is at least 450 nucleotides in length.

12. The AAV vector genome of claim 11, wherein the poly(A) signal sequence region is 477 nucleotides in length.

13. The AAV vector genome of claim 2, wherein
i) the IE1 sequence region comprises a nucleotide sequence from IE1 exon1,
ii) the IE1 sequence region comprises a nucleotide sequence from IE1 intron 1 or a fragment thereof,
iii) the HB sequence region comprises a nucleotide sequence from HB intron 2, and
iv) the HB sequence region comprises a nucleotide sequence from HB exon 3.

14. The AAV vector genome of claim 13, wherein the CMV sequence region is 507 nucleotides in length, the IE1 sequence region is 166 nucleotides in length, the HB sequence region is 400 nucleotides in length, the poly(A) signal region is 477 nucleotides in length,

15. The AAV vector genome of claim 1, wherein the AAV vector genome comprises a sequence selected from the group consisting of SEQ ID NO: 1-13, 15, and 16 or variants having at least 95% identity thereto.

16. The AAV vector genome of claim 2, wherein, the AADC region comprises a codon optimized nucleotide sequence encoding SEQ ID NO: 1.

17. The AAV vector genome of claim 16, wherein the AAV vector genome comprises a sequence selected from the group consisting of SEQ ID NO: 7 and 12 or variants having 95% identity thereto.

18. A recombinant AAV virus comprising the AAV vector genome of any one of claims 1-17.

19. The recombinant AAV virus of claim 18, comprising a capsid serotype selected from the group consisting of AAV2, AAV1, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, AAV9, AAV9.47, AAV9(hu14), AAV10, AAV11, AAV12, AAVrh8, AAVrh10, AAV-DJ, and AAV-DJ8.

20. The recombinant AAV virus of claim 19, wherein the capsid serotype is AAV2.

21. A pharmaceutical composition comprising the recombinant AAV virus of any one of claims 18-20.

22. The pharmaceutical composition of claim 21, wherein at least 70% of the recombinant AAV vectors contain an AAV vector genome.

23. The pharmaceutical composition of claim 21 or 22, for use in a method of reducing periods of dyskinesia in a subject in need thereof.

24. The pharmaceutical composition of claim 23, wherein the decrease in periods of dyskinesia is shown by improvement in off time and motor fluctuations by at least 30%.

25. The pharmaceutical composition of claim 24, wherein the improvement lasts for at least 6 hours.

26. The pharmaceutical composition of any one of claims 23-25, wherein the subject has Parkinson's Disease.

27. The pharmaceutical composition of claim 21 or 22, for use in a method of improving the sleep-wake cycle of a subject in need thereof.

28. The pharmaceutical composition of claim 27, where the subject's amount of rapid eye movement (REM) sleep is decreased after administration of the pharmaceutical composition to the subject as compared to the subject's amount of REM sleep prior to the administration of the pharmaceutical composition.

29. The pharmaceutical composition of claim 27, wherein the subject's amount of non-REM (NREM) sleep is increased after administration of the pharmaceutical composition to the subject as compared to the subject's amount of REM sleep prior to the administration of the pharmaceutical composition.

30. The pharmaceutical composition of any one of claims 27-29, wherein the subject has Parkinson's Disease.

31. The pharmaceutical composition of claim 21 or 22, for use in a method of treating a sleep disorder of a subject in need thereof.

32. The pharmaceutical composition of claim 31, wherein the sleep disorder is insomnia.

33. The pharmaceutical composition of any one of claims 31-32, wherein the subject has Parkinson’s Disease.

34. The pharmaceutical composition of claim 21 or 22, for use in a method of increasing the level of AADC protein in a subject in need thereof.