CLAIMS

1. A recombinant adeno-associated vector (rAAV) comprising a nucleic acid sequence comprising a transgene encoding Glut1 and a chicken Beta-actin promoter and wherein the rAAV is capable of crossing the blood-brain barrier.

2. The recombinant AAV of claim 1, wherein the transgene is capable of being expressed in endothelial cells lining the brain microvasculature.

3. The recombinant AAV of claim 1, wherein the chicken Beta-actin promoter is selected from the group consisting of SEQ ID NO:31, 38, 45, 54, 62, and 70.

4. The recombinant AAV of claim 1, wherein the AAV is AAV8 or AAV9.

5. The recombinant AAV of claim 1, wherein the Glut1 comprises SEQ ID NO:78 or 79.

6. The recombinant AAV of claim 1, further comprising miRNA elements selected from the group consisting of SEQ ID NO:48, 56, 59, 64, and 73.

7. The recombinant AAV of claim 6, wherein the recombinant vector further comprises inverted terminal repeats (ITRs) flanking the miRNA elements.

8. A composition comprising the recombinant AAV of claim 1.

9. The composition of claim 8, further comprising a pharmaceutical carrier.

10. A kit comprising a container housing comprising the composition of claim 8.

11. The kit of claim 10, wherein the container is a syringe.

12. Use of the recombinant AAV vector of claim 1 for the manufacture of a medicament for restoring Glut1 transport in the blood brain barrier (BBB).

13. Use of the recombinant AAV vector of claim 1 for the manufacture of a medicament for treating Glut1 deficiency syndrome.

14. The use of claim 12 or 13, wherein the AAV is AAV8 or AAV9.

15. The use of claim 12 or 13, wherein the Glut1 comprises SEQ ID NO:78 or 79.

16. The use of claim 12 or 13, further comprising miRNA elements selected from the group consisting of SEQ ID NO:48, 56, 59, 64, and 73.

17. The use of claim 16, wherein the recombinant vector further comprises inverted terminal repeats (ITRs) flanking the miRNA elements.

18. The use of claim 12 or 13, wherein the recombinant AAV is comprised within a composition further comprising a pharmaceutical carrier.

19. An effective amount of the recombinant AAV vector of claim 1 for use in restoring Glut1 transport in the blood brain barrier.

20. An effective amount of the recombinant AAV vector of claim 1 for use in treating Glut1deficiency syndrome.

21. The effective amount of the recombinant AAV vector of claim 19 or 20, wherein the AAV is AAV8 or AAV9.

22. The effective amount of the recombinant AAV vector of claim 19 or 20, wherein the Glut1 comprises SEQ ID NO:78 or 79.

23. The effective amount of the recombinant AAV vector of claim 19 or 20, further comprising miRNA elements selected from the group consisting of SEQ ID NO:48, 56, 59, 64, and 73.

24. The effective amount of the recombinant AAV vector of claim 23, wherein the recombinant vector further comprises inverted terminal repeats (ITRs) flanking the miRNA elements.

25. The effective amount of the recombinant AAV vector of claim 19 or 20, wherein the recombinant AAV is comprised within a composition further comprising a pharmaceutical carrier.