CLAIMS

What is claimed is:

1. A recombinant expression vector comprising a nucleic acid encoding a polypeptide having a sequence selected from the group consisting of: SEQ ID NO: 1 to 409, 435-868, or 1726-1988, or a fragment thereof that does not encode a peptide that is identical to a sequence of any one of SEQ ID NOs: 869, 870, or 871.

2. An isolated AAV capsid protein comprising an amino acid sequence selected from the group consisting of: SEQ ID NOs: 1 to 409, 435-868 and 1726-1988, or fragment thereof.

3. An isolated AAV capsid protein comprising a sequence selected from SEQ ID NOs: 1-409, 837-852, or 1726-1814, wherein an amino acid of the sequence that is not identical to a corresponding amino acid of the sequence set forth as SEQ ID NO: 869 is replaced with a conservative substitution.

4. An isolated AAV capsid protein comprising a sequence selected from SEQ ID NOs: 435-628 or 1815-1988, wherein an amino acid of the sequence that is not identical to a corresponding amino acid of the sequence set forth as SEQ ID NO: 869 or 870 is replaced with a conservative substitution.

5. An isolated AAV capsid protein comprising a sequence selected from SEQ ID NOs: 629-836 or 853-868, wherein an amino acid of the sequence that is not identical to a corresponding amino acid of the sequence set forth as SEQ ID NO: 871 is replaced with a conservative substitution.

6. A peptide fragment of the isolated AAV capsid protein of any one of claims 2 to 5 that is not identical to a sequence of any one of SEQ ID NOs: 869, 870, or 871.

7. An isolated AAV capsid protein comprising the peptide fragment of claim 6.

8. An recombinant expression vector comprising a nucleic acid sequence encoding the isolated AAV capsid protein of any one of claims 2 to 5.

9. A composition comprising the isolated AAV capsid protein of any one of claims 2 to 5.

10. A composition comprising the isolated AAV capsid protein of any one of claims 2 to 5 and a pharmaceutically acceptable carrier.

11. A recombinant AAV (rAAV) comprising the isolated AAV capsid protein of any one of claims 2 to 5.

12. A composition comprising the recombinant rAAV of claim 11.

13. The composition of claim 12 further comprising a pharmaceutically acceptable carrier.

14. A host cell containing a nucleic acid that comprises a coding sequence of a polypeptide selected from the group consisting of: SEQ ID NO: 1-409, 435-868, and 1726-1988, that is operably linked to a promoter.

15. A composition comprising the host cell of claim 14 and a sterile cell culture medium.

16. A composition comprising the host cell of claim 15 and a cryopreservative.

17. A method for delivering a transgene to a subject comprising administering a rAAV of claim 11 to a subject, wherein the rAAV comprises at least one transgene, and wherein the rAAV infects cells of a target tissue of the subject.

18. A method for generating a somatic transgenic animal model comprising administering a recombinant rAAV of claim 11 to a non-human animal, wherein the rAAV comprises at least one transgene, and wherein the rAAV infects cells of a target tissue of the non-human animal.

19. The method of claim 17, wherein the at least one transgene is a protein coding gene.

20. The method of claim 17, wherein the at least one transgene encodes a small interfering nucleic acid.

21. The method of claim 20, wherein the small interfering nucleic acid is a miRNA.

22. The method of claim 20, wherein the small interfering nucleic acid is a miRNA sponge or TuD RNA that inhibits the activity of at least one miRNA in the subject or animal.

23. The method of claim 22, wherein the miRNA is expressed in a cell of the target tissue

24. The method of claim of claim 17, wherein the target tissue is liver, central nervous system (CNS), ocular, gastrointestinal, respiratory, breast, pancreas, urinary tract, or uterine tissue.

25. The method of claim 18, wherein the transgene expresses a transcript that comprises at least one binding site for a miRNA, wherein the miRNA inhibits activity of the transgene, in a tissue other than the target tissue, by hybridizing to the binding site.

26. A method for generating a somatic transgenic animal model comprising administering a rAAV of claim 23 to a non-human animal, wherein the rAAV comprises at least one transgene, wherein the transgene expresses a transcript that comprises at least one

binding site for a miRNA, wherein the miRNA inhibits activity of the transgene, in a tissue other than a target tissue, by hybridizing to the binding site of the transcript.

27. The method of claim 26, wherein the transgene comprises a tissue specific promoter or inducible promoter.

28. The method of claim 27, wherein the tissue specific promoter is a liver-specific thyroxin binding globulin (TBG) promoter, an insulin promoter, a glucagon promoter, a somatostatin promoter, mucin-2 promoter, a pancreatic polypeptide (PPY) promoter, a synapsin-1 (Syn) promoter, a retinoschisin promoter, a K12 promoter, a CC10 promoter, a surfactant protein C (SP-C) promoter, a PRC1 promoter, a RRM2 promoter, uroplakin 2 (UPII) promoter, or a lactoferrin promoter.

29. The method of claim 17, wherein the rAAV is administered intravenously, transdermally, intraocularly, intrathecally, orally, intramuscularly, subcutaneously, intranasally, or by inhalation.

30. The method of claim 17, wherein the subject is selected from a mouse, a rat, a rabbit, a dog, a cat, a sheep, a pig, and a non-human primate.

31. The method of claim 17, wherein the subject is a human.

32. A somatic transgenic animal model produced by the method of claim 18.

33. A kit for producing a rAAV, the kit comprising:

a container housing an isolated nucleic acid encoding a polypeptide having a sequence of any one of SEQ ID NO: 1 to 409, 435-868, or 1726-1988.

34. The kit of claim 33 further comprising instructions for producing the rAAV.

35. The kit of claim 34 further comprising at least one container housing a recombinant AAV vector, wherein the recombinant AAV vector comprises a transgene.

36. A kit comprising:

a container housing a recombinant AAV having an isolated AAV capsid protein of any one of claims 2 to 5.

37. The kit of claim 36, wherein the container is a syringe.

38. The isolated AAV capsid protein of any one of claims 2-5, wherein the capsid protein is a VP1 capsid protein.

39. The isolated AAV capsid protein of any one of claims 2-5, wherein the capsid protein is a VP2 capsid protein.

40. The isolated capsid protein of any one of claims 2-5, wherein the capsid protein is a VP3 capsid protein.

41. A pseudotyped AAV comprising the capsid protein of any one of claims 2 to 5, or 7.

42. The recombinant expression vector of claim 1, wherein the nucleic acid encodes a V1 capsid protein.

43. The recombinant expression vector of claim 1, wherein the nucleic acid encodes a V2 capsid protein.

44. The recombinant expression vector of claim 1, wherein the nucleic acid encodes a V3 capsid protein.

45. A nucleic acid comprising a sequence selected from the group consisting of SEQ ID NO: 410-434, 876-1718, and 1989-2251.

46. The nucleic acid of claim 45, wherein the nucleic acid is engineered to express an AAV capsid protein, or a variant thereof and/or an AAV assembly-activating protein (AAP), or a variant thereof.

47. The nucleic acid of claim 45, wherein the AAP is in a different open reading frame of the nucleic acid than the AAV capsid protein.

48. The nucleic acid of claim 46, wherein the AAP is AAV2 AAP (AAP-2), or variant thereof.

49. An isolated protein encoded by the nucleic acid of claim 45.

50. A recombinant AAV comprising the isolated protein of claim 49.