CLAIMS

1. A recombinant adeno-associated virus (AAV) capsid protein, wherein the AAV capsid protein comprises a sequence of SEQ ID NO: 49 having a first substitution, a second substitution, and a third substitution, wherein the first substitution is a replacement of amino acids corresponding to residues 454-460 of SEQ ID NO: 49 with SEQ ID NO: 9, the second substitution is a replacement of amino acids corresponding to residues 585-590 of SEQ ID NO: 49 with SEQ ID NO: 17, and the third substitution is a replacement of amino acids corresponding residues 493-500 of SEQ ID NO: 49 with any one of SEQ ID NOs: 10, 12, 14 and 15.

2. The recombinant AAV capsid protein of claim 1, wherein the third substitution comprises replacement of amino acids 493-500 of SEQ ID NO: 49 with SEQ ID NO: 10.

3. The recombinant AAV capsid protein of claim 2, comprising the amino acid sequence of SEQ ID NO: 380.

4. The recombinant AAV capsid protein of claim 1, wherein the third substitution comprises replacement of amino acids 493-500 of SEQ ID NO: 49 with SEQ ID NO: 15.

5. The recombinant AAV capsid protein of claim 4, comprising the amino acid sequence of SEQ ID NO: 785.

6. The recombinant AAV capsid protein of claim 1, wherein the third substitution comprises replacement of amino acids 493-500 of SEQ ID NO: 49 with SEQ ID NO: 14.

7. The recombinant AAV capsid protein of claim 6, comprising the amino acid sequence of SEQ ID NO: 384.

8. The recombinant AAV capsid protein of claim 1, wherein the third substitution comprises replacement of amino acids 493-500 of SEQ ID NO: 49 with SEQ ID NO: 12.

9. The recombinant AAV capsid protein of claim 12, comprising the amino acid sequence of SEQ ID NO: 784.

10. An adeno-associated virus (AAV) vector, comprising the recombinant AAV capsid protein of claim 1, and a cargo nucleic acid encapsidated by the AAV capsid.

11. The AAV vector of claim 10, wherein the cargo nucleic acid encodes a therapeutic protein or RNA.

12. The AAV vector of claim 10, wherein the cargo nucleic acid comprises a 5' inverted terminal repeat (5' ITR), a heterologous nucleic acid sequence encoding a therapeutic protein or RNA, and a 3' ITR.

13. The AAV vector of claim 10, wherein the cargo nucleic acid encodes a gene editing molecule.

14. The AAV vector of claim 13, wherein the gene editing molecule is a nuclease or a guide RNA.

15. The AAV vector of claim 13, wherein the gene editing molecule is a Cas9 nuclease or a Cpf1 nuclease.

16. A method of introducing a cargo nucleic acid molecule into a cell ex vivo, comprising contacting the cell with the AAV vector of claim 10.

17. A pharmaceutical composition, comprising the AAV vector of claim 14.

18. Use of the AAV viral vector of claim 10 in the manufacture of a medicament for treating a patient in need thereof, wherein the patient has a liver disease or liver disorder.

19. The use of claim 18, wherein the liver disease or liver disorder is primary biliary cirrhosis, nonalcoholic fatty liver disease (NAFLD), non-alcoholic steatohepatitis (NASH), autoimmune hepatitis, hepatitis B, hepatitis C, alcoholic liver disease, fibrosis, jaundice, primary sclerosing cholangitis (PSC), Budd-Chiari syndrome, hemochromatosis, Wilson's disease, alcoholic fibrosis, non-alcoholic fibrosis, liver steatosis, Gilbert's syndrome, biliary atresia, alpha-1-antitrypsin deficiency, alagille syndrome, progressive familial intrahepatic cholestasis, Hemophilia B, Hereditary Angioedema (HAE), Homozygous Familial Hypercholesterolemia (HoFH), Heterozygous Familial Hypercholesterolemia (HeFH), Von Gierke's Disease (GSD I), Hemophilia A, Methylmalonic Acidemia, Propionic Acidemia, Homocystinuria, Phenylketonuria (PKU), Tyrosinemia Type I, Arginase I Deficiency, Argininosuccinate Lyase Deficiency, Carbamoyl-phosphate synthetase 1 deficiency, Citrullinemia Type 1, Citrin Deficiency, Crigler-Najjar Syndrome Type 1, Cystinosis, Fabry Disease, Glycogen Storage Disease Ib, LPL Deficiency, NAcetylglutamate Synthetase Deficiency, Ornithine Transcarbamylase Deficiency, Ornithine Translocase Deficiency, Primary Hyperoxaluria Type I, ADA SCID, liver cancer, or liver metastasis.

20. A polynucleotide encoding the recombinant AAV capsid protein of claim 1.

21. An expression vector, comprising the polynucleotide of claim 20.

22. A cell, comprising the polynucleotide of claim 20.