What is claimed is:-

~~1. An adeno-associated virus (AAV) comprising:~~

~~(a) a capsid protein comprising an amino acid sequence that is about or at least about 98% identical to: (i) a VP1 region of any one of SEQ ID NOS:1-7, (ii) a VP2 region of any one of SEQ ID NOS:1-7, or (iii) a VP3 region of any one of SEQ ID NOS:1-7, wherein the amino acid corresponding to position 566 of any one of SEQ ID NOS:1-7 is an amino acid selected from the group: G, A, M, F, W, K, Q, E, S, P, V, I, C, Y, H, R, N, D, or T; and~~

~~(b) a transgene comprising a heterologous gene operably linked to a regulatory sequence that controls expression of the heterologous gene in a host cell.~~

~~2. An adeno-associated virus (AAV) comprising:~~

~~(a) a capsid protein comprising, an amino acid sequence that is about or at least about 98% identical to: (i) a VP1 region of any one of SEQ ID NOS:1-7, (ii) a VP2 region of any one of SEQ ID NOS:1-7, or (iii) a VP3 region of any one of SEQ ID NOS:1-7; and~~

~~(b) a transgene comprising a heterologous gene operably linked to a regulatory sequence that controls expression of the heterologous gene in a host cell, wherein liver cells infected with the AAV express the heterologous gene at a level that is about or at least about 5-fold greater than the level of the heterologous gene expressed in liver cells infected with an AAV comprising an AAV5 capsid and the transgene under the same conditions.~~

1~~3~~. An adeno-associated virus (AAV) comprising:

(a) a capsid protein comprising an amino acid sequence that is ~~about or~~ at least ~~about~~ 99~~9~~8% identical to: (i) a VP1 region of any one of SEQ ID NOS: 2 and 4-6, (ii) a VP2 region of any one of SEQ ID NOS: 2 and 4-6, or (iii) a VP3 region of any one of SEQ ID NOS: 2 and 4-6, wherein the capsid protein comprises variable regions (VRs) IV to VII of any one of SEQ ID NOS: 2 and 4-6, and constant regions in between; and

(b) a transgene comprising a heterologous gene operably linked to a regulatory sequence that controls expression of the heterologous gene in a host cell~~, wherein the AAV has specificity for liver cells~~.

~~4~~2. An adeno-associated virus (AAV) comprising,

(a) a capsid protein comprising, an amino acid sequence that is ~~about or~~ at least ~~about~~ 98% identical to: (i) a VP1 region of any one of SEQ ID NOS: 1-7, (ii) a VP2 region of any one of SEQ ID NOS: 1-7, or (iii) a VP3 region of any one of SEQ ID NOS: 1-7, wherein the capsid protein comprises a GH loop that is identical to the GH loop of any one of SEQ ID NOS: 1-7; and

(b) a transgene comprising a heterologous gene operably linked to a regulatory sequence that controls expression of the heterologous gene in a host cell.

~~5~~3. The AAV of claim ~~1,~~ 2, ~~or 4,~~ wherein the capsid protein comprises an amino acid sequence that is ~~about or~~ at least ~~about~~ 99% identical to: (i) the VP1 region of any one of SEQ ID NOS: 1-7, (ii) the VP2 region of any one of SEQ ID NOS: 1-7, or (iii) the VP3 region of any one of SEQ ID NOS: 1-7.

~~6~~4. The AAV of ~~any one of~~ claim~~s 1,~~ 2~~, and 4~~, wherein the capsid protein comprises the amino acid sequence of: (i) the VP1 region of any one of SEQ ID NOS: 1-7, (ii) the VP2 region of any one of SEQ ID NOS: 1-7, or (iii) the VP3 region of any one of SEQ ID NOS: 1-7.

~~7~~5. The AAV of claim ~~3~~1, wherein the capsid protein comprises the amino acid sequence that is at least 99% identical to~~of~~: (i) the VP1 region of any one of SEQ ID NOS: 2 and 4-6, (ii) the VP2 region of any one of SEQ ID NOS: 2 and 4-6, or (iii) the VP3 region of any one of SEQ ID NOS: 2 and 4-6.

6. The AAV of claim 1, wherein the capsid protein comprises the amino acid sequence that is identical to: (i) the VP1 region of any one of SEQ ID NOS: 2 and 4-6, (ii) the VP2 region

of any one of SEQ ID NOS: 2 and 4-6, or (iii) the VP3 region of any one of SEQ ID NOS: 2 and 4-6.

7. The AAV of any one of claims 1 to 6, wherein liver cells infected with the AAV express the heterologous gene at a level that is between 10 fold and 40 fold greater than the level of the heterologous gene expressed in liver cells infected with an AAV comprising an AAV5 capsid and the transgene under the same conditions.

8. The AAV of any one of claims 1 to 6, wherein liver cells infected with the AAV express the heterologous gene at a level that is at least 5 fold greater than the level of the heterologous gene expressed in liver cells infected with an AAV comprising an AAV5 capsid and the transgene under the same conditions.

~~8~~9. The AAV of claim ~~2, 5,~~7 or ~~6~~8, wherein expression of the heterologous gene is measured by total flux of the transgene in a liver specific assay.

~~9. The AAV of claim 2, 5, 6, or 8, wherein the liver cells infected with the AAV express the heterologous gene at a level that is about or at least about 10 fold greater than the level of the heterologous gene expressed in liver cells infected with the AAV comprising the AAV5 capsid and the transgene under the same conditions.~~

~~10. The AAV of claim 1, 2, 4, 5, 6, or 8, wherein the capsid protein comprises a functional fragment of any one of SEQ ID NOS:1-7.~~

~~11. The AAV of claim 3 or 7, wherein the capsid protein comprises a functional fragment of any one of SEQ ID NOS:4-6.~~

~~12. The AAV of claim 10 or 11, wherein the functional fragment of the capsid protein comprises one or more of a variable region (VR), a constant region, a GBS domain, and/or a GH loop.~~

10~~3~~. The ~~adeno-associated virus (~~AAV~~)~~ of any one of claims 1 to ~~13~~9, wherein the capsid protein comprises an amino acid sequence encoded by a nucleotide sequence that hybridizes to a nucleotide sequence of any one of SEQ ID NOS: 8-14.

~~14~~11. The AAV of ~~any one of~~ claim~~s 1-13~~4, wherein the capsid protein comprises an amino acid sequence encoded by a nucleotide sequence of any one of SEQ ID NOS: 8-14.

~~15~~12. The AAV of any one of claims 1~~-14~~ to 11, wherein the transgene is flanked by one or more AAV inverted terminal repeats.

~~16~~13. A composition comprising, the AAV of any one of claims 1~~-15~~ to 12, and a physiological acceptable carrier.

14~~7~~. A composition comprising, the AAV of any one of claims 1~~-15~~ to 12, for delivering the transgene to a cell.

~~18~~15. A composition comprising, the AAV of any one of claims 1~~-15~~ to 12, for repeat delivery of the transgene to a cell.

~~19. Use of the AAV of any one of claims 1-15 in the manufacture of a medicament for treating a subject with a disorder or a disease that can be treated by expression of a transgene in the liver or by expression of a secreted protein from the liver.~~

~~20. Use of the AAV of any one of claims 1-15 for repeat delivery of the transgene to a cell in the manufacture of a medicament for treating a subject with a disorder or a disease that can be treated by expression of a transgene in the liver or by expression of a secreted protein from the liver~~

~~21~~16. The composition of claim ~~17~~ 14 or ~~18~~15, wherein the cell is a liver cell.

~~22~~17. Use of the AAV of any one of claims 1~~-15~~ to 12, or the composition of any one of claims 13-16, in the manufacture of a medicament for treating a subject suffering from a disorder or a disease associated with abnormal activity of an endogenous protein.

~~23~~18. The use of claim ~~19, 20, or 22~~17, wherein the disorder or the disease is associated with abnormal activity of an endogenous gene expressed in a liver cell.

~~24~~19. The use of claim ~~19, 20, or 22~~17 or 18, wherein the disorder or disease is selected from the group consisting of: hemophilia A, hemophilia B, Wilson's disease, hereditary angioedema (HAE), alpha 1 antitrypsin deficiency, and galactosemia.

~~25. A vector comprising:~~

~~a nucleic acid sequence encoding an adeno-associated virus (AAV) capsid protein comprising an amino acid sequence that is about or at least about 98% identical to (i) a VP1 region of any one of SEQ ID NOS:1-7, (ii) a VP2 region of any one of SEQ ID NOS:1-7, or (iii) a VP3 region of any one of SEQ ID NOS:1-7, wherein the amino acid corresponding to position 566 of any one of SEQ ID NOS:1-7 is an amino acid selected from the group: G, A, M, F, W, K, Q, E, S, P, V, I, C, Y, H, R, N, D, or T.~~

~~26~~20. A vector comprising:

a nucleic acid sequence encoding an adeno-associated virus (AAV) capsid protein comprising an amino acid sequence ~~that an amino acid sequence~~ that is ~~about or~~ at least ~~about~~ 98% identical to: (i) a VP1 region of any one of SEQ ID NOS: 1-7, (ii) a VP2 region of any one of SEQ ID NOS: 1-7, or (iii) a VP3 region of any one of SEQ ID NOS: 1-7, wherein the capsid protein comprises a GH loop that is identical to the GH loop of any one of SEQ ID NOS: 1-7.

~~27~~21. A vector comprising:

a nucleic acid sequence encoding an adeno-associated virus (AAV) capsid protein comprising an amino acid sequence that is ~~about or~~ at least ~~about 99~~98% identical to (i) a VP1 region of any one of SEQ ID NOS: ~~1-7~~2, and 4-6, (ii) a VP2 region of any one of SEQ ID NOS: ~~1-7~~2 and 4-6, or (iii) a VP3 region of any one of SEQ ID NOS: ~~1-7~~2 and 4-6, wherein the capsid protein comprises variable regions (VRs) IV to VII of any one of SEQ ID NOS:2 and 4-6, and constant regions in between.

22. The vector of claim 20, wherein the AAV capsid protein comprises an amino acid sequence that is at least 99% identical to: (i) the VP1 region of any one of SEQ ID NOS: 1-7, (ii) the VP2 region of any one of SEQ ID NOS: 1-7, or (iii) the VP3 region of any one of SEQ ID NOS: 1-7.

~~28~~23. The vector of claim ~~27~~20, wherein the capsid protein comprises the amino acid sequence of: (i) the VP1 region of any one of SEQ ID NOS: 1-7, (ii) the VP2 region of any one of SEQ ID NOS: 1-7, or (iii) the VP3 region of any one of SEQ ID NOS: 1-7.

24. The vector of claim 21, wherein the AAV capsid protein comprises an amino acid sequence that is at least 99% identical to: (i) the VP1 region of any one of SEQ ID NOS: 2 and 4-6, (ii) the VP2 region of any one of SEQ ID NOS: 2 and 4-6, or (iii) the VP3 region of any one of SEQ ID NOS: 2 and 4-6.

25. The vector of claim 21, wherein the AAV capsid protein comprises an amino acid sequence that is identical to: (i) the VP1 region of any one of SEQ ID NOS: 2 and 4-6, (ii) the VP2 region of any one of SEQ ID NOS: 2 and 4-6, or (iii) the VP3 region of any one of SEQ ID NOS: 2 and 4-6.

~~29~~26. The vector of any one of claims ~~25-28~~20 to 25, wherein the nucleic acid sequence encoding the AAV capsid protein hybridizes to a nucleotide sequence of any one of SEQ ID NOS: 8-14.

~~30. The vector of any one of claims 25-27, wherein the capsid protein comprises a functional fragment of any one of SEQ ID NOS:1-7.~~

~~31. The vector of claim 30, wherein the functional fragment comprises one or more of a variable region (VR), a constant region, a GBS domain, and/or a GH loop of an amino acid sequence of any one of SEQ ID NOS: 1-7.~~

~~32~~27. The vector of claim ~~28~~23, wherein the nucleic acid sequence encoding the AAV capsid protein comprises a nucleotide sequence of any one of SEQ ID NOS: 8-14.

~~33~~28. The vector of any one of claims ~~25-32~~20 to 27, wherein the nucleic acid sequence is operably linked to a heterologous regulatory sequence that controls expression of the capsid protein in a host cell.

~~34~~29. An *in vitro* cell comprising, the vector of any one of claims ~~25-33~~20 to 28.

~~35~~30. A method of producing an AAV comprising:

(a) culturing in a cell culture a viral production cell comprising an AAV vector comprising one or more AAV inverted terminal repeat sequences flanking a transgene comprising a

heterologous gene operably linked to regulatory sequences that control expression of the heterologous gene in a host cell, wherein the cell expresses an AAV capsid protein as defined in any one of claims 2~~1~~0 to 27 and ~~and one or more of the vectors of any one of claims 25-33, wherein the viral production cell expresses~~ AAV rep; and

(b) ~~recovering~~ collecting the AAV from the supernatant of the ~~viral production~~ cell culture.

3~~6~~31. The method of claim 3~~5~~30, wherein the cell is an invertebrate cell, an insect cell, or a mammalian cell.

3~~7~~32. The method of claim 3~~6~~31, wherein the mammalian cell is HEK293, HeLa, CHO, NS0, SP2/0, PER.C6, Vero, RD, BHK, HT 1080, A549, Cos-7, ARPE-19, or MRC-5 cell.

3~~8~~33. The method of claim 3~~6~~31, wherein the insect cell is High Five, Sf9, Se301, SeIZD2109, SeUCR1, Sf900+, Sf21, BTI-TN-5B1-4, MG-1, Tn368, HzAm1, BM-N, Ha2302, Hz2E5, or Ao38 cell.

3~~9~~34. The method of claim 3~~7~~32, wherein the mammalian cell is a HEK293 cell.

4~~0~~35. The method of claim 3~~8~~33, wherein the insect cell is an Sf9 cell.

4~~1~~36. An AAV produced by the method of any one of claims 3~~5~~30-4~~0~~35.

4~~2~~37. The use of any one of claims ~~19, 20, or 22~~17 to 19, wherein the subject is human.