sAAVient Therapeutics

Scientific Publication Directory

Table of Contents

Section (# entries)
NextGen AAV Vectors (6)
GenX AAV Vectors (1)
GenY AAV Vectors (2)
GenZ AAV Vectors (1)
Opt AAV Vectors (2)
Synthetic AAV Vectors (2)
Liver-Tropism (16)
Supporting Publications (25)

Click on a section title to jump to its publication list.

NextGen AAV Vectors

1. L. Zhong, B. Li, C.S. Mah, L. Govindasamy, M. Agbandje-McKenna, M.A. Cooper, R.W. Herzog, I. Zolotukhin, K.H. Warrington, Jr., K.A. Weigel-Van Aken, J.A. Hobbs, S. Zolotukhin, N. Muzyczka, and A. Srivastava. Next generation of adeno-associated virus 2 vectors: Point mutations in tyrosines lead to high-efficiency transduction at reduced doses. *Proc. Natl. Acad. Sci., USA*, 105: 7827-7832, 2008.

2. D. Markusic, R.W. Herzog, G. Aslanidi, B. Hoffman, B. Li, M. Li, G.R. Jayandharan, C. Ling, I. Zolotukhin, W. Ma, S. Zolotukhin, A. Srivastava, and L. Zhong. High-efficiency transduction and correction of murine hemophilia B using AAV2 vectors devoid of multiple surface-exposed tyrosines. *Mol. Therapy*, 18: 2048-2056, 2010.

3. G.V. Aslanidi, A.E. Rivers, L. Ortiz, L. Govindasamy, C. Ling, G.R. Jayandharan, S. Zolotukhin, M. Agbandje-McKenna, and A. Srivastava. High-efficiency transduction of human monocyte-derived dendritic cells by capsid-modified recombinant AAV2 vectors. *Vaccine*, 30: 3908-3917, 2012.

4. A.T. Martino, E. Basner-Tschakarjan, D.M. Markusic, J. Finn, C. Hinderer, S. Zhou, D.A. Ostrov, A. Srivastava, H.C.J. Ertl, C. Terhorst, K.A. High, F. Mingozzi, and R.W. Herzog. Engineered AAV vector minimizes *in vivo* targeting of transduced hepatocytes by capsid-specific CD8+ T cells. *Blood*, 121: 2224-33, 2013.

5. G.V. Aslanidi, A.E. Rivers, L. Ortiz, C. Ling, L. Song, L. Govindasamy, M. Tan, M. Agbandje-McKenna, and A. Srivastava. Optimization of recombinant AAV2 vectors for gene therapy: The final threshold? *PLoS One*, 8(3): e59142, 2013.

6. B. Li, W. Ma, G.V. Aslanidi, C. Ling, K.V. Vliet, L.-y. Huang, M. Agbandje-McKenna, A. Srivastava, and G.A. Aslanidi. Site-directed mutagenesis of surface-exposed lysine residues leads to high-efficiency transduction by recombinant AAV2, but not AAV8 vectors. *Hum. Gene Therapy Methods*, 26: 211-220, 2015.

GenX AAV Vectors

1. C. Ling, Y. Wang, Y. Lu, L. Wang, G.R. Jayandharan, G.V. Aslanidi, B. Li, B. Cheng, W. Ma, T. Lentz, C. Ling, X. Xiao, R.J. Samulski, N. Muzyczka, and A. Srivastava. Enhanced transgene expression from recombinant single-stranded AAV vectors in human cell lines *in vitro* and in murine hepatocytes *in vivo*. *J. Virology*, 89: 952-961, 2015.

GenY AAV Vectors

1. J. Shoti, K. Qing, G.D. Keeler, D. Duan, B.J. Byrne, and A. Srivastava. Development of capsid- and genome-modified AAVrh74 vectors for gene therapy of muscle diseases. *Molecular Therapy Methods & Clinical Development*, 31: 101147, 2023.

2. Y. Lu, C. Ling, J. Shoti, H. Yang, A. Nath, G.D. Keeler, K.Qing, and A. Srivastava. Enhanced transgene expression Enhanced transgene expression from single-stranded AAV vectors in human cells *in vitro* and in murine hepatocytes *in vivo*. *Mol. Ther.-Nucl. Acids*, 35: 102196, 2024.

GenZ AAV Vectors

1. K. Qing, J. Shoti, A. Nath, G.. Keeler, and A. Srivastava. Development of genome-modified generation Z (GenZ) single-stranded AAV vectors with improved transgene expression in human cells *in vitro* and transduction at further reduced doses. *Mol. Ther.,* 31: 234, 2023.

Opt AAV Vectors

1. C. Ling, B. Li, W. Ma, and A. Srivastava. Development optimized AAV serotype vectors for high-efficiency transduction at further reduced doses. *Hum. Gene Ther. Meth*., 27: 143-149, 2016.
2. J. Shoti, K. Qing, G.D. Keeler, D. Duan, B.J. Byrne, and A. Srivastava. Development of capsid-and genome-modified optimized AAVrh74 vectors for muscle gene therapy. *Mol. Ther. Meth. Clin. Dev.*, 31: 101147, 2023.

Synthetic AAV Vectors

1. P. Nahreini, S.H. Larsen, and A. Srivastava. Cloning and integration of DNA fragments in human cells via the inverted terminal repeats o the adeno-associated virus 2 genome. *Gene*, 119: 265-272, 1992.
2. J. Shoti, K. Qing, and A. Srivastava. Development of an AAV DNA-based synthetic vector for the potential gene therapy of hemophilia in children. *Front. Microbiol.,* 13: 1033615, 2022.

Liver-Tropism

1. S. Ponnazhagan, P. Mukherjee, M.C. Yoder, X.-S. Wang, S.Z. Zhou, J. Kaplan, S. Wadsworth and A. Srivastava. Adeno-associated virus 2-mediated gene transfer *in vivo*: Organ-tropism and expression of transduced sequences in mice. *Gene*, 190: 203-210, 1997.
2. L. Zhong, W. Li, Z, Yang, L.Y. Chen, Y. Li, K.Y. Qing, K.A. Weigel-Kelley, M.C. Yoder, W. Shou and A. Srivastava. Improved transduction of primary murine hepatocytes by recombinant adeno-associated virus 2 vectors *in vivo*. *Gene Therapy*, 11: 1165-1169, 2004.
3. L.G. Glushakova, M.J. Lisankie, E.B. Eruslanov, C. Ojano-Dirain, I. Zolotukhin, L. Zhong, C. Liu, A. Srivastava, and P.W. Stacpoole. AAV3-mediated transfer and expression of the pyruvate dehydrogenase E1a subunit gene causes metabolic remodeling and apoptosis in human liver cancer cells. *Mol. Genet. Metabol*., 98: 289-299, 2009

4. C. Ling, Y. Lu, J. Kalsi, G.R. Jayandharan, B. Li, W. Ma, B. Cheng, S. Gee, K. McGoogan, L. Zhong, L. Govindasamy, M. Agbandje-McKenna, and A. Srivastava. Hepatocyte growth factor receptor is a cellular coreceptor for adeno-associated virus 3. *Hum. Gene Therapy*, 21: 1741-1747, 2010.

5. G.R. Jayandharan, L. Zhong, B.K. Sack, A.E. Rivers, M. Li, B. Li, R.W. Herzog, and A. Srivastava. Optimized adeno-associated virus (AAV)-protein phosphatase-5 helper viruses for efficient liver transduction by single-stranded AAV vectors: Therapeutic expression of Factor IX at reduced vector doses. *Hum. Gene Therapy*, 21: 271-283, 2010.

6. Ling, Y. Lu, B. Cheng, K.E. McGoogan, S.W.Y. Gee, W. Ma, B. Li, G.V. Aslanidi, and A. Srivastava. High-efficiency transduction of liver cancer cells by recombinant adeno-associated virus serotype 3 vectors. *J. Vis. Exp.*, 49. Pii: 2538, doi: 10.3791/2538, 2011.

7. B. Cheng, C. Ling, Y. Dai, L.G. Glushakova, Y. Lu, S.W.Y. Gee, K.E. McGoogan, G.V. Aslanidi, M. Park, P.W. Stacpoole, D. Siemann, C. Liu, A. Srivastava, and C. Ling. Development of optimized AAV3 serotype vectors: Mechanism of high-efficiency transduction of human liver cancer cells. *Gene Therapy*, 19: 375-384, 2012.

8. C. Ling, Y. Wang, Y. Zhang, A. Ejjigani, Z. Yin, Y. Lu, L. Wang, M. Wang, J. Li, Z. Hu, G.V. Aslanidi, L. Zhong, G. Gao, A. Srivastava, and C. Ling. Selective *in vivo* targeting of human liver tumors by optimized recombinant AAV3 vectors in a murine xenograft model. *Human Gene Therapy,* 25: 1023-1034, 2014.

9. S. Li, C. Ling, L. Zhong, M. Li, Q. Su R. He, Q. Tang, D.L. Greiner, L.D. Shultz, M.A. Brehm, T.R. Flotte, C. Mueller, A. Srivastava, and G. Gao. Efficient and targeted transduction of non-human primate liver with systemically delivered optimized AAV3B vectors. *Mol. Therapy*, 23: 1867-1876, 2015.

10. K. Vercauteren, B.E. Hoffman, I. Zolotukhin, J.W. Xiao, E. Basner-Tshakarjan, K.A. High, H.C.J. Ertl, C.M. Rice, A. Srivastava, Y.P. de Jong, and R.W. Herzog. Superior *in vivo* transduction of human hepatocytes using engineered AAV3 capsid. *Mol. Therapy,* 24: 1042-1049, 2016.

11. D. Markusic, T.C. Nichols E.P. Merricks, B. Palaschak, I. Zolotukhin; D. Marsic; S. Zolotukhin, A. Srivastava, and R.W. Herzog. Evaluation of engineered AAV capsids for hepatic factor IX gene transfer in murine and canine models. *J. Transl. Medicine*, 15: 94, 2017.

12. H.C. Brown, C.B. Doering, R.W. Herzog, C. Ling, D.M. Markusic, H.T. Spencer, A. Srivastava, and A. Srivastava. Development of a clinical candidate AAV3 vector for gene therapy of hemophilia B. *Hum. Gene Therapy*, 31: 1114-1123, 2020.

13. S.R.P. Kumar, J. Xie, S. Hu, J. Ko, Q. Huang, H.C. Brown, A. Srivastava, D.M. Markusic, C.B. Doering, H.T. Spencer, A. Srivastava, G. Gao, and R.W. Herzog. Coagulation factor IX gene transfer to non-human primates using engineered AAV3 capsid and hepatic optimized expression cassette. *Mol. Ther Meth. Clin. Devel*., 23: 98-107, 2021.

14. L. Yin, G.D. Keeler, Y. Zhang, B.E. Hoffman, C. Ling, K. Qing, and A. Srivastava. AAV3-miRNA vectors for growth suppression of human hepatocellular carcinoma cells *in vitro* and human liver tumors in a murine xenograft model *in vivo*. *Gene Therapy*, 28: 422-434, 2021.

15. H.D. Daniel, S. Kumar, R. Kannangai, K.M. Lakshmi, M. Agbandje-Mckenna, K. Coleman K, A. Srivastava, A. Srivastava, and A.M. Abraham. Prevalence of adeno-associated virus 3 capsid binding and neutralizing antibodies in healthy and hemophilia B individuals from India. *Hum. Gene Therapy*, 32: 451-457, 2021.

16. H.D. Daniel, S. Kumar, R. Kannangai, J. Farzana, J.F. Noel, A. Abraham, K.M. Lakshmi, M. Agbandje-Mckenna, K. Coleman K, A. Srivastava, A. Srivastava, and A.M. Abraham. Age-stratified adeno-associated virus serotype 3 neutralizing and total antibody prevalence in hemophilia A patients from India. *J. Med. Virology, 94*: 4542-4547, 2022.

Supporting Publications

1. K.Y. Qing, X.-S. Wang, D.M. Kube, S. Ponnazhagan, A. Bajpai and A. Srivastava. Role of tyrosine phosphorylation of a cellular protein in adeno-associated virus 2-mediated transgene expression. *Proc. Natl. Acad. Sci., USA*, 94: 10879-10884, 1997.

2. X.-S. Wang, K.Y. Qing, S. Ponnazhagan and A. Srivastava. Adeno-associated virus 2 DNA replication *in vivo*: Mutation analyses of the D-sequence in viral inverted terminal repeats. *J. Virology*, 71: 3077-3082, 1997.

3. C. Mah, K.Y. Qing, B. Khuntirat, S. Ponnazhagan, X.-S. Wang, D.M. Kube, M.C. Yoder and A. Srivastava. Adeno-associated virus 2-mediated gene transfer: Role of epidermal growth factor receptor protein tyrosine kinase in transgene expression. *J. Virology*, 72: 9835-9843, 1998.

4. K.Y. Qing, B. Khuntirat, C. Mah, D.M. Kube, X.-S. Wang, S. Ponnazhagan, S.Z. Zhou, V.J. Dwarki, M.C. Yoder and A. Srivastava. Adeno-associated virus type 2-mediated gene transfer: Correlation of tyrosine phosphorylation of the cellular single-stranded D sequence-binding protein with transgene expression in human cells *in vitro* and murine tissues *in vivo*. *J. Virology*, 72: 1593-1599, 1998.

5. K.Y. Qing, C. Mah, J. Hansen, S.Z. Zhou, V.J. Dwarki and A. Srivastava. Human fibroblast growth factor receptor 1 is a co-receptor for infection by adeno-associated virus 2. *Nature Medicine*, 5: 71-77, 1999.

6. K.Y. Qing, J. Hansen, K.A. Weigel-Kelley, M.Q. Tan, S.Z. Zhou and A. Srivastava. Adeno-associated virus 2-mediated gene transfer: Role of cellular FKBP52 protein in transgene expression. *J. Virology*, 75: 8968-8976, 2001.

7. K.Y. Qing, W. Li, L. Zhong, M.Q. Tan, J. Hansen, K.A. Weigel-Kelley, L. Chen, M.C. Yoder and A. Srivastava. Adeno-associated virus 2-mediated gene transfer: Role of T-cell protein tyrosine phosphatase in transgene expression in established cell lines *in vitro* and transgenic mice *in vivo*. *J. Virology*, 77: 2741-2746, 2003.

8. L. Zhong, L.Y. Chen, Y. Li, K.Y. Qing, K.A. Weigel-Kelley, R.J. Chan, M.C. Yoder, and A. Srivastava. Self-complementary adeno-associated virus 2 (AAV)-T cell protein tyrosine phosphatase vectors as helper-viruses to improve transduction efficiency of conventional single-stranded AAV vectors *in vitro* and *in vivo*. *Mol. Therapy*, 10: 950-957, 2004.

9. L. Zhong, K.Y. Qing, Y. Si, L. Chen, M.Q. Tan and A. Srivastava. Heat-shock treatment-mediated increase in transduction by adeno-associated virus 2-vectors is independent of the cellular heat-shock protein 90. *J. Biol. Chem*., 279: 12714-12723, 2004.

10. W. Zhao, L. Zhong, J. Wu, L. Chen, K. Qing, K.A. Weigel-Kelley, S.H. Larsen, W. Shou, K.H. Warrington, Jr., and A. Srivastava. Role of cellular FKBP52 protein in intracellular trafficking of recombinant adeno-associated virus 2 vectors. *Virology*, 353: 283-293, 2006.

11. W. Zhao, J. Wu, L. Zhong, and A. Srivastava. Adeno-associated virus 2-mediated gene transfer: Identification of a cellular serine/threonine protein phosphatase involved in augmenting vector transduction efficiency. *Gene Therapy*, 14: 545-550, 2007.

12. L. Zhong, W. Zhao, J. Wu, B. Li, B. Li, S. Zolotukhin, L. Govindasamy, M. Agbandge-McKenna, and A. Srivastava. A dual role of EGFR protein tyrosine kinase signaling in ubiquitination of AAV2 capsids and viral second-strand DNA synthesis. *Mol. Therapy*, 15: 1323-1330, 2007.

13. L. Zhong, X. Zhou, Y. Li, K.Y. Qing, X. Xiao, R.J. Samulski, and A. Srivastava. Single-polarity recombinant adeno-associated virus 2 vector-mediated transgene expression *in vitro* and *in vivo*: Mechanism of transduction. *Mol. Therapy*, 16: 290-295, 2008.

14. K.Y. Qing, C. Mah, J. Hansen, S.Z. Zhou, V.J. Dwarki and A. Srivastava. Human fibroblast growth factor receptor 1 is a co-receptor for infection by adeno-associated virus 2. *Nature Medicine*, 5: 71-77, 1999.

15. L. Zhong, W. Li, Z, Yang, L.Y. Chen, Y. Li, K.Y. Qing, K.A. Weigel-Kelley, M.C. Yoder, W. Shou and A. Srivastava. Improved transduction of primary murine hepatocytes by recombinant adeno-associated virus 2 vectors *in vivo*. *Gene Therapy*, 11: 1165-1169, 2004.

16. L. Zhong, K.Y. Qing, Y. Si, L. Chen, M.Q. Tan and A. Srivastava. Heat-shock treatment-mediated increase in transduction by adeno-associated virus 2-vectors is independent of the cellular heat-shock protein 90. *J. Biol. Chem*., 279: 12714-12723, 2004.

17. C. Ling, Y. Lu, J. Kalsi, G.R. Jayandharan, B. Li, W. Ma, B. Cheng, S. Gee, K. McGoogan, L. Zhong, L. Govindasamy, M. Agbandje-McKenna, and A. Srivastava. Hepatocyte growth factor receptor is a cellular coreceptor for adeno-associated virus 3. *Hum. Gene Therapy*, 21: 1741-1747, 2010.

18. C. Ling, Y. Wang, Y. Lu, L. Wang, G.R. Jayandharan, G.V. Aslanidi, B. Li, B. Cheng, W. Ma, T. Lentz, C. Ling, X. Xiao, R.J. Samulski, N. Muzyczka, and A. Srivastava. The adeno-associated virus genome packaging puzzle. *J. Mol. Genet. Medicine*, 9: 3, 1000178, 2015.

19. C. Ling, Z. Yin, J. Li, D. Zhang, G. Aslanidi, and A. Srivastava. Strategies to generate high-titer, high-potency recombinant AAV3 serotype vectors. *Mol. Ther. Methods & Clin. Dev.*, 3:16029, 2016.

20. C. Ling, Z. Yin, J. Li, D. Zhang, G. Aslanidi, and A. Srivastava. Strategies to generate high-titer, high-potency recombinant AAV3 serotype vectors. *Mol. Ther. Meth. & Clin. Dev.*, 3:16029, 2016.

21. H.-J. Kwon, K. Qing, S. Ponnazhagan, X.-S. Wang, D.M. Markusic, S. Gupte, S.E. Boye, and A. Srivastava. Adeno-associated virus D-sequence-mediated suppression of expression of a human major histocompatibility class II gene: Implications in the development of adeno-associated virus vectors for modulating humoral immune response. *Hum. Gene Therapy*, 31: 565-574, 2020.

22. M.G. Sanal and A. Srivastava. Gene therapy for hemophilia A. *New Engl. J. of Medicine*, 386: 2247, 2022.

23. A. Srivastava. Rationale and strategies for the development of safe and effective optimized AAV vectors for human gene therapy. *Mol. Ther.-Nucl. Acids*. 32: 949-959, 2023.

24. A. Srivastava. AAV vectors for long-term gene therapy of hemophilia B: Are we there yet? *Mol. Therapy*, 32: 2042-2044, 2024.

25. H.D. Daniel, J. Farzana J, R. Kannangai, K.M. Lakshmi, C. Kaur, B. Jashal, H. Dhamne, V. Lahoti, D. Kanjwani, A. Abraham, K. Coleman, A. Srivastava, A. Srivastava, and A.M. Abraham. Total and neutralizing antibody seroprevalence of hepatotropic AAV among healthy and hemophilia A or B population from India. *Human Gene Therapy*, 36: 1500-1508, 2025.