James E. Dahlman, Ph.D. | james.dahlman@bme.gatech.edu | www.dahlmanlab.org

Appointments

2021 – Associate Professor with tenure, Department of Biomedical Engineering, Georgia Institute of Technology and Emory School of Medicine
2016 – Assistant Professor, Department of Biomedical Engineering, Georgia Institute of Technology / Emory
Member, Parker H. Petit Institute for Bioengineering and Biosciences, Georgia Institute of Technology
2015 – LSRF post-doctoral fellow, Genome Engineering, Broad Institute of Harvard and MIT
Advisor: Feng Zhang
2015 – Ph.D., Medical Engineering / Medical Physics, MIT and Harvard Medical School HST Program
Advisors: Robert Langer and Daniel Anderson
Committee Members: Robert Langer, Daniel Anderson, Philip Sharp, Sangeeta Bhatia
2009 – B.S. Biomedical Engineering, Wright State University

Summary

(1) Pioneering DNA barcoded nanoparticles to quantify how thousands of nanoparticles deliver drugs *in vivo*. Created DNA barcodes that (i) quantify nanoparticle delivery at doses 10^9x lower than fluorescence and (ii) screen for functional mRNA (i.e., protein production) or siRNA (i.e., protein silencing) delivery *in vivo*. (2) Currently developing novel omics-based methods to track delivery of nucleic acids in rare cells *in vivo*. (3) Designed multiple nanoparticles that deliver RNA to new cell types in non-human primates and are licensed for clinical development. (4) Designed 'dead' sgRNAs that activate gene A and delete gene B in a single cell.

Founder and former Board Chairman of Guide Therapeutics, a biotech company based on our DNA barcoding that was acquired by Beam Therapeutics. Experience fundraising, analyzing deal structures, and negotiating partnerships. Strong ties to leading venture capital firms, gene therapy biotechs, and pharma.

Department-, college-, and university-wide Georgia Tech teaching awards and accolades since starting to teach in 2017. Perfect (5.0 / 5.0) teaching scores for core genetics / cell biology course with 55 students in the section. Active advocate of mental health; Chair, Georgia Tech BME Mental Health Subcommittee.

In 2018, named to Technology Review TR35. In 2019, Dahlman Lab DNA barcoding mentioned by the World Economic Forum and Scientific American in an article describing Top 10 Emerging Technologies. Young faculty recognitions from Bayer, Parkinson's Disease Foundation, Journal of Materials Chemistry B, SERLC, Cell / Molecular Bioengineering (CMBE), Bioengineering and Translational Medicine, Biomedical Engineering Society, American Society of Gene and Cell Therapy, and Controlled Release Society. As a trainee: NSF, NDSEG, MIT Presidential, Whitaker, NIH Oxford Cambridge, and LSRF fellowships. One of 13 US / UK students to receive Weintraub for Ph.D. thesis work.

Scientific Vision

My vision is to apply systems biology and 'big data' approaches to nanomedicine in order to create targeted gene therapies in 'second generation' tissues such as lung, spleen, bone marrow, muscle, and heart. I do this by combining high throughput chemical engineering, nanotechnology, and genomics. My background is in Materials Science (Ph.D., MIT, Nanoparticles for non-liver siRNA delivery), Medicine (Harvard), and Cas9 (Post-doc, Broad Institute, CRISPR-Cas9). I have two long-term goals. First, fundamentally improve how nanomedicines are studied *in vivo*, in order to identify promising gene therapies more efficiently. E.g., we combined high throughput chemistry and genomics to track thousands of nanoparticles *in vivo*. We are now developing second- and third-generation approaches to study how cellular heterogeneity affects nanoparticle delivery *in vivo*. Second, elucidate the biology of drug delivery. Pathways that affect nanoparticles *in vivo* are poorly understood. Using small molecules, knockout mice, and CRISPR, we perturb genes to study how pathways affect nanoparticle targeting *in vivo*.

Honors, Awards, and Recognitions

As a PI (2016 – Current)

Nature Biotechnology 25th Anniversary "Voices of Biotech"
AOCS Phospholipid Division Best Paper Award for Gan et al., 2020
BMES CMBE Editor's Choice Award for Sago et al., 2019
GaTech BME Department Outstanding Teaching Recognition for Remote Instruction
Controlled Release Society Gene Delivery and Gene Editing Young Investigator Award
Georgia Tech Thank A Teacher Certificate
ASGCT Outstanding New Investigator Award
Georgia Tech Outstanding Achievement in Early Career Research Award - One GT Professor / Year
Student Recognition of Excellence in Teaching: Class of 1934 Award
Georgia Bio 'Deals of the Year' Award for GuideTx fundraising
Invited: Special 'Futures' Issue of Bioengineering and Translational Medicine (BioTM)
Parker H. Petit Institute for Bioengineering and Biosciences Entrepreneurship Award
BMES Rita Schaffer Young Investigator Award
Barcoding mentioned by World Economic Forum in Top 10 Emerging Technologies of 2019
Above and Beyond Award, Georgia Tech Biomedical Engineering Students
Invited: Young Investigator – Cellular and Molecular Bioengineering (CMBE) Journal
MIT Tech Review TR35 – 35 innovative people in world <35 years old
Drug delivery co-chair for Robert Langer birthday symposium
Invited: Emerging Investigator Issue – Journal of Materials Chemistry B
Women In Engineering Teaching Award - only 2 faculty members GaTech College of Engineering
Named 1 of 6 'Transcendent Teachers' for Georgia Tech
Class of 1940 Course Teaching Effectiveness Award (12 courses awarded each year across GaTech)
Excellence in Teaching Award – Georgia Tech Biomedical Engineering
Georgia Tech Teaching Award
Young Investigator Keynote, SERLC Conference
Bayer Young Investigator Award
Parkinson's Disease Foundation Stanley Fahn Jr. Faculty Award

As a trainee (2009 – 2015)

Weintraub PhD Award in Biological Sciences – only 13 Ph.D. theses from entire US / UK selected
LSRF Postdoctoral Fellowship
Excellence in Science Award - North American Vascular Biology Inflammation Meeting
Excellence in Applied Cellular and Molecular Biology Award - *Nature Biotech* Symposium
Travel Grant Awardee, Gordon Research Conference on Vascular Biology
NDSEG Graduate Fellowship
NSF GRFP Graduate Fellowship
NIH Oxford-Cambridge Graduate Fellowship
Whitaker International Research Fellowship
MIT Presidential Graduate Fellowship
NSF REU Fellowship
Wright State Presidential Commendation for Excellence
Barry M. Goldwater Fellowship

DahlmanLab Publications (1st Ph.D. students joined in the fall of 2016)

Research highlighted by Nature Biotechnology, STAT News, Scientific American, GEN, GQ Brazil, @StartupSpeed, MIT Technology Review, MIT Technology Review, O Globo, ASME, Georgia Tech, MIT, and others.

[&&]Co-corresponding, *Co-first. **DahlmanLab members are bolded.**

1. **Ni H*, Zhao K*, Dahlman JE.** Invited, **Accounts of Chemical Research**.

2. **Paunovska K, Loughrey D, Dahlman JE.** Invited, **Nature Reviews Genetics.**

3. **Hatit MZC*, Lokugamage MP*, Dobrowolski CN*, Paunovska K,** Vanover D, Beyersdorf J, Peck HE, **Loughrey D, Sato M, Cristian A,** Santangelo PJ, **Dahlman JE.** Reviews received; to be resubmitted.

4. **Sago CD, Lokugamage MP,** Lindsay KE, **Loughrey D,** Hincapie R, **Krupczak BR, Kalathoor S, Sato M, Fitzgerald JP, Gan Z,** Castro MG, **Paunovska K,** Sanhueza CA, Finn MG, Santangelo PJ, **Dahlman JE.** Reviews received; to be resubmitted.

5. Culley MK. Reviews received; resubmitted.

6. **Lokugamage MP*,** Vanover D*, Beyersdorf J*, **Hatit MZC***, Rotolo L, Peck HE, **Ni H**, **Schrader E**, Yoon JK, Kim Y, Santangelo PJ[&&], **Dahlman JE[&&]. Nature Biomedical Engineering**, 2021.

7. **Dobrowolski C*, Paunovska K*, Hatit MZC, Lokugamage MP, Dahlman JE.** Therapeutic RNA delivery for COVID and other diseases. **Advanced Healthcare Materials**, 2021. **Invited.**

8. Somatic Cell Gene Editing Consortium. The NIH Somatic Cell Gene Editing Program. Accepted, **Nature**.

9. Alter G*, Bingham K*, Corey L*, **Dahlman JE***, Jackson N*, Moore J*, Rappuoli R*. Whither COVID-19 Vaccines? **Nature Biotechnology**, 2020. **Invited.**

10. **Paunovska K, Da Silva Sanchez AJ, Cristian A, Dahlman JE.** Treating cystic fibrosis with mRNA and CRISPR. **Human Gene Therapy**, 2020**. Invited, Special Issue on Lung Gene Therapies.**

11. **Paunovska K*, Da Silva Sanchez AJ*,** Foster MT, Loughrey D, Blanchard EL, **Islam FZ, Gan Z,** Mantalaris A, Santangelo PJ, **Dahlman JE**. Increased PIP3 activity blocks nanoparticle mRNA delivery. **Science Advances**, 2020.

    Highlighted by Oligotherapeutics Society.

12. **Gan Z*, Lokugamage MP*, Hatit MZC, Loughrey D, Paunovska K, Sato M, Cristian A, Dahlman JE.** Nanoparticles containing constrained phospholipids deliver mRNA to immune cells *in vivo* without targeting ligands. **Bioengineering and Translational Medicine**, 2020. **Invited for 'Futures' Issue.**

13. **Lokugamage MP, Gan Z,** Zurla C, **Levin J, Islam FZ, Kalathoor S, Sato M, Sago CD,** Santangelo PJ, **Dahlman JE.** Mild innate immune activation overrides efficient nanoparticle-mediated RNA delivery. **Advanced Materials**, 2019.

    Highlighted by Oligotherapeutics Society.

14. Chen PY, Qin L, Li G, Wang Z, **Dahlman JE** et al. Endothelial TGF-ß signaling drives vascular inflammation and atherosclerosis. **Nature Metabolism**, 2019.

    Highlighted by Nature Metabolism, Genetic Engineering News, Science Daily, MedicalXPress, and others.

15. **Paunovska K, Loughrey D, Sago CD,** Langer R, **Dahlman JE.** Using large datasets to understand nanotechnology. **Advanced Materials**, 2019.

    Highlighted by Journal of Controlled Release.

16. **Lokugamage MP*, Sago CD*, Gan Z, Krupczak BR, Dahlman JE**. Constrained nanoparticles deliver siRNA and sgRNA to T cells *in vivo* without targeting ligands. **Advanced Materials,** 2019.

    Highlighted by Oligotherapeutics Society.

17. Brown JM, **Dahlman JE**, Neuman K, Prata C, Krampert M, Hadwiger P, Vornlocher HP. Ligand conjugated multimeric siRNAs enable multiplexed gene silencing. **Nucleic Acid Therapeutics,** 2019.

18. **Dahlman JE.** How DNA is used to store – and generate – information at extreme scales. **Invited, Scientific American**, 2019.

19. **Sago CD, Krupczak BR, Lokugamage MP, Gan Z, Dahlman JE.** Cell types within the liver microenvironment differentially interact with lipid nanoparticles. **Cell and Molecular Bioengineering**, 2019. **Invited, CMBE 2019 Young Investigators.**

    2020 CMBE Editor's Choice Award

20. Yu Q et al. BOLA3 deficiency controls endothelial metabolism and glycine homeostasis in pulmonary hypertension. **Circulation**, 2019.

21. **Paunovska K, Da Silva Sanchez AJ, Sago CD, Gan Z, Lokugamage MP, Islam FZ, Krupczak BR, Dahlman JE.** Nanoparticles containing oxidized cholesterol deliver mRNA to the liver microenvironment at clinically relevant doses. **Advanced Materials**, 2019.

22. Kofler N, Collins JP, Kuzma J, Marris E, Esvelt K, Nelson MP, Newhouse A, Rothschild LJ, Vigliotti VS, Semenov M, Jacobsen R, **Dahlman JE**, Prince S, Caccone A, Brown T, Schmitz OJ. Editing Nature: Local roots of global governance. **Science**, 2018.

23. **Sago CD*, Lokugamage M*, Islam FZ, Krupczak BR, Sato M, Dahlman JE.** Nanoparticles that deliver RNA to bone marrow identified by *in vivo* directed evolution. **JACS**, 2018.

    Featured on JACS cover.
    Highlighted by Chemistry News.

24. **Sago CD, Lokugamage MP, Paunovska K,** Vanover DA, **Monaco CM, Castro MG,** Anderson S, **Rudoltz TR, Lando G,** Kirschman JL, Willet N, Jang Y, Santangelo PJ, Bryksin AV, **Dahlman JE.** A high throughput *in vivo* screen of functional mRNA delivery identifies nanoparticles for endothelial cell gene editing. **PNAS**, 2018**.**

    Highlighted by GaTech, Scientific American, STAT News, Journal of Controlled Release, Phys.org, GenEng News, Futurity, and others.

25. **Sago CD*, Lokugamage MP*, Lando GN,** Djeddar N, **Shan NN,** Bryksin AV, **Dahlman JE.** Modifying a commonly expressed endocytic receptor retargets nanoparticles *in vivo*. **Nano Letters**, 2018.

    Featured on Nano Letters cover.

26. **Sago CD, Kalathoor S, Islam FZ, Krupczak BR, Dahlman JE**. Barcoding chemical modifications into nucleic acids improves drug stability *in vivo*. **Journal of Materials Chemistry B**, 2018. **Invited, Emerging Investigator Issue.**

    Featured on journal cover.

27. **Lokugamage M, Sago CD, Dahlman JE.** Testing thousands of nanoparticles *in vivo* using DNA barcodes. **Current Opinion in Biomedical Engineering**, 2018.

28. **Paunovska K, Gil CG, Lokugamage M, Sago CD, Sato M, Lando GN, Castro MG,** Bryksin AV, **Dahlman JE.** Analyzing 2,000 *in vivo* drug delivery data points reveals cholesterol structure impacts nanoparticle delivery. **ACS Nano**, 2018**.**

    Highlighted by Journal of Controlled Release, ASME and others.

29. **Paunovska K*, Sago CD*, Monaco CM,** Hudson WH, Castro MG, **Rudoltz T, Kalathoor S,** Vanover DA, Santangelo PJ, Ahmed R, Bryksin AV, **Dahlman JE**. A direct comparison of *in vitro* nanoparticle delivery and *in vivo* nanoparticle delivery using hundreds of nanoparticles reveals a weak correlation. **Nano Letters**, 2018.

    Highlighted by Nature Biotech, Georgia Tech, UPenn, Phys.org, Science Daily, ASME, and others.

30. **Dahlman JE[&&]**, Kauffman KJ*, Xing Y, Shaw TE, Dlott C, Mir Faryal F, Langer R, Anderson DG, Wang E[&&]**.** High throughput *in vivo* therapeutic discovery. **PNAS,** 2017.

    Highlighted by MIT, Georgia Tech, University of Florida, Phys.org, and others

PhD (2009-2014, Robert Langer) and post-doc (2014-2016, Feng Zhang) publications

31. Tibbitt MW, **Dahlman JE**, Langer R. Emerging frontiers in drug delivery. **JACS**, 2016.

32. Sager HB*, Dutta P*, **Dahlman JE***, Borodovsky A, Fitzgerald K, Heidt T, Courties G, Wojtkiewicz GR, Iwamoto Y, Sebas Y, Khan OF, Xing Y, Shaw TE, Libby P, Swirski FK, Langer R, Weissleder R, Anderson, DG, Nahrendorf M. Five gene RNAi therapy targeted to endothelial cells reduces post-MI vascular inflammation. **Science Translational Medicine,** 2016

    Featured on cover.
    Image named top 10 science images of 2016 by NSF.
    Highlighted by Science, Nature Reviews Cardiology, and Mass General Hospital.

33. Yun S, Budatha M, **Dahlman JE**, Coon BG, Langer R, Anderson DG, Baillie G, Schwartz MA. Integrin alpha5-PDE4D interaction regulates endothelial inflammatory signaling. **Nature Cell Biology***,* 2016.

34. **Dahlman JE[&&]**, Abudayyeh OA*, Gootenberg JS, Joung J, Zhang F, Konermann S. Orthogonal gene knockout and activation with a catalytically active Cas9 nuclease. **Nature Biotechnology,** 2015.

    Featured on Nature Biotech cover.
    Highlighted by Nature Methods.

35. **Dahlman, JE***, Barnes C* et al. *In vivo* endothelial siRNA delivery using polymeric nanoparticles with low molecular weight. **Nature Nanotechnology,** 2014.

    Highlighted by MIT, MIT Tech Review, Nature Materials, Nature Medicine, and others.

Cover Feature.

36. Platt RJ, Chen S, Zhou Y, Yim M, Swiech L, Kempton HR, **Dahlman JE**, Parnas O, Eisenhaure TM, Jovanovico M, Jhunjhunwala S, Graham D., Xavier RJ, Langer R, Anderson DG, Hacohen N, Regev A, Feng G, Zhang F. A Cre-Dependent CRISPR-Cas9 knockin transgenic mouse for efficient *ex vivo* and *in vivo* genome editing. **Cell,** 2014.

37. Xue W*, **Dahlman JE***, Tammela T, Khan OF, Sood S, Dave A, Cai W, Chirino L, Yang GR, Bronson R, Crowley DG, Sahay G, Schroeder A, Langer R, Anderson DG, Jacks T. Small RNA combination therapy for lung cancer. **PNAS,** 2014.

38. Schroeder A, Heller DA, Winslow MM, **Dahlman JE***, Pratt GW, Langer R, Jacks T, Anderson DG. Treating metastatic cancer with nanotechnology. **Nature Reviews Cancer** 2012.

39. Sager HB, Hulsmans M, Lavin KJ, Moreira MB, Courties G, Sun Y, Iwamoto Y, Heidt T, Tricot B, Khan OF, **Dahlman JE**, Borodovsky A, Fitzgerald K, Anderson DG, Weissleder R, Libby P, Swirski FK, Nahrendorf M. Proliferation and recruitment contribute to myocardial macrophage expansion in chronic heart failure. **Circulation Research,** 2016.

40. Koga J, Figueiredo J, **Dahlman JE**, Niida T, Iwata H, Aster JC, Yagita H, Anderson DG, Ozaki CK, Aikawa M. Macrophage Notch ligand Delta-like 4 promotes the lesion development of vein grafts: implications for the treatment of vein graft failure. **Arteriosclerosis, Thrombosis, and Vascular Biology**, 2015.

    Featured on cover.
    Awarded cover of the year by ATVB.

41. Khan OF, Zaia E, Jhunjhunwala S, Xue W, Wenxin C, Dong YS, Barnes C, **Dahlman JE**, Dong Y, Pelet J, Webber M, Tsosie J, Jacks T, Langer R, Anderson DG. Dendrimer-inspired nanomaterials for the *in vivo* delivery of siRNA to lung vasculature. **Nano Letters**, 2015.

42. White K, Lu Y, Annis S, Hale AE, Chau N, **Dahlman JE**, Hemann C, Opotowsky AR, Vargas SO, Rosas I, Perrella MA, Osorio JC, Haley KJ, Graham BR, Kumar R, Saggar R, Wallace WD, Ross DJ, Khan OF, Bader A, Gochuico BR, Matar M, Polach K, Anderson DG, Langer R, Zweier JL, Bindoff LA, Systrom D, Waxman AB, Jin RC, Chan SY. Genetic and hypoxic alterations of the miR-210-ISCU1/2 axis promote iron-sulfate deficiency and pulmonary hypertension. **EMBO Molecular Medicine**, 2015.

43. Khan OF, Zaia E, Yin H, Bororad R, Pelet JM, Webber MJ, Zhuang I, **Dahlman JE**, Langer R, Anderson DG. Chemically modified dendrimers with alkyl chain-substituted amines for siRNA delivery to the liver endothelium *in vivo*. **Angewandte Chemie**, 2014.

44. Stewart MP, Lorenz A, **Dahlman JE**, and Sahay G. Challenges in carrier mediated intracellular delivery: Lessons from cell biology to trigger endosomal escape. **WIRES Nanomedicine and Nanobiotechnology.**

45. Herr KJ, Tsang YN, En JO, Qiushi L, Yap LL Yu W, Yin H, Bogorad R, **Dahlman JE**, Chan YG, Bay BH, Singaraja R, Anderson DG, Kotelianky V, Viasnoff V. Alpha-catenin elicits a cholestatic response and impairs liver regeneration. **Scientific Reports,** 2014.

46. **Dahlman JE**, Kauffman K, Langer R, Anderson DG. Nanotechnology for *in vivo* targeted siRNA Delivery. **Advances in Genetics,** 2014.

47. **Dahlman JE**. A lesson in communication. **Nature Nanotechnology** 2014.

48. **Dahlman JE**, Langer R, Goldberg M. Lipid-like delivery materials for efficient siRNA delivery. **Nanotechnology for the delivery of therapeutic nucleic acids** 2013.

49. Schroeder A, **Dahlman JE***, Sahay G, Love KT, Jiang S, Eltouhky AA, Levins CG, Wang Y, Anderson DG. Alkane-modified short polyethyleneimine for siRNA delivery. **Journal of Controlled Release** 2012.

50. Whitehead K, **Dahlman JE**, Langer R, Anderson DG. Silencing or stimulation? siRNA delivery and the immune system. **Annual Reviews of Chemical and Biomolecular Engineering,** 2011.

51. Miracle DB, Wilks G, Dahlman A, **Dahlman JE**. The strength of chemical bonds in solids and liquids. **Acta Materialia**, 2011.

52. **Dahlman J,** Senkov ON, Scott JM, Miracle DB. Corrosion Properties of Ca based bulk metallic glasses. **Materials Transactions**, 2007.

Professional Experience

Co-founder and Board Member. Guide Therapeutics. Started the company in late 2018, led fundraising efforts, helped developed BD / partnership strategy. Extensive network of biotech VCs and leadership of biotech / pharma companies. Guide was acquired by Beam Therapeutics in February 2021.

Teacher. BMED 2250; 32 student core course on engineering design. BMED 3600; 55 student core course on cell biology and genetics. While teaching a total of ~100 students between two sections of BMED3600 in the same semester, achieved perfect (5.0 / 5.0) and near-perfect (4.9 / 5.0) teaching scores for the two sections, respectively. **Won eight Georgia Tech teaching awards or accolades since 2016.**

Consultant. MPEG LA; Aided experimental design, data analysis, IP strategy, and RNA therapeutics market analysis from 2015 - 2019. GLG; Regularly discuss RNA / gene editing landscape with investors. Warner Brothers; Genetics Lab Tech Advisor for *Rampage* (CRISPR movie starring Dwayne 'The Rock' Johnson).

Journal Reviewer. Nature Biotechnology, Nature Materials, Nature Nanotechnology, Nature Methods, Advanced Materials, Cell Chemical Biology, Nature Communications, JACS, ACS Nano, PNAS, Nano Letters, Advanced Drug Delivery Reviews, Cell Reports, Biomaterials, Trends in Biotechnology, Advanced Healthcare Materials, Current Opinion in Biomedical Engineering, The CRISPR Journal, PLOS One, Scientific Reports, Journal of Controlled Release, Analytical Chemistry, FEBS Reports, Biomacromolecules, Journal of Colloids and Surfaces B, Biomaterial Science, Bioengineering and Translational Medicine, Acta Biomaterialia.

Grant Reviewer. NSF, NIH (National Cancer Institute), Israeli DOD, Georgia Regenerative Medicine, Georgia Clinical and Translational Science Alliance,

Moderator / Chair. 2020 ASGCT Early Career Development Award Symposium, 2019 First annual American Chemical Society 'Nanoinformatics' Session, 2018 Robert Langer 70th Birthday Conference, 2017 North American CF Conference, 2017 CF Research Foundation Conference.

Member. Petit Scholars Selection Committee, Stem Cell Faculty Search Committee, Faculty Recruitment Committee, Graduate Student Admissions Committee, Director of Business Operations Search, Community / Diversity / Inclusion Committee (Chair of BME Mental Health Subcommittee), GTRI 'Tiger Team' (five Professors from GT selected to choose a very large, university-wide 'moonshot' initiative), College of Engineering Dean Search.

Selected Invited Talks (From >100 invited talks)

1. European Symposium on Controlled Drug Delivery, Egmond ann Zee, The Netherlands, April 2022. **Plenary.**

2. American Association of Pharmaceutical Scientists Annual Meeting, Philadelphia, PA, October 2021. **Keynote.**
3. Nature Conference on Next-Generation Genomics, New York, NY, Summer 2021.
4. Controlled Release Society Gene Editing / Gene Delivery Talk on Startups, Online, May 2021. **Keynote**.
5. BioTech Xpo, March 2021. **Keynote.**
6. Cold Spring Harbor Laboratory Nucleic Acid Therapies, Cold Spring Harbor, NY, March 2021.
7. Keystone Symposium on Precision Engineering of the Genome, Epigenome, Transcriptome, Whistler, Canada, March 2021.
8. Vertex Pharmaceuticals, Boston, MA, December 2020.
9. Genentech, San Francisco, CA, October 2020.
10. TIDES, Boston, MA, September 2020.
11. Harvard School of Engineering and Applied Sciences, Boston, MA, September 2020.
12. Controlled Release Society, Las Vegas, NV, July 2020. **Gene Delivery / Gene Editing Young Investigator Award Lecture.**
13. Novartis, Boston, MA, July 2020.
14. ASGCT, Boston, MA, May 2020. **Outstanding New Investigator Keynote.**
15. Oligotherapeutics Society, Online Webinar, April 2020.
16. US / Japan Drug Delivery Symposium, Maui, HI, December 2019.
17. Rita Schaffer Young Investigator Lecture, BMES, Philadelphia, PA, October 2019. **Keynote.**
18. CMBE Young Investigator Lecture, BMES, Philadelphia, PA, October 2019. **Young Investigator Award.**
19. American Chemical Society National Meeting, San Diego, CA, August 2019. **Session co-chair.**
20. TIDES, San Diego, CA, May 2019.
21. Broad Institute of MIT and Harvard, Boston, MA, May 2019.
22. Great Point Ventures Limited Partners Conference, San Francisco, CA, May 2019.
23. UC San Francisco, San Francisco, CA, May 2019.
24. EPFL Bioengineering, Lausanne, Switzerland, April 2019.
25. ETH Zurich D-BSSE, Basel, Switzerland, April 2019.
26. FDA, Washington, D.C., March 2019.
27. Gordon Research Conference on Vascular Biology, Venture, CA, January 2019.
28. Children's Hospital of Philadelphia Center for Cellular / Molecular Therapies, December 2018.
29. WIRED Magazine Brazil, Rio de Janeiro, December 2018. **Keynote.**
30. MIT Tech Review TR35 EmTech, Boston, MA, September 2018.
31. Bob Langer 70th Birthday Symposium, Boston, MA, September 2018. **Co-chair, drug delivery session.**
32. Stanford Bio-X Institute, Palo Alto, CA, May 2018.
33. *The Scientist* CRISPR (Webinar, Not In Person Talk), September 2017.
34. BioNTech Therapeutics, Mainz, Germany, December 2017.
35. SERLC, Cashiers, NC, November 2017. **Young Investigator Lecture.**
36. Fred Hutchinson Cancer Research Center, May 2015. **Weintraub Award Ceremony**.