

Eric Michael Bachelder

Division of Molecular Pharmaceutics, School of Pharmacy, University of North Carolina
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EDUCATION

The University of Nebraska, Chemical Engineering 1/2004 – 8/2006
Virginia Polytechnic and State University 8/2000 – 12/2003
Advisor: Prof. William Velander
PhD
(Prof. Velander became Department Chair at Nebraska in August 2003)

Michigan State University, Chemical Engineering 8/1995 – 5/1999
Graduated with Honors from the Honors College
BS

PROFESSIONAL EXPERIENCE

University of North Carolina College of Pharmacy
Associate Professor 8/2019-present
Assistant Research Professor 6/2014-8/2019

The Ohio State University College of Pharmacy
Assistant Research Professor 2010-2014
Research Scientist 2009-2010

University of California at Berkeley Chemistry Department 2006-2009
Postdoctoral Research Fellow
Advisor: Prof. Jean M.J. Fréchet

- Invented and patented degradable acid-labile polymer based on dextran.
- Development of novel polyurethane based acid-labile particles for vaccine delivery.
- Led a NIH R01 grant project and mentored three graduate students.
- Established collaboration and financial support with Naval Medical Research Lab regarding encapsulation of vaccine adjuvants in dextran based polymeric nanoparticles.

National Institutes of Health 2001-2006
Pre-doctoral Research Fellow (Graduate Student)
Advisor: Prof. William Velander/Dr. Polly Matzinger

- Development of immunosensor for the detection of CD4⁺ T-cells.
- Studied mechanism of oral immunization.
- Investigated how CD4⁺ T-cells and dendritic cells communicate.
- Utilized microarray to analyze cellular communication.
- Interaction of immune system with biomaterials.

Michigan State University Department of Chemical Engineering 5/1998 – 8/1999
Undergraduate Researcher
Advisor: Prof. Kris Berglund

- Design of fermentors, cooling coils, and other supporting fermentor equipment.
- Operation and maintenance of distillation column.
- Proprietary study on biodegradable scale inhibitors using light scattering techniques.
- New biodegradable inhibitors were used in industrial type setting.

MSU Department of Food Science and Post Harvest Research 5/1994 – 8/1996
Undergraduate and High School Researcher
Advisors: Dr. Ian Gray & Dr. David Dilley

- Performed model system production of carcinogens in the process of cooking meats.

- Operated HPLC and GC to analyze extractions.
- Use of competent cells for the production of recombinant protein.
- Performed studies on ethylene receptor knockout transgenic tomato plants.

PUBLICATIONS

1. Alpan O, **Bachelder E**, Isil E, Arnheiter H, Matzinger P. Educated Dendritic Cells Act as Messengers from Memory to Naïve T helper Cells. *Nat Immunol* 2004 Jun;5(6):615-22.
2. **Bachelder EM**, Ainslie KM, Pishko MV. Quantifying CD4+ Cell Count with a Quartz Crystal Microbalance. *Sensor Letters* 3(4): Dec 2005 p 304-308.
3. Ainslie KM, **Bachelder EM**, Sharma G, Grimes CA and Pishko MV. Macrophage cell adhesion and inflammation cytokines on magnetostrictive nanowires, *Nanotoxicology*, 2007 1:4, 279.
4. Ainslie KM, **Bachelder EM**, Borkar S, Zahr AS, Sen A, Badding JV, Pishko MV. Cell adhesion on nanofibrous polytetrafluoroethylene (nPTFE). *Langmuir*. 2007 Jan 16;23(2):747-54.
5. Lee KS, Scanga CA, **Bachelder EM**, Chen Q, Snapper CM. TLR2 synergizes with both TLR4 and TLR9 for induction of the MyD88-dependent splenic cytokine and chemokine response to *Streptococcus pneumoniae*. *Cell Immunol*. 2007 Feb;245(2):103-10.
6. **Bachelder EM**, Paramonov SE, Beaudette TT, Standley SM, Lee CC, Dashe J, Fréchet JM. Fully acid-degradable biocompatible polyacetal microparticles for drug delivery. *Bioconjug Chem*. 2008 Apr;19(4):911-9.
7. **Bachelder EM**, Beaudette TT, Broaders KE, Dashe J, Fréchet JM. Acetal-Derivatized Dextran: An Acid-Responsive Biodegradable Material for Therapeutic Applications. *J Am Chem Soc*. 2008 Aug 13;130(32):10494-5.
8. **Bachelder EM**, Beaudette TT, Broaders KE, Paramonov SE, Dashe J, Fréchet JM. Acid-degradable polyurethane particles for protein-based vaccines: biological evaluation and in vitro analysis of particle degradation products. *Mol Pharmaceutics* 2008 Sep-Oct;5(5):876-84.
9. Cohen JA, Beaudette TT, Tseng WW, **Bachelder EM**, Mende I, Engleman EG, and Fréchet JM T-Cell Activation by Antigen-Loaded pH-Sensitive Hydrogel Particles in Vivo. *Bioconjug Chem*. 2009 Jan;20(1):111-9
10. Broaders KE, Cohen JA, Beaudette TT, **Bachelder EM**, and Fréchet JM Acetalated Dextran is a Chemically and Biologically Tunable Material for Particulate Immunotherapy. *PNAS*. 2009 Apr 7;106(14):5497-502
11. Beaudette TT, **Bachelder EM**, Cohen JA, Obermeyer AC, Broaders KE, and Fréchet JM In vivo studies on the effect of co-encapsulation of CpG DNA and antigen in acid-degradable microparticle vaccines. *Mol Pharm*. 2009 Jul-Aug;6(4):1160-9.
12. Beaudette TT, Cohen JA, **Bachelder EM**, Broaders KE, Cohen JL, Engleman EG, and Fréchet JM Chemoselective Ligation in the Functionalization of Polysaccharide-based Particles. *J Am Chem Soc*. 2009 Aug 5;131(30):10360-1.
13. Ainslie KM, Lowe RD, Beaudette TT, Petty L, **Bachelder EM**, Desai TA. Microfabricated devices for enhanced bioadhesive drug delivery: attachment to and small-molecule release through a cell monolayer under flow. *Small*. 2009 Dec;5(24):2857-63
14. **Bachelder EM**, Pesce JT, Albrecht MT, Cook CP, Mateczun A, Beaudette TT, Keane-Myers AM, and Fréchet JM, In vitro analysis of acetalated dextran microparticles as a potent delivery platform for vaccine adjuvants. *Mol Pharm*. 2010 Jun 7;7(3):826-35.
15. Cohen JA, Beaudette TT, Cohen JL, Broaders KE, **Bachelder EM**, Fréchet JM Acetal-Modified Dextran Microparticles with Controlled Degradation Kinetics and Surface Functionality for Gene Delivery in Phagocytic and Non-Phagocytic Cells. *Adv Mater*. 2010 Jun 1.
16. Kauffman KJ, Kanthamneni N, Meenach SA, Pierson BC, **Bachelder EM**, Ainslie KM Optimization of rapamycin-loaded acetalated dextran microparticles for immunosuppression. *Int J Pharm*. 2011 Oct 21
17. Meenach SA, Kim YJ, Kauffman KJ, Kanthamneni N, **Bachelder EM**, Ainslie KM. Synthesis, optimization, and characterization of camptothecin-loaded acetalated dextran porous microparticles for pulmonary delivery. *Mol Pharm*. 2012 Feb 6;9(2):290-8
18. Kanthamneni N, Sharma S, Meenach SA, Billet B, Zhao JC, **Bachelder EM**, Ainslie KM Enhanced stability of horseradish peroxidase encapsulated in acetalated dextran microparticles stored outside cold chain conditions. *Int J Pharm*. 2012 Jul 15;431(1-2):101-10.

19. Kauffman KJ, Do C, Sharma S, Gallovic MD, **Bachelder EM**, Ainslie KM Synthesis and characterization of acetalated dextran polymer and microparticles with ethanol as a degradation product. *ACS Appl Mater Interfaces*. 2012 Aug 22;4(8):4149-55.
20. Duong AD, Sharma S, Peine KJ, Gupta G, Satoskar AR, **Bachelder EM**, Wyslouzil BE, Ainslie KM Electrospray encapsulation of toll-like receptor agonist resiquimod in polymer microparticles for the treatment of visceral leishmaniasis. *Mol Pharm*. 2013 Mar 4;10(3):1045-55
21. Schully KL, Sharma S, Peine KJ, Pesce J, Elberson MA, Fonseca ME, Prouty AM, Bell MG, Borteh H, Gallovic M, **Bachelder EM**, Keane-Myers A, Ainslie KM Rapid vaccination using an acetalated dextran microparticulate subunit vaccine confers protection against triplicate challenge by bacillus anthracis. *Pharm Res*. 2013 May;30(5):1349-61.
22. Borteh HM, Gallovic MD, Sharma S, Peine KJ, Miao S, Brackman DJ, Gregg K, Xu Y, Guo X, Guan J, **Bachelder EM**, Ainslie KM. Electrospun Acetalated Dextran Scaffolds for Temporal Release of Therapeutics. *Langmuir*. 2013 May 31
23. Peine KJ, **Bachelder EM**, Vangundy Z, Papenfuss T, Brackman DJ, Gallovic MD, Schully K, Pesce J, Keane-Myers A, Ainslie KM. Efficient Delivery of the Toll-like Receptor Agonists Polyinosinic:Polycytidylic Acid and CpG to Macrophages by Acetalated Dextran Microparticles *Mol Pharm*. 2013 Aug 5;10(8):2849-57
24. Collier MA, Gallovic MD, Peine KJ, **Bachelder EM**, Gunn JS, Schlesinger LS, Ainslie KM. Delivery of host cell-directed therapeutics for intracellular pathogen clearance. *Expert Review Anti-infective Therapy*. In Press.
25. Peine KJ, Gupta G, Brackman DJ, Papenfuss T, Ainslie KM, Satoskar AR, **Bachelder EM**. Liposomal resiquimod for the treatment of against *Leishmania donovani* infection. *J Antimicrob Chemother*. 2013 Aug 16
26. Collier MA, Gallovic MD, Peine KJ, Duong AD, **Bachelder EM**, Gunn JS, Schlesinger LS, Ainslie KM. Delivery of host cell-directed therapeutics for intracellular pathogen clearance. *Expert Rev Anti Infect Ther*. 2013 Nov;11(11):1225-35.
27. Peine KJ, Guerau-de-Arellano M, Lee P, Kanthamneni N, Severin M, Probst GD, Peng H, Yang Y, Vangundy Z, Papenfuss TL, Lovett-Racke AE, **Bachelder EM**, Ainslie KM. Treatment of Experimental Autoimmune Encephalomyelitis by Codelivery of Disease Associated Peptide and Dexamethasone in Acetalated Dextran Microparticles. *Mol Pharm*. 2014 Feb 4.
28. Hoang KV, Borteh HM, Rajaram MV, Peine KJ, Curry H, Collier MA, Homsy ML, Bachelder EM, Gunn JS, Schlesinger LS, Ainslie KM. Acetalated dextran encapsulated AR-12 as a host-directed therapy to control *Salmonella* infection. *Int J Pharm*. 2014 Dec 30;477(1-2):334-43.
29. Gaurav Gupta, Kevin J. Peine, Dalia Abdelhamid, Heidi Snider, Andrew B. Shelton, Latha Rao, Sainath R. Kotha, Andrew C. Huntsman, Sanjay Varikuti, Steve Oghumu, C. Benjamin Naman, Li Pan, Narasimham L. Parinandi, Tracy L. Papenfuss, A. Douglas Kinghorn, **Eric M. Bachelder**, Kristy M. Ainslie, James R. Fuchs, and Abhay R. Satoskar A Novel Sterol Isolated from a Plant Used by Mayan Traditional Healers Is Effective in Treatment of Visceral Leishmaniasis Caused by *Leishmania donovani*. *ACS Infect. Dis.*, 2015, 1 (10), pp 497–506
30. Chen N, Peine KJ, **Bachelder EM**, Ainslie KM. Micro- and Nano-particulate Strategies for Antigen Specific Immune Tolerance to Treat Autoimmune Diseases. *Pharmaceutical Nanotechnology*, 2015 3(2): 85-100.
31. Schully KL, Bell MG, Prouty AM, Gallovic MD, Gautam S, Peine KJ, Sharma S, **Bachelder EM**, Pesce JT, Elberson MA, Ainslie KM, Keane-Myers A. Evaluation of a biodegradable microparticulate polymer as a carrier for *Burkholderia pseudomallei* subunit vaccines in a mouse model of melioidosis. *Int J Pharm*. 2015 Nov 30;495(2):849-61
32. Duong AD, Collier MA, **Bachelder EM**, Wyslouzil BE, Ainslie KM One Step Encapsulation of Small Molecule Drugs in Liposomes via Electrospray-Remote Loading. *Mol Pharm*. 2016 Jan 4;13(1):92-9.
33. Gallovic MD, Montjoy DG, Collier MA, Do C, Wyslouzil BE, **Bachelder EM**, Ainslie KM. Chemically modified inulin microparticles serving dual function as a protein antigen delivery vehicle and immunostimulatory adjuvant. *Biomater Sci*. 2016 Jan 11.
34. Collier MA, Peine KJ, Gautam S, Oghumu S, Varikuti S, Borteh H, Papenfuss TL, Satoskar AR, **Bachelder EM**, Ainslie KM. Host-mediated *Leishmania donovani* treatment using AR-12 encapsulated in acetalated dextran microparticles. *Int J Pharm*. 2016 Jan 5;499(1-2):186-194.
35. Hoang KV, Curry H, Collier MA, Borteh H, **Bachelder E**, Schlesinger LS, Gunn JS, Ainslie K Needle-free Delivery of Acetalated Dextran-Encapsulated AR-12 Protects Mice from *Francisella tularensis* Lethal Challenge. *Antimicrob Agents Chemother*. 2016 Jan 19.
36. Collier MA, Gallovic MD, **Bachelder EM**, Sykes CD, Kashuba A, Ainslie KM Saquinavir Loaded Acetalated Dextran Microconfetti - a Long Acting Protease Inhibitor Injectable. *Pharm Res*. 2016 Aug;33(8):1998-2009.

37. Chen N, Collier MA, Gallovic MD, Collins GC, Sanchez CC, Fernandes EQ, **Bachelder EM**, Ainslie KM. Degradation of acetalated dextran can be broadly tuned based on cyclic acetal coverage and molecular weight. *Int J Pharm.* 2016 Oct 15;512(1):147-57.
38. Gallovic MD, Schully KL, Bell MG, Elberson MA, Palmer JR, Darko CA, **Bachelder EM**, Wyslouzil BE, Keane-Myers AM, Ainslie KM. Acetalated Dextran Microparticulate Vaccine Formulated via Coaxial Electrospray Preserves Toxin Neutralization and Enhances Murine Survival Following Inhalational Bacillus Anthracis Exposure. *Adv Healthc Mater.* 2016 Oct;5(20):2617-2627.
39. **Bachelder EM**, Pino EN, Ainslie KM. Acetalated Dextran: A Tunable and Acid-Labile Biopolymer with Facile Synthesis and a Range of Applications. *Chem Rev.* 2016 Dec 29.
40. Chen N, Peine K, Collier M, Gautam S, Jablonski K, Guerau-de-Arellano M, Ainslie K, **Bachelder EM**. Co-Delivery of Disease Associated Peptide and Rapamycin via Acetalated Dextran Microparticles for Treatment of Multiple Sclerosis. *Advanced Biosystems.* 2017
41. Collier MA, **Bachelder EM**, Ainslie KM. Electrosprayed Myocet-like Liposomes: An Alternative to Traditional Liposome Production. *Pharm Res.* 2017 Feb;34(2):419-426
42. Webb LM, Amici SA, Jablonski KA, Savardekar H, Panfil AR, Li L, Zhou W, Peine K, Karkhanis V, **Bachelder EM**, Ainslie KM, Green PL, Li C, Baiocchi RA, Guerau-de-Arellano M. PRMT5-Selective Inhibitors Suppress Inflammatory T Cell Responses and Experimental Autoimmune Encephalomyelitis. *J Immunol.* 2017 Feb 15;198(4):1439-1451
43. Junkins RD, Gallovic MD, Johnson BM, Collier MA, Watkins-Schulz R, Cheng N, David CN, McGee CE, Sempowski GD, Shterev I, McKinnon K, **Bachelder EM**, Ainslie KM, Ting JP. A robust microparticle platform for a STING-targeted adjuvant that enhances both humoral and cellular immunity during vaccination. *J Control Release.* 2017 Nov 21;270:1-13.
44. Graham-Gurysh EG, Moore KM, Satterlee AB, Sheets KT, Lin FC, **Bachelder EM**, Miller CR, Hingtgen S, Ainslie KM. Sustained Delivery of Doxorubicin via Acetalated Dextran Scaffold Prevents Glioblastoma Recurrence after Surgical Resection. *Mol Pharm.* 2018 Jan 17
45. Chen N, Johnson MM, Collier MA, Gallovic MD, **Bachelder EM**, Ainslie KM. Tunable degradation of acetalated dextran microparticles enables controlled vaccine adjuvant and antigen delivery to modulate adaptive immune responses. *J Control Release.* 2018 Mar 10;273:147-159.
46. Chen N, Kroger CJ, Tisch RM, **Bachelder EM**, Ainslie KM. Prevention of Type 1 Diabetes with Acetalated Dextran Microparticles Containing Rapamycin and Pancreatic Peptide P31. *Adv Healthc Mater.* 2018 Sep;7(18):e1800341.
47. Batty CJ, Tiet P, **Bachelder EM**, Ainslie KM. Drug Delivery for Cancer Immunotherapy and Vaccines. *Pharm Nanotechnol.* 2018 Sep 18.
48. Chen N, Gallovic MD, Tiet P, Ting JP, Ainslie KM, **Bachelder EM**. Investigation of tunable acetalated dextran microparticle platform to optimize M2e-based influenza vaccine efficacy. *J Control Release.* 2018 Sep 24;289:114-124.
49. Collier MA, Junkins RD, Gallovic MD, Johnson BM, Johnson MM, Macintyre AN, Sempowski GD, **Bachelder EM**, Ting JP, Ainslie KM. Acetalated Dextran microparticles for co-delivery of STING and TLR7/8 agonists. *Mol Pharm.* 2018 Oct 3.
50. Johnson MM, Collier MA, Hoang KV, Pino EN, Graham-Gurysh EG, Gallovic MD, Zahid MSH, Chen N, Schlesinger L, Gunn JS, **Bachelder EM**, Ainslie KM. In Vivo and Cellular Trafficking of Acetalated Dextran Microparticles for Delivery of a Host-Directed Therapy for Salmonella enterica Serovar Typhi Infection. *Mol Pharm.* 2018 Oct 17.
51. Krovi SA, Gallovic MD, Keller AM, Bhat M, Tiet P, Chen N, Collier MA, Gurysh EG, Pino EN, Johnson MM, Shamim Hasan Zahid M, Cottrell ML, Pirone JR, Kashuba AD, Kwiek JJ, **Bachelder EM**, Ainslie KM. Injectable long-acting human immunodeficiency virus antiretroviral prodrugs with improved pharmacokinetic profiles. *Int J Pharm.* 2018 Oct 8;552(1-2):371-377.
52. Chen N, Gallovic MD, Tiet P, Ting JP, Ainslie KM, **Bachelder EM**. Investigation of tunable acetalated dextran microparticle platform to optimize M2e-based influenza vaccine efficacy. *J Control Release.* 2018 Sep 24;289:114-124
53. Cheng N, Watkins-Schulz R, Junkins RD, David CN, Johnson BM, Montgomery SA, Peine KJ, Darr DB, Yuan H, McKinnon KP, Liu Q, Miao L, Huang L, **Bachelder EM**, Ainslie KM, Ting JP. A nanoparticle-incorporated STING activator enhances antitumor immunity in PD-L1-insensitive models of triple-negative breast cancer. *JCI Insight.* 2018 Nov 15;3(22)

54. Watkins-Schulz R, Tiet P, Gallovic MD, Junkins RD, Batty C, **Bachelder EM**, Ainslie KM, Ting JPY A microparticle platform for STING-targeted immunotherapy enhances natural killer cell- and CD8+ T cell-mediated anti-tumor immunity. *Biomaterials*. 2019 Jun;205:94-105
55. Zahid MSH, Johnson MM, Tokarski RJ 2nd, Satoskar AR, Fuchs JR, **Bachelder EM**, Ainslie KM. Evaluation of synergy between host and pathogen-directed therapies against intracellular *Leishmania donovani*. *Int J Parasitol Drugs Drug Resist*. 2019 Aug;10:125-132.
56. Steipel RT, Gallovic MD, Batty CJ, **Bachelder EM**, Ainslie KM. Electrospray for generation of drug delivery and vaccine particles applied in vitro and in vivo. *Mater Sci Eng C Mater Biol Appl*. 2019 Dec
57. Gallovic MD, Junkins RD, McGee CE, Sandor AM, Sample CJ, Mason AK, Arwood LC, Sahm RA, **Bachelder EM**, Sempowski GD, Ainslie KM, Ting JPY. Delivery of STING agonist via polymeric microparticles improves seasonal influenza vaccine efficacy and durability in ferrets over standard adjuvants. *In preparation*.
58. Zahid MSH, Varma DM, Johnson MM, Landavazo A, **Bachelder EM**, Blough BE, Ainslie KM. In Vitro Resensitization of Resistant Intracellular *Salmonella enterica* Serovar Typhimurium to Traditional Antibiotics with AR-12. *In preparation*.
59. Genito CJ, Batty CJ, **Bachelder EM**, Ainslie KM. Considerations for size, surface charge, polymer degradation, co-delivery, and manufacturability in the development of polymeric particle vaccines for infectious diseases. *Advanced NanoBiomed Research*. Epub (*Invited*)
60. Batty CJ, Heise MT, **Bachelder EM**, Ainslie KM. Vaccine Formulations in Clinical Development for the Prevention of Severe Acute Respiratory Syndrome Coronavirus 2 Infection. *Adv Drug Deliv Rev*. 2020 Dec 11:S0169-409X(20)30277-5. (*Invited*)
61. Stiepel RT, Batty CJ, MacRaild CA, Norton RS, **Bachelder E**, Ainslie KM. Merozoite surface protein 2 adsorbed onto acetalated dextran microparticles for malaria vaccination. *Int J Pharm*. 2020 Dec 10;593:120168.
62. Moore KM, Batty CJ, Stiepel RT, Genito CJ, **Bachelder EM**, Ainslie KM. Injectable, Ribbon-Like Microconfetti Biopolymer Platform for Vaccine Applications. *ACS Appl Mater Interfaces*. 2020 Sep 2;12(35):38950-38961
63. Varma DM, Redding EA, **EM Bachelder**, Ainslie KM. Nano-and Microformulations to Advance Therapies for Visceral Leishmaniasis *ACS Biomaterials Science & Engineering*. 2020 Online Oct 16. (*Invited*)
64. Moore KM, Murthy AB, Graham-Gurysh EG, Hingtgen SD, **Bachelder EM**, Ainslie KM. Polymeric Biomaterial Scaffolds for Tumorcidal Stem Cell Glioblastoma Therapy. *ACS Biomaterials Science & Engineering*. 2020;6(7):3762-77.
65. Varma DM, Zahid MSH, **Bachelder EM**, Ainslie KM. Formulation of host-targeted therapeutics against bacterial infections. *Transl Res*. 2020 Mar 16:S1931-5244(20)30046-3.
66. Graham-Gurysh EG, Murthy AB, Moore KM, Hingtgen SD, **Bachelder EM**, Ainslie KM. Synergistic drug combinations for a precision medicine approach to interstitial glioblastoma therapy. *J Control Release*. 2020 Jul 10;323:282-292.
67. Graham-Gurysh EG, Moore K, Schorzman AN, Lee T, Zamboni WC, Hingtgen S, **Bachelder EM**, Ainslie KM. Tumor Responsive and Tunable Polymeric Platform for Optimized Delivery of Paclitaxel to Treat Glioblastoma. *ACS Appl Mater Interfaces*. 2020 Apr 6.
68. Iweala OI, Choudhary SK, Addison CT, Batty CJ, Kapita CM, Amelio C, Schuyler AJ, Deng S, **Bachelder EM**, Ainslie KM, Savage PB, Brennan PJ, Commins SP. Glycolipid-mediated basophil activation in alpha-gal allergy. *J Allergy Clin Immunol*. 2020 Feb 20:S0091-6749(20)30258-X.
69. Moore KM, Graham-Gurysh EG, Bomba HN, Murthy AB, **Bachelder EM**, Hingtgen SD, Ainslie KM. Impact of composite scaffold degradation rate on neural stem cell persistence in the glioblastoma surgical resection cavity. *Submitted Materials Science & Engineering C*. 2020 Jun;111:110846.
70. Genito CJ, Batty CJ, **Bachelder EM**, Ainslie KM. Considerations for size, surface charge, polymer degradation, co-delivery, and manufacturability in the development of polymeric particle vaccines for infectious diseases. *Advanced NanoBiomed Research*. 2021,1 p. 2000041 (*invited*).
71. Johnson BM, Uchimura T, Gallovic MD, Thamilarasan M, Chou WC, Gibson SA, Deng M, Tam JW, Batty CJ, Williams J, Matsushima GK, **Bachelder EM**, Ainslie KM, Markovic-Plese S, Ting JP. STING Agonist Mitigates Experimental Autoimmune Encephalomyelitis by Stimulating Type I IFN-Dependent and Independent Immune Regulatory Pathways. *J Immunol*. 2021 May 1;206(9):2015-2028.
72. Batty CJ, **Bachelder EM**, Ainslie KM. Historical Perspective of Clinical Nano and Microparticle Formulations for Delivery of Therapeutics. *Trends Mol Med*. 2021 Apr 23;S1471-4914(21)00097-6.

73. Zahid MSH, Varma DM, Johnson MM, Landavazo A, **Bachelder EM**, Blough BE, Ainslie KM. In Vitro Re-sensitization of Resistant Intracellular Salmonella enterica Serovar Typhimurium to Traditional Antibiotics with AR-12. FEMS Microbiol Lett. 2021 Jun 16;368(11):fnab062.
74. Genito CJ, Eckshtain-Levi M, Piedra-Quintero ZL, Krovi SA, Kroboth A, Stiepel RT, Guerau-de-Arellano M, **Bachelder EM**, Ainslie KM. Dexamethasone and Fumaric Acid Ester Conjugate Synergistically Inhibits Inflammation and NF- κ B in Macrophages. Bioconj Chem. 2021 Jun 24.
75. Pena ES, Graham-Gurysh EG, **Bachelder EM**, Ainslie KM. Design of Biopolymer-Based Interstitial Therapies for the Treatment of Glioblastoma. International Journal of Molecular Sciences. 2021; 22(23):13160. (Invited)

NON-PEER REVIEWED ARTICLES

1. Pena ES, Bachelder EB, Ainslie KM. Acetalated Dextran for Enhanced Delivery of Subunit Vaccines. In: Patravale VB, editor. Nineteenth International e-Symposium: Advances in Technology & Business Potential of New Drug Delivery Systems; February; Online: Controlled Release Society Indian Chapter 2021.

BOOK CHAPTERS

1. Graham-Gurysh EG, Carpenter BW, Beck WA, Varma DM, Vincent BG, Bachelder EM, Ainslie KM. Delivery Strategies for Cancer Vaccines and Immunoadjuvants. In: Mansoor Amiji M, editor. Delivery Strategies in Immuno-Oncology: Elsevier; 2021
2. Peine KJ, Chen N, **Bachelder EM**, Ainslie KM. Drug Delivery Strategies for Tolerogenic Therapy For Autoimmune Diseases in an Antigen Specific Manner. In: Keservani R, editor. Recent Advances in Drug Delivery Technology. Hershey, PA: IGI Global; 2017.
3. Gallovic MD, **Bachelder EM**, Ainslie KM. Immunostimulatory Inulin Adjuvants in Prophylactic Vaccines Against Pathogens. In: Davis CR, editor. Inulin: Chemical Properties, Uses and Health Benefits: Nova Science Publishers; 2017.
4. Naihan Chen, Kevin J. Peine, **Eric M. Bachelder** and Kristy M Ainslie. Micro- and Nano-particulate Strategies for Antigen Specific Immune Tolerance to Treat Autoimmune Diseases. Pharmaceutical Nanotechnology, 3(2): 85-100. 2016

SERVICE TO COMPANIES

2012 - 2014 Scientific Advisory Board Member, Peptineo, Albuquerque, NM
 2017 Co-Founder IMMvention Therapeutix, Durham, NC
 2017 - 2020 Scientific Advisory Board Member, IMMvention Therapeutix, Durham, NC
 2017-2020 Board of Directors, IMMvention Therapeutix, Durham, NC

PATENTS

1. Jean M.J. Frechet, **Eric M. Bachelder**, Tristan T. Beaudette, Kyle E. Broaders “Acid-Degradable and Bioerodible Modified Polyhydroxylated Materials” Priority date 2006-03-24WO2010005847
2. **Eric M. Bachelder**, James R. Fuchs, Angelica P. Isaac-Marquez, Alan Douglas Kinghorn, Claudio M. Lezama-Davila, Li Pan, Abhay R. Satoskar, “Antileishmanial compositions and methods.” WO2012145734 A1. Priority date 2011-04-22
3. Larry Schlesinger, **Eric Bachelder**, Fred Cope “Compositions for targeting macrophages and other CD206 high expressing cells and methods of treating and diagnosis.” Priority date 2014-07-17 US20170209584A1
4. Kristy Ainslie, **Eric Bachelder**, Shalini Gautam, Kevin Peine, Abhay Satoskar “Compositions and methods for inhibiting leishmania.” Priority date 2014-10-30 US20160120844A1
5. Larry Schlesinger, **Eric Bachelder**, Fred Cope, “Compounds and compositions for targeting macrophages and other mannose-binding c-type lectin receptor high expressing cells and methods of treating and diagnosis using same.” Pub. Date: Jul. 20, 2017 WO2016011415A2
6. Ting JPY, Junkins R, Johnson B, Ainslie KM, **Bachelder EM**, Gallovic MD, Collier MA, Cheng N. Methods and Compositions for Inducing An Immune Response. Application Number: US11052149B2. 2021-07-06.

TEACHING

Autumn 2010

- The Ohio State University, Biomedical Science. Special Topics in Biomedical Science: Immunology And Infectious Disease 581. 2 credit hours (1 class)

Every Autumn 2010-2014.

- The Ohio State University, Pharmacy. Drug Transport Q:804/S:8040. 3 credit hours (2 classes)
- The Ohio State University, Pharmacy. Introduction to Clinical Immunology Q:710/S:7100. 2 credit hours (2 classes)

Every Winter quarter/Spring semester 2010-2014.

- The Ohio State University, Pharmacy. Drug Delivery II Q:622/S:6220. 3 credit hours (2 classes)
- The Ohio State University, Microbiology. Immunology Q:522/S:5220. 3 credit hours (1 class)

SERVICE TO PROFESSIONAL PUBLICATIONS

Journal Reviewer: Nature Materials, JACS, Biomacromolecules. Molecular Pharmaceutics, Journal of Controlled Release, International Journal of Pharmaceutics, Pharmaceutical Research

AWARDS

Fellowship Award for Research Excellence (FARE)

2004 & 2005

- Awarded to best research performed on the NIH campuses.
- Traditionally given to postdoctoral candidates.
- Selected from over 1,000 candidates.
- Only thirty candidates have won two years in a row.

Pre-doctoral Fellow - Intramural Research Training Award (IRTA)

2001 - 2006

- Fellowship provides funding for graduate research done at the NIH.

Michigan State University College of Engineering Graduation Commencement Speaker

1999

PRESENTATIONS

Invited Intramural

1. **Bachelder EM**, Presenter. 2009. Acid-Labile Biomaterials for Immunotherapeutic Applications. to Pharmaceutics Division. OSU. Columbus, OH. (November 8)
2. **Bachelder EM**, Seminar Presenter. 2009. Novel Polymeric Carriers for Immune Modulation. to Whitticare/Racke/Lovett-Racke Neuroimmunology Lab Meeting. OSU. Columbus, OH. (December 6)
3. **Bachelder EM**, Seminar Presenter. 2010. Acid-Labile Biomaterials for Immunotherapeutic Applications. to Chemistry. OSU. Columbus, OH. (February 4)
4. **Bachelder EM**, Seminar Presenter. 2010. Acid-Labile Biomaterials for Immunotherapeutic Applications. to CMIB Work in Progress. OSU. Columbus, OH. (April 5)
5. **Bachelder EM**, Seminar Presenter. 2011. Novel Polymeric Carriers for Immune Modulation. to Hadley Group Meeting. OSU. Columbus, OH. (January 6)
6. **Bachelder EM**, Presenter. 2011. Novel Polymeric Carriers for Immune Modulation. to Immunology Roundtable. OSU. Columbus, OH. (April 27)

Extramural

1. **Bachelder EM**, Acetalated Dextran: A spoonful of sugar helps the medicine (and vaccines) go down!, Howard University, 2021.
2. **Bachelder EM**, Formulation of a Universal Flu Vaccine. Pharmalliance. Monash University, Melbourne AUS 2019.
3. **Bachelder EM**, Invited Seminar. (2015) "Natural product treatment for visceral *Leishmaniasis*" DOD Military Health System Research Symposium
4. **Bachelder EM**, Invited Seminar. (2013) "Acetalated Dextran: Vaccination methods for immunotolerance" Novartis, Boston, MA.
5. **Bachelder EM**, Invited Seminar. (2013) "Acetalated dextran particles for the treatment of Multiple Sclerosis." JDRF FOCIS, Boston, MA.
6. **Bachelder EM**, Poster Presenter. 2013 "Acetalated dextran particles for the treatment of Multiple Sclerosis." FOCIS, Boston, MA.
7. **Bachelder EM**, Poster Presenter. 2013 "Acetalated dextran particles for the treatment of Multiple Sclerosis." FOCIS, Boston, MA.

8. Schully K, Sharma S, Pesce JT, **Bachelder EM**, Keane-Myers A, Ainslie KM. Poster Presenter. 2011 “Encapsulated Francisella novicida Lysate Confers Protection From High Dose Challenge in BALB/c Mice.” Chemical and Biological Defense Science and Technology Conference, Las Vegas NV.
9. **Bachelder EM**, Poster Presenter. 2011. Novel Polymeric System for Rapid Vaccination Novel Polymeric System for Rapid Vaccination. Presented at Gordon Research Conference: Chemical & Biological Terrorism Defense. Ventura Beach Marriott. Ventura, CA. (February 20 - 25) [Peer Reviewed]
10. **Bachelder EM**, Invited Seminar. (2009) “Acetal-Derivatized Dextran: An Acid-Responsive Biodegradable Material for Therapeutic Applications.” Cleveland Clinic, Department of Biomedical Engineering.
11. **Bachelder EM**, Invited Seminar. (2009) “Acetal-Derivatized Dextran: An Acid-Responsive Biodegradable Material for Therapeutic Applications.” University of Akron, Department of Chemical Engineering.
12. **Bachelder EM**, Invited Seminar. (2009) “Acetal-Derivatized Dextran: An Acid-Responsive Biodegradable Material for Therapeutic Applications.” University of Cincinnati, Division of Pharmaceutics.
13. **Bachelder EM**, Invited Seminar. (2009) “Acetal-Derivatized Dextran: An Acid-Responsive Biodegradable Material for Therapeutic Applications.” University of Wisconsin, Division of Pharmaceutics.
14. **Bachelder EM**, Beaudette TT, Broaders KE, Dashe J, Fréchet JM. (2008) “Acetal-Derivatized Dextran: An Acid-Responsive Biodegradable Material for Therapeutic Applications.” American Institute of Chemical Engineers National Meeting, Philadelphia, Pennsylvania.
15. **Bachelder EM**, Ainslie KM, Pishko MV. (2004) “Quartz Crystal Microbalance used for counting CD4+ T cells” American Institute of Chemical Engineers National Meeting, Austin, TX.
16. **Bachelder EM**, Matzinger P, Velander W. (2004) “Oral Delivery FIX” American Institute of Chemical Engineers National Meeting, Austin, TX.

EMPLOYMENT HISTORY (non-research employment)

Virginia Polytechnic and State University

5/2001 – 8/2001

Teaching Assistant

Instructor: Preston Durill

- Instructor for Unit Operations course.
- Designed projects for students to learn and understand core engineering operations.
- Graded and evaluated student write-ups and presentations.

Virginia Polytechnic and State University

8/2000 – 5/2001

Teaching Assistant

Instructor: Prof. William Velander

- Taught four lectures focused on fundamental mass transfer topics.
- Developed and taught curriculum for a lecture based on components of mass transfer.
- Graded quizzes and examinations.

HalsoSalt™

1999 – 2000

Engineer

- Product Processing and Development.
- Sales and Customer Relations.

Pharmacia & Upjohn (Pfizer)

5/1997 – 12/1997

Professional Intern Quality Control Laboratory

- Analyzed potency and purity of steroid and specialty chemicals by HPLC.
- Familiar with GMP and FDA regulations along with various compendial assays for Active Pharmaceutical Ingredients.
- Evaluated compendial method changes as well as initiated improvements with established methods.
- Exposure to pharmaceutical production.

GRADUATE COMMITTEE

Current: Mairead Heavy, Natalie Jasiewicz, Cole Batty, Rebeca Stiepel, Erik Pena, Dylan Hendy, Ryan Woodring, Nicole Lukush.

Previous: Sara Musetti, Chris Genito, Katherine Moore, Naihan Chen, Michael Collier, Kevin Peine.

GRANTS

NIH (Ainslie) 7/1/2018-6/30/2023 \$1,891,998
R01AI137525-01A1

Biomaterials to study tolerance immune induction kinetics

Antigen specific treatment of autoimmune diseases, like multiple sclerosis, relies on the communication between dendritic cells and T cells. To understand this and the role of nanoparticles in enhancing the immune synapse, we aim to apply acetalated dextran nanoparticles that have been previously shown to reduce clinical score in a mouse model of multiple sclerosis. We will use the unique degradation rates of acetalated dextran to understand the kinetics of dendritic and T cell interactions as it relates to tolerance.

NIH (Ainslie) 4/22/2016 – 3/31/2022 \$5,961,014
5R01AI125147-02

Host Targeted Therapy for Drug Resistant Salmonella and Francisella infection

We propose the optimization of a host targeted therapeutic for the treatment of infection due to drug resistant bacteria. We will alter the chemical structure and formulate the drug to increase the efficacy of the compound. We will perform experiments that will help enable IND FDA filing of the proposed therapy.

NIH (Hingtgen) 6/1/2016 – 5/31/2022 \$1,628,896
5R01NS097507-02

Nanofiber matrices to improve neural stem cell-mediated cancer therapy

This proposal seeks to define the design cues that are essential for polymeric scaffolds to improve tNSC therapy, and determine the efficacy of novel polymeric scaffolds capable of maximizing cytotoxic tNSC treatment of surgically resected GBM.

University of Georgia/NIH (Ainslie) 9/16/2019 - 8/31/2026 \$1,687,861
Contract No. 75N93019C00052

Center for Influenza Vaccine Research in High Risk Populations (CIVICs)

Our proposed research plan will converge human vaccine assessment with currently commercial vaccines in populations that are under-represented in many vaccine trials and compared results in match animal models to assess the effectiveness of universal vaccine formulations developed in the CIVR-HRP. These data sets will be analyzed and statistical models will be produced to make intelligent predictions for success of our universal vaccine candidates in people.

NIH (Ainslie) 01/14/2020 - 1/13/2025 \$2,919,766
1R01AI147497-01A1

Optimizing a Universal Influenza Subunit Nano/Microparticulate Vaccine

Here we propose an improved influenza vaccine that can act more broadly to prevent infection from viruses that have undergone natural genetic changes that prevent current flu vaccines from being efficacious. Our goal is to formulate computer generated influenza antigens (COBRA antigens) into degradable biopolymeric (Ac-DEX) nanoparticles to improve the vaccine's efficacy by co-delivering immune activating adjuvants.

NIH (Ting/Bachelder) 12/14/2018 – 11/30/2023 \$6,054,843
R01AI141333-01

Micro-Particle Delivery of a Potent Intracellular Adjuvant for a Universal Flu Vaccine

This proposal plans to use a unique microparticle formulation to deliver adjuvants comprised of pathogen-associated molecules to activate the immune system. We propose that such an activated immune system will aid in vaccine responses to emerging viruses of urgent health impact.

NIH (Ainslie) 7/1/2021 – 6/30/2025 \$1,526,836
1R01DK130225-01

Formulation to Generate Tolerance Towards Type 1 Diabetes

Antigen specific tolerance towards type-1 (insulin dependent) diabetes can provide a long-term cure for the disease without the need for administration of exogenous insulin. We propose the use of microparticles to reprogram the immune system's response against the islet cells by creating antigen specific tolerance to mitigate the harmful autoimmune response

NIH (Ainslie) 8/1/2021 – 7/31/2026 \$1,797,170
1R01CA257009-01A1

CV – Eric M. Bachelder

Tunable Temporal Drug Release for Optimized Synergistic Combination Therapy of Glioblastoma Glioblastoma is a devastating brain cancer that needs new treatment options because even with chemotherapy, radiation, and surgical resection, tumor recurrence almost always leads to death. Here we propose synergistic combination therapy that relies on optimized elution of chemotherapeutics from a nanofibrous controlled-release scaffold placed in the brain at time of surgery to remove the tumor.

Completed

Grant # (PI: Ainslie) 01/01/2019 - 7/31/2019 \$125,187

Duke University / NIH

Adjuvant Discovery Program

NIH (Bachelder) 07/16-06/18 \$275,000

“U19 Supplement: Novel Nanoparticle Platform for the Delivery of Vaccines”

This is work for developing an influenza vaccine.

NIH (Ainslie) 04/16-03/18 \$423,739

“Microparticle resiquimod for the treatment of visceral leishmaniasis”

This is work to treat visceral leishmaniasis with resiquimod.

NIH (Ainslie) 07/12-06/17 0.6 calendar \$928,000

“Celecoxib Derivative: Host Cell-Directed Inhibitors of Intracellular Pathogens”

The goal of this project is to develop a treatment against bioterrorism agents using the Celecoxib Derivative, AR-12.

DOD (Satoskar) 09/14-09/17 0.42 calendar \$848,354

Formulation of lead compounds at 10, 15 and 20% from the PEN and DNER analogue library into white soft paraffin with 10% urea to treat CL ipan a mouse model, for in vivo testing at OSU.

OSU PHPID (Ibba) 10/13-9/15 \$50,000

“A Systems Biology Approach to Drug Target Discovery for Leishmaniasis”

JDRF (Bachelder) 09/12-08/15 3.0 calendar \$395,454

NIH

“Tolerogenic Nanoparticle Vaccine for the Treatment of Type 1 Diabetes”

The goal of this project is to treat Type 1 Diabetes using microparticles encapsulating rapamycin.

NIH (Popovich) 09/12-08/14 0.6 calendar \$275,000

R21

“miRNA Regulation of Macrophages after Spinal Cord Injury.”

The specific aim that our lab will be working on is the targeting of macrophages with nanoparticles in the spinal cord.

NIH (Papenfuss) 7/12-6/14 1.2mos \$275,000

NIH/NIAID

“Regulatory myeloid cells in inflammatory disease: Therapy and targeted generation with micro particles”

1R21NS072813-01A1 (Ainslie) 7/11-6/14 3.6 calendar \$275,000

NIH/NINDS

“Encapsulated active vitamin D vaccine for the treatment of multiple sclerosis.”

The major goal of this project is to develop a vaccine to treat multiple sclerosis using microparticles encapsulating vitamin D.

DTRA (Ainslie) 9/12-07/14 0.6 calendar \$3,426,677

DTRA/DOD

“Development of needle-free, multi-formulation nanoparticle vaccine.”

The major goal of this project is to develop a needle free vaccine for bioterrorism agents.

Arno (Schlesinger)	7/13-9/14	\$200,000
“Evaluation and encapsulation of AR-12 compound”		
Arno Therapeutics (Bachelder)	10/13-9/14	\$7,500
“AR-12 for the treatment of visceral leishmaniasis”		
BAA-09-43 (Ainslie)	9/10-9/12	0.6 calendar
DOD/DARPA	\$1,176,660	
“Universal vaccine microparticulate carrier that encapsulates immune modifiers and antigens in a novel polymeric matrix to passively target dendritic cells.”		
Defense Threat Reduction Agency Site PI (Bachelder)	9/09-9/10	6 mos
“Stimulation of broad spectrum protection via TLR 7,8&9”		\$96,959
R01GM066115 (Cook)	07/11-06/13	1.2 calendar
NIH	\$1,250,000	
“Bacterial sepsis and Reactivation of Latent Cytomegalovirus”		
The specific aim that I will be working on in this project is the encapsulation of a peptide that is associated with cytomegalovirus for vaccine applications.		

PENDING

1R01DK130225-01	(PI: Ainslie)	7/1/2021 – 6/30/2026
NIH	\$ 1,911,798 (\$250,000 Yr 1 direct)	

Formulation to Generate Tolerance Towards Type 1 Diabetes

Antigen specific tolerance towards type-1 (insulin dependent) diabetes can provide a long-term cure for the disease without the need for administration of exogenous insulin. We propose the use of microparticles to reprogram the immune system’s response against the islet cells by creating antigen specific tolerance to mitigate the harmful autoimmune response.

GRANT13253090	(PI: Ainslie)	7/1/2021 – 6/30/2026
NIH	\$ 3,074,260 (\$400,000 Yr1 direct)	

Vaccine for safe and efficacious protection against SARS-CoV-2

Infection from SARS-CoV-2 has affected the world like no other virus in recent history. Safe and effective vaccines that promote specific immune responses are needed to best prevent infection, particularly in the elderly. We propose a particulate based vaccine that more aptly delivers immune stimulating adjuvant and SARS-CoV- 2 antigen for generation of robust protection against COVID-19.

1R01CA257009-01A1	(PI: Ainslie)	7/1/2021 – 6/30/2026
NIH	\$ 1,925,265 (\$257,516 Yr 1 direct)	

Tunable Temporal Drug Release for Optimized Synergistic Combination Therapy of Glioblastoma

Glioblastoma is a devastating brain cancer that needs new treatment options because even with chemotherapy, radiation, and surgical resection, tumor recurrence almost always leads to death. Here we propose synergistic combination therapy that relies on optimized elution of chemotherapeutics from a nanofibrous controlled-release scaffold placed in the brain at time of surgery to remove the tumor.