Joseph Kreitz

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Google Scholar

EDUCATION

Massachusetts Institute of Technology, *Cambridge, MA* 2018-2025

- PhD in Biological Engineering (graduate date: March 15, 2025)
- Topic: Engineering bacterial protein injection systems for therapeutic delivery

Duke University, *Durham, NC* 2014-2018

- B.S., Biology, High Distinction, *cum laude*
- Topic: Rational design of phage cocktails to enhance antimicrobial efficacy

RESEARCH EXPERIENCE

Postdoctoral Fellow (Advisors: Prof. Min Dong and Prof. George Church) 2025-Present
Boston Children's Hospital & Harvard Medical School

Graduate Research Assistant (Advisor: Prof. Feng Zhang) 2019-2025
Broad Institute of MIT and Harvard

- Developed a therapeutic delivery technology based on engineered bacterial contractile injection systems (CISs)

Rotation Student (Advisor: Prof. Timothy Lu) 2018-2019
Department of Biological Engineering, MIT

- Helped to develop a method for retargeting phages against novel bacterial hosts

NSF REU Fellow (Advisor: Prof. Ryland Young) 2016
Center for Phage Technology, Texas A&M University

- Isolated 5 phages for a national project to treat a patient with bacteremia

Undergraduate Research Assistant (Advisor: Prof. Lingchong You) 2015-2018
Department of Biomedical Engineering, Duke University

- Developed a method for optimizing phage cocktails based on phage synergy

PUBLICATIONS & PATENTS

1. **Kreitz, J.**, Yang, V., Lash, B., Friedrich, M.J., Pham, J., Macrae, R.K., Zhang, F. (2025). Targeted delivery of diverse biomolecules with engineered bacterial nanosyringes. *Nature Biotechnology*.
2. **Kreitz, J.**, Friedrich, M.J., Guru, A., Lash, B., Saito, M., Macrae, R.K., Zhang, F. (2023) Programmable protein delivery with a bacterial contractile injection system. *Nature* 616, 357–364.
   - *Nature* News & Views, *Nature* Podcast, *Scientific American*, *Freethink*, *GEN*
3. Zhang, F., **Kreitz, J**. Cell-type-specific targeting contractile injection system. Patent no. WO/2023/158486 (2023).
4. **Kreitz, J**., You, L. Interaction network optimization improves the antimicrobial efficacy of phage cocktails. Duke University, Thesis for Degree in Biology (2018).

AWARDS & HONORS

2020 Yang-Tan Graduate Fellowship, *Massachusetts Institute of Technology*
2018 Presidential Graduate Fellowship, *Massachusetts Institute of Technology*
2018 Graduation with High Distinction, *Duke University* (top 10% of undergraduate theses)
2017 Finalist, Best Poster Award, *NC ASM Annual Meeting* (top 5 posters of 70)
2017 Dean's Summer Research Fellowship, *Duke University*
2016 NSF REU Fellowship in Biochemistry, *Texas A&M University*
2015 Howard Hughes Research Fellowship, *HHMI/Duke University*
2014 National AP Scholar, *The College Board*
2013 Eagle Scout, *Boy Scouts of America*
2013 General Member, *Mensa*

SELECTED PRESENTATIONS

2023 "Programmable protein delivery with a bacterial contractile injection system". *Genome Engineering Symposium*, Harvard Medical School, Boston, MA. (Invited Talk)
2023 "Programmable protein delivery with a bacterial contractile injection system". *Broad Institute Retreat*, Boston, MA. (Invited Talk)
2023 "Programmable therapeutic delivery with a bacterial nano-syringe." *KCA Novel Technologies Symposium*, Sydney, Australia. (Invited Keynote Talk)
2023 "Programmable protein delivery with a bacterial injection system." *Mammalian Synthetic Biology Workshop (mSBW)*, San Jose, CA. (Talk)
2022 "Protein delivery with a bacterial contractile injection system". *Yang-Tan Centers Retreat*, Cambridge, MA. (Talk)
2022 "Protein delivery with a bacterial contractile injection system". *MIT Biochemistry and Toxicology Seminar*, Cambridge, MA. (Talk)
2018 "Interaction network optimization improves the antimicrobial efficacy of phage cocktails." *ACC Meeting of the Minds*, Boston, MA. (Poster)
2017 "Interaction network optimization improves the antimicrobial efficacy of phage cocktails." *NC ASM Annual Meeting*, Raleigh, NC. (Poster)
2016 "Hunting for phage against pandrug-resistant *Acinetobacter baumannii* clinical isolates." *Biochemistry REU Research Symposium*, College Station, TX (Talk)
2015 "Characterization of bacterial conjugation *in vivo* using *C. elegans*." *Howard Hughes Research Fellowship Symposium*, Durham, NC. (Poster)
2015 "Detecting Antibiotic Resistance with dCas9." *iGEM regional conference*, College Park, MD. (Talk).

TEACHING EXPERIENCE & OUTREACH

2023-2024 Research mentor for an undergraduate student in the Zhang laboratory
2023 Featured speaker, Biotech Engineering Exploration Challenge for High schools
- Led a discussion for an initiative aimed at informing Boston-area high schoolers about local work in biotechnology

2019-2020 Teaching assistant, *20.109 Laboratory Fundamentals in Biological Engineering*, MIT
- Taught undergraduates laboratory techniques in molecular biology