

Tal Danino

Curriculum Vitae

Associate Professor
Department of Biomedical Engineering
Columbia University
550 W. 120th St, New York, NY 10027
Phone: (212) 853-0787
Email: td2506@columbia.edu
Web: <http://daninolab.nyc>

EDUCATION

- Ph.D., Bioengineering, University of California, San Diego (2011)
- B.S., Physics, University of California, Los Angeles (2005)
- B.S., Mathematics, University of California, Los Angeles (2005)
- B.S., Chemistry, University of California, Los Angeles (2005)

POSITIONS

- Associate Professor (tenure-track), Department of Biomedical Engineering, Columbia University, 2020 - present
- Assistant Professor, Department of Biomedical Engineering, Columbia University, 2016 - 2020
- Member, Herbert Irving Comprehensive Cancer Center, Columbia University, 2016 - present
- Member, Data Science Institute, Columbia University, 2016 - present
- Postdoctoral Fellow, Koch Institute for Integrative Cancer Research, Massachusetts Institute of Technology, Dr. Sangeeta N. Bhatia, 2011-2015
- Ph.D student, Department of Bioengineering, University of California-San Diego, Dr. Jeff Hasty, 2005-2011

HONORS AND AWARDS

- 2020 Cancer Research Institute (CRI) Lloyd J. Old Scientist's Taking Risks (STAR) Award
- 2020 Pershing Square Sohn Prize for Young Investigators in Cancer Research
- 2019 NSF CAREER Award
- 2018 ALCF Young Innovators Team Awards (YITA)
- 2017 Breast Cancer Research Foundation-AACR Career Development Award
- 2017 Department of Defense Era of Hope Breast Cancer Scholar Award
- 2015 NIH Pathway to Independence Award (K99/R00)
- 2015 TED Fellow
- 2014 New England Biolabs Passion in Science Award
- 2012 NIH Ruth L. Kirschstein National Research Service Award (NRSA)
- 2011 Misrock Postdoctoral Fellowship
- 2006 Department of Energy Computational Science Graduate Fellowship (DoE CSGF)
- 2002 Arthur Beckman Undergraduate Research Scholar
- 2001 California Governor's Math and Science Scholar

PUBLICATIONS

40. Savage, T, Vincent, R., Hanrahan, S., Huang, L., Ahn, A., Pu, K., Li, F., Coker, C., Danino, T., Arpaia, N. Rational engineering of bacteria to recruit and orchestrate anti-tumor immunity. *Nature Medicine* submitted (2022)
39. Deb, D., Wu, Y., Coker, C., Harimoto, T., Huang, R., Danino, T.* Design of combination therapy for engineered bacterial therapeutics in non-small cell lung cancer. *Nature Communications*, Submitted (2022)
38. Doshi, A., Shaw, M., Tonea, R., Moon, S., Joshi, A., Laine, A., Guo, J., Danino, T. Engineered bacterial swarm patterns as spatial records of environmental inputs. *bioRxiv* 477106 (2022)
37. Harimoto, T.[‡], Hahn, J.[‡], Chen, Y., Im, J., Zhang, J., Hou, N., Coker, C., Gray, K., Harr, N., Chowdhury, S., Pu, K., Nimura, C., Arapaia, N., Leong, K.* , Danino, T.* A programmable encapsulation system improves delivery of therapeutic bacteria in mice. *Nature Biotechnology* 40:1259–1269 (2022)
36. Harimoto, T., Deb, D., Danino, T.* A rapid screening platform to coculture bacteria within tumor spheroids. *Nature Protocols* (2022) doi.org/10.1038/s41596-022-00723-5
35. Redenti, A., Hahn, J., Danino, T.* Bacterial couriers as cancer vaccines. *Nature Biomedical Engineering News and Views* 6, 3–5 (2022)
34. Doshi, A., Shaw, M., Tonea, R., Moon, S., Joshi, A., Laine, A., Guo, J.*, Danino, T.* A deep learning pipeline for segmentation of *Proteus mirabilis* colony patterns. *bioRxiv* 475672 (2022)
33. Deb, D., Shoreibah, S., Danino, T.* Reimagining cancer research with art. Danino, T.* Re-imagining cancer research through Art. *Nature Reviews Cancer* 22(4), 191 (2022)
32. Vincent, R.[‡], Danino, T.* CAR-T cells SEAK help from enzymes. *Nature Chemical Biology News and Views* 18(1); 1-2 (2021)
31. Vincent, R.[‡], Gurbatri, C.[‡], Redenti, A., Coker, C., Savage, T., Arpaia, N., Danino, T.* Probiotic-guided CAR-T cells for universal solid tumor targeting. *bioRxiv* 463366 (2021)
30. Zhu, N.[‡], Liu, C.[‡], Singer, Z., Danino, T., Laine, A., Guo, J. Segmentation with residual attention U-Net and an edge-enhancement approach preserves cell shape features. *arXiv* 2001.05548 (2020)
29. Kobayashi, H., Gieniec, K.A., Lannagan, T.R.M, Wang, T., Asai, N., Mizutani, Y., Iida, T., Ando, R., Thomas, E.M., Sakai, A., Suzuki, N., Ichinose, M., Wright, J.A., Vrbanac, L., Ng, J.Q., Goynes, J., Radford, G., Lawrence, M.J., Sasmour, T., Hayakawa, Y., Klebe, S., Shin, A.E., Asfaha, S., Bettington, M.L., Rieder, F.L., Arapaia, N., *, Danino, T.* , Butler, L.M., Burt, A.D., Leedham, S.J., Rustgi, A.K., Mukherjee, S., Takahashi, M., Wang, T.C., Enomoto, A., Woods, S.L., Worthley, D.L., The origin and contribution of cancer-associated fibroblasts in colorectal carcinogenesis. *Gastroenterology* 161:6 (2021)
28. Chien, T.[‡], Harimoto, T.[‡], Kepecs, B., Gray, K., Coker, C., Pu, K., Azad, T., Danino, T.* Enhancing the tropism of bacteria via genetically programmed biosensors. *Nature Biomedical Engineering* 6: 94-104 (2021)
27. Singer, Z., Ambrose, P., Danino, T.* , Rice, CM.* Quantitative measurements of early alphaviral replication dynamics in single cells reveals the basis for superinfection exclusion. *Cell Systems* 12(3):210-219 (2021)
26. Zhu, N.[‡], Liu, C.[‡], Singer, Z., Danino, T., Laine, A., Guo, J. Segmentation with residual attention U-Net and an edge-enhancement approach preserves cell shape features. *arXiv* 2001.05548 (2020)
25. Chien, T., Jones, D.R., Danino, T.* Engineered bacterial production of volatile methyl salicylate. *ACS Synthetic Biology* 10:1 204–208 (2020)
24. Gurbatri, C., Coker, C., Hinchliffe, T., Lia, I., Arpaia, N., Danino, T.* Engineered probiotics for local tumor delivery of checkpoint blockade nanobodies. *Science Translational Medicine* 12(530):eaax0876 (2020)

23. Barra, M., **Danino, T.**, Garrido, D. Engineered Probiotics for Detection and Treatment of Inflammatory Intestinal Diseases *Frontiers in Bioengineering and Biotechnology* 8:265 (2020)
22. Zhu, S., Deb, D., **Danino, T.*** A spatial cell culture model for predicting chemotherapy dosing strategies. *bioRxiv* 561746 (2019)
21. Harimoto, T., Singer, Z., Velazquez, O., Zhang, J., Castro, S., Hinchliffe, T., Mather, W., **Danino, T.*** Rapid screening of engineered microbial therapies in a 3-D multicellular model. *PNAS* 116.18: 9002-9007 (2019)
20. Chowdhury, S., Castro, S., Coker, C., Hinchliffe, T.E., Arpaia, N., **Danino, T.*** Programmable bacteria induce durable tumor regression and systemic antitumor immunity. *Nature Medicine* 25(7): 1057–1063 (2019)
19. Fedorec, A J.H., Ozdemir, T., Doshi, A., Rosa, L., Velazquez, O., **Danino, T.**, Barnes, C P. Two new plasmid post-segregational killing mechanisms for the implementation of synthetic gene networks in *E. coli*. *iScience* 14, 323-334 (2019)
18. Harimoto, T., **Danino, T.*** Engineering Bacteria For Cancer Therapy. *Emerging Topics In Life Science* 3(5): 623-629 (2019)
17. Ozdemir, T., Fedorec, A J.H., **Danino, T.**, Barnes, C P. Synthetic Biology and Engineered Live Biotherapeutics: Toward Increasing System Complexity. *Cell Systems* 7 (1): 5-16 (2018)
16. Chien, T.†, Doshi, A.†, **Danino, T.*** Advances in bacterial cancer therapies using synthetic biology. *Current Opinions in Systems Biology* 5:1-8 (2017)
15. Geller, L. T.†, Barzily-Rokni, M.†, **Danino, T.**, Jonas, O., H. Shental, N., Nejman, D., Gavert, N., Zwang, Y., Cooper, Z., A., Shee, K., Thaiss, C., A., Reuben, A., Livny, J., Avraham, R., Frederick, D., T., Ligorio, M., Chatman, K., Johnston, S., E., Mosher, C., M., Brandis, A., Fuks, G., Gurbatri, C., Gopalakrishnan, V., Kim, M., Hurd, M., W., Katz, M., Fleming, J., Maitra, A., Smith, D., A., Skalak, M., Bu, J., Michaud, M., Trauger, S., A., Barshack, I., Golan, T., Sandbank, J., Flaherty, K., T., Mandinova, A., Garrett, W., S., Thayer, S., P., Ferrone, C., R., Huttenhower, C., Bhatia, S., N., Gevers, D., Wargo, J., A., Golub, T., R. Straussman, R. Tumor-microbiome mediated resistance to gemcitabine. *Science* 357 (6356): 1156-1160 (2017)
14. Moon, S.†, Fritz, I.†, Singer, Z.†, **Danino, T.*** Spatial Control of Bacteria Using Screen Printing. *3D Printing and Additive Manufacturing* 3(4): 194-203 (2016)
13. Din, M.†, **Danino, T.†**, Prindle, A., Allen, K., Skalak, M., Bhatia, S., Hasty, J. Synchronized cycles of bacterial lysis for in vivo delivery. *Nature* 536: 81-85 (2016)
12. Luna, J., Scheel, T., **Danino, T.**, Shaw, K., Takacs, C., Mele, A., Fak, J., Nishiuchi, E., Cantanese, M., Rice, C., Darnell, R. Hepatitis C virus RNA functionally sequesters miR-122. *Cell* 160(6): 1099-1110 (2015)
11. **Danino, T.†**, Prindle, A.†, Kwong, G., Skalak, M., Li, H., Allen, K., Hasty, J., and Bhatia, S. Programmable probiotics for cancer detection in urine. *Science Translational Medicine* 7: 289ra84 (2015)
10. **Danino, T.***, Prindle, A.*, Hasty, J., and Bhatia, S. Measuring growth and gene expression dynamics of tumor-targeted *S. typhimurium* bacteria. *Journal of Visualized Experiments* 77: e50540 (2013)
9. **Danino, T.**, Lo, J., Prindle, A., Hasty, J., and Bhatia, S. In vivo gene expression dynamics from tumor-targeted bacteria. *ACS Synthetic biology* 1(10): 465-470 (2012)
8. Prindle, A., **Danino, T.**, Selimkhanov, J.S., Samayoa, P., Goldberg, A., Bhatia, S., and Hasty, J. Genetic circuits in *Salmonella typhimurium*. *ACS Synthetic biology* 1(10), 458-464 (2012)
7. Cookson, N.A., Mather, W.H., **Danino, T.**, Mondragón-Palomino, O., Williams, R. J., Tsimring, L. S., and Hasty, J. Queueing up for enzymatic processing: Correlated signaling through coupled degradation. *Molecular Systems Biology* 7:561 (2011)

6. Prindle, A., Samayoa, P., Razinkov, I., **Danino, T.**, Tsimring, L.S. and Hasty, J. [A sensing array of radically coupled genetic biopixels](#). *Nature* 481: 39-44 (2011)
5. Mondragon-Palomino, O., **Danino, T.**, Selimkhanov, J., Tsimring, L.S., and Hasty, J. [Entrainment of a population of synthetic genetic oscillators](#). *Science* 333(6047): 1315-1319 (2011)
4. Boyer, D., Mather, W., Mondragon-Palomino, O., Orozco-Fuentes, S., **Danino, T.**, Hasty, J., and Tsimring, L. S. [Buckling instability in ordered bacterial colonies](#). *Physical Biology* 8: 026008 (2011)
3. **Danino, T.**, Volfson, D., Bhatia, S., Tsimring, L., and Hasty, J. [In-silico pattern formation of vascular mesenchymal stem-cells in three-dimensions](#). *PLoS ONE* 6(5): e20182 (2011)
2. Mather, W., Mondragon-Palomino, O., **Danino, T.**, Hasty, J., and Tsimring, L.S. [Streaming instability in growing cell populations](#). *Physical Review Letters* 104(20): 208101 (2010)
1. **Danino, T.**[‡], Mondragon-Palomino, O.[‡], Tsimring, L., and Hasty, J. [A synchronized quorum of genetic clocks](#). *Nature* 463: 326-330 (2010)

TEACHING

- Instructor, Art of Engineering E1102: Department of Biomedical Engineering Project (2019-present)
- Instructor, Biomedical Engineering 4520: Introduction to Synthetic Biology, Design Principles of Genetic Circuits (2017-present)
- Instructor, Biomedical Engineering 6003: Computational Modeling of Physiological Systems (2017-present)
- Guest Instructor, Center for Theoretical Biological Physics Summer School (Rio de Janeiro, Brazil): Experimental and Mathematical models in Synthetic Biology (2017)
- Guest Instructor, Q-bio Summer School (San Diego, CA): Experimental methods in Synthetic Biology (2013)
- Teaching Assistant, Bioengineering 125, Computational Molecular Biology, UCSD (2008)

MENTORSHIP

- *Associate Research Scientist*: Jade Pereira de Andrade Peres (current), Zakary Singer (current), Ed Ballister (current), Dhruva Deb (current)
- *Postdoctoral*: Shu Zhu (2018), Zakary Singer (2021), Dhruva Deb (2021), Ed Ballister (2021), Jaeseung Hahn (current), Bentley Shuster (current), Ayelet Sivan (current), Candice Gurbatri (current)
- *Ph.D. Graduate*: Sreyan Chowdhury (CMBS, 2021), Tiffany Chien (BME, 2022), Candice Gurbatri (BME, 2022), Tetsuhiro Harimoto (BME, 2022), Lior Kriendler (BME, current), Zeren Sheng (BME, current), Sophia Windemuth (BME, current), Linda Chen (BME, current), Andrew Redenti (CMBS, current), Marian Shaw (BME, current), Jonathan Pabon (CMBS, current), Jongwon Im (BME, current), Anjali Doshi (BME, current), Rosa Vincent (BME, current), Amanda Decker (CMBS, current)
- *M.S.*: Gabe Reder (M.S. in Applied Mathematics 2016), Shikha Sharma (M.S. BME 2017), Yangfan Wu (M.S. BME 2020), Nicholas Hou (M.S. BME 2020), Michael le Blanc (M.S. BME 2021), Akshada Pradhan (M.S. BME 2022), Meghna Komaranchath (M.S. BME current), David Jang (M.S. BME current)
- *Undergraduate*: Andrew Vallejos, Edward Ko, Leigh West, Jil Berenblum, Phoenix Lai, Benjamin Kepecs, Soonhee Moon, Emma Ruskin, Ben Kepecs, Samuel Castro, Joanna Zhang, Marian Shaw, Ioana Lia, Kelly Pu, Kelsey Gray, Clare Nimura, Ruxandra Tonea, Stefani Shoreibah, Andoni Nolasco, Tamjeed Azad, Stan Liao, Nicole Harr, Emily Sieler, Tasfia Haque, Jiaqi Liu, Nathan Ocampo, Rosalia Minyety, Linnaea Kavulich, Hsinyen Huang, Eva Cruz, Steven Wang, Ayman Siam, Ijeoma Obi, Julian Michaud, William Sun, Mohammed Yusufali, Skylar Li, Lauren Goralsky, Rohin Patel
- *Senior Design Teams*: BME 2016-2017, iGEM 2016-2018, Biodesign Challenge 2017/2019

SELECTED TALKS

- Synthetic Biology: Engineering, Evolution and Design (SEED) Conference 2022
- UK Microbiome Institute, London, UK (virtual) 2021
- Synthetic Biology Young Speaker Series (SynBSS), St. Louis, MO (virtual) 2021
- New York Genome Center Research Series, New York, NY (virtual) 2021
- Infection and Cancer Workshop, Umeå, Sweden (virtual) 2021
- NIH Synthetic Biology Consortium Conference, Bethesda, MD (virtual) 2021
- NIH Immuno-oncology Translational Network Series, Bethesda, MD (virtual) 2021
- Cancer Research Center of Lyon (CRCL) Scientific Day, Lyon, France (virtual) 2021
- Computational and Quantitative Biology Lecture Series, Univ. Federico II of Naples, Italy (virtual) 2021
- Bioengineering Seminar Series, University of Maryland, MD (virtual) 2021
- Visualizing Science, Columbia University, NY (virtual) 2021
- Congreso Biogenesis, Benemerita Universidad autonoma de Puebla, Mexico (virtual) 2021
- Founder's Day speaker, Institute of Post Graduate Medical Education and Research (IPGMER)/SSKM Hospital (virtual) (2021)
- Emerging Cell Therapies- Realizing the Vision of NextGen Smart Cell Therapeutics for Disease, Keystone, CO (virtual) (2021)
- Engineering in Medicine Symposium, Columbia University, New York, NY (2021)
- NIH Cancer, Autoimmunity, and Immunology Conference (2020)
- Memorial Sloan Kettering Cancer Center, Molecular Pharmacology (2020)
- University of Pennsylvania, Physical Sciences and Oncology Center (2020)
- University of California, Los Angeles, Bioengineering (2020)
- Central Saint Martins, London (2020)
- NIH/NCI Advanced Microbiome Therapeutics meeting, Bethesda, MD (2019)
- NIH/NCI SYNDICATE meeting, Bethesda, MD (2019)
- UT Southwestern Center for Computational and Systems Biology, Dallas, TX (2019)
- Regeneron Seminar Series, Tarrytown, NY (2019)
- Simons Foundation Symposium, New York, NY (2018)
- NYU Department of Systems Biology and Genomics, New York, NY (2019)
- UC Merced NSF CREST Center (Keynote), Merced, CA (2018)
- STEAM lecture series, Broward College, Fort Lauderdale, FL (2018)
- Veterinary Seminar Series, University of Pennsylvania, PA (2018)
- Ideas Festival Aspen Institute, Abu Dhabi, UAE (2018)
- Being Material, MIT, Cambridge, MA (2017)
- Biotrans, University of Granrio, Rio de Janeiro, Brazil (2017, Keynote)
- Pontificia Universidad Católica de Chile Symposium, Santiago, Chile (2017)
- Engineering in Medicine Symposium, Columbia University, New York, NY (2017)
- BME Graduate Seminar, Columbia University, New York, NY (2016)
- Biofabricate, New York, NY (2016)
- Active Matter, MIT, Cambridge, MA (2016)
- Biomedical Engineering Society, San Antonio, TX (2014, contributed)

SELECTED MEDIA

- Seek and destroy: beneficial bacteria programmed to fight cancer, BBC Science Focus [\[Link\]](#)
- Programmable bacteria as cancer therapy, Nature Medicine, News & Views [\[Link\]](#)
- New Weapons Against Cancer: Millions of Bacteria Programmed to Kill, New York Times [\[Link\]](#)
- Programmable bacteria as cancer therapy, Nature Medicine, News & Views [\[Link\]](#)
- Scientists Are Retooling Bacteria to Cure Disease, New York Times [\[Link\]](#)
- Programming bacteria to detect and treat cancer, TED talk (Vancouver, Canada) [\[Link\]](#)
- Synthetic biology: Bacteria synchronized for drug delivery, Nature News & Views on Din et al. Nature 2016 [\[Link\]](#)
- Synthetic Biology: Synchronized bacterial clocks, Nature commentary, Synthetic Systems Biology special feature [\[Link\]](#)
- Bacteria make Mexican waves, Nature produced Youtube video [\[Link\]](#)