José L. McFaline-Figueroa

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Positions

Assistant Professor – Department of Biomedical Engineering, Columbia University.	2021 - Present
Associate Member – Irving Institute for Cancer Dynamics, Columbia University	2021 - Present
Member – Precision Oncology and Systems Biology Program, Herbert Irving Comprehensive Cancer Center	2021 - Present
Postdoctoral Fellow – Department of Genome Sciences, University of Washington. Advisor: Cole Trapnell.	2015 - 2020
Postdoctoral Fellow – Department of Biological Engineering, MIT. Advisors: Leona D. Samson, Forest M. White.	2014 - 2015
Research Technician – Department of Biological Engineering, MIT.	2006 - 2008
Undergraduate Research Technician – Department of Chemistry, University of Puerto Rico at Mayagüez.	2004 - 2006

Education

Ph.D., Cancer Cell Biology, Department of Biology, MIT Advisors: Leona D. Samson, Forest M. White. Thesis: Mechanisms of Acquired Temozolomide Resistance in Glioblastoma	2008 - 2014
B.S., Chemistry, Department of Chemistry, University of Puerto Rico at Mayagüez.	2001 - 2006

Honors and Awards

Allen Institute Distinguished Investigator Award	September 2023
HICCC Emerging Leaders Program	September 2023
Office of the Provost Grant for Junior Faculty who Contribute to the Diversity Goals of the University, Columbia University	July 2022
NSF CAREER Award	February 2022
NIH NHGRI Genomic Innovator Award	August 2021
Emerging Scholar in Genome Sciences, Center for Public Health Genomics at the University of Virginia	September 2020

F31 Ruth L. Kirschstein National Research Service Award Predoctoral Fellowship — 2012 - 2014
Cum Laude, University of Puerto Rico at Mayagüez — June 2006

In the News and Highlights

Profile: Growing and Learning together. Department of Biology, MIT. — December 2021
Hispanic Heritage Month Faculty Profile. Department of Biomedical Engineering, Columbia University. — September 2021
2021 NHGRI Genomic Innovator Awards. — September 2021
Science in Seattle publication of the week: "A Pooled Single-Cell Genetic Screen Identifies Regulatory Checkpoints in the Continuum of the Epithelial-to-Mesenchymal Transition" — September 2019
Highlighted in "BBI Scientific Impact in 2019", Brotman Baty Scientific Institute, University of Washington — January 2020

Publications

Google Scholar citation list:
https://scholar.google.com/citations?user=T3ckjXkAAAAJ&hl=en

*Denotes co-first authorship.
#Denotes corresponding authorship.
✦Denotes lead author.

Peer-reviewed publications

1. **McFaline-Figueroa, J.L.** #✦, Srivatsan, S., Hill, A.J., Gasperini, M., Jackson, D.L., Saunders, L., Domcke, S., Regalado, S.G., Lazarchuck, P., Alvarez, S., Monnatt Jr, R.J., Shendure, J., Trapnell, C. 2023. Multiplex single-cell chemical genomics reveals the kinase dependence of the response to targeted therapy. Cell Genomics, 100487. doi: 10.1016/j.xgen.2023.100487.

2. Booth, G.T., Daza, R.M., Srivatsan, S.R., **McFaline-Figueroa, J.L.**, Green Gladden, R., Mullen, A.C., Furlan, S.N., Shendure, J., Trapnell, C. 2023. High-capacity multiplexing for single cell chromatin accessibility profiling. BMC Genomics, 24, 737. doi: 10.1186/s12864-023-09832-1.

3. Lotfollahi, M.*, Klimovskaia Susmelj, A.*, De Donno, C., Hetzel, L., Ji, Y., Ibarra, I.L., Naghipourfar, M., Daza, R.M., Martin, B., Shendure, J., **McFaline-Figueroa, J.L.**, Boyeau, P., Wolf, F.A., Yakubova, N., Günnemann, S., Trapnell, C., Lopez-Paz, D., Theis, F.J. 2023. Molecular Systems Biology, 19, e11517. doi: 10.15252/msb.202211517.

4. Kim, H.J.*, Booth, G.*, Saunders, L., Srivatsan, S., **McFaline-Figueroa, J.L.**, Trapnell, C. 2022. Nuclear oligo hashing improves differential analysis of single-cell RNA-seq. Nature Communications, 13, 2666. doi: 10.1038/s41467-022-30309-4.

5. Cruz, N.M.*, Reddy, R.*, **McFaline-Figueroa, J.L.**, Tran, C., Fu, H. and Freedman, B.S. 2022. Modelling ciliopathy phenotypes in human tissues derived from pluripotent stem cells with genetically ablated cilia. Nature Biomedical Engineering, 6, 463-475. doi: 10.1038/s41551-022-00880-8.

6. O'Connor, S.A., Feldman, H.M., Arora, S., Toledo, C.M., Hoellerbauer, P. Corrin, P., Carter, L., Kufeld, M., Bolouri, H., Basom, R., Delrow, **McFaline-Figueroa, J.L.**, Trapnell, C., Pollard, S.M., Patel, A., Paddison, P.J. and Plaisier, C.L. 2021. Neural G0: a quiescent-like state found in neuroepithelial-derived cells and glioma. Molecular Systems Biology, 17(6), e9522. doi: 10.15252/msb.20209522.

7. **McFaline-Figueroa, J.L.**, Trapnell, C., Cuperus J. 2020. The promise of single-cell genomics in plants. Curr. Opin. Plant Biol. 54, 114-121. doi: 10.1016/j.pbi.2020.04.002.

8. Srivatsan, S.*, **McFaline-Figueroa, J.L.*,** Ramani, V.*, Saunders, L., Cao, J., Packer, J., Pliner, H.A., Jackson, D., Daza, R., Christiansen, L., Zhang, F., Steemers, F., Shendure, J. and Trapnell, C. 2020. Massively multiplex chemical transcriptomics at single cell resolution. Science, 367(6473), 45-51. doi: 10.1126/science.aax6234.

9. Qiu, X., Rahimzamani, A., Wang, L., Ren, B. Mao, Q., Durham, T. **McFaline-Figueroa, J.L.**, Saunders, L., Trapnell, C. and Kannan, S. Inferring causal gene regulatory networks from single-cell expression dynamics using scribe. 2020. Cell Systems, 10(3), 265-274. doi: 10.1016/j.cels.2020.02.003.

10. **McFaline-Figueroa, J.L.,** Hill, A.J., Qiu, X., Jackson, D., Shendure, J. and Trapnell, C. 2019. A pooled single-cell genetic screen identifies regulatory barriers in the continuum of the epithelial to mesenchymal transition. Nature Genetics, 51, 1389-1398. doi: 10.1038/s41588-019-0489-5.

11. Saunders, L.M., Mishra, A.K., Aman, A.J., Lewis, V.M., Toomey, M.B., Packer, J.S., Qiu, X., **McFaline-Figueroa, J.L.**, Corbo, J.C., Trapnell, C. and Parichy, D.M. 2019. Thyroid hormone regulates distinct paths to maturation in pigment cell lineages. Elife, 8, e45181. doi: 10.7554/eLife.45181.

12. Gasperini, M., Hill, A.J., **McFaline-Figueroa, J.L.,** Martin, B., Kim, S., Zhang, M.D., Jackson, D., Leith, A., Schreiber, J., Noble, W.S., Trapnell, C. Ahituv, N and Shendure, J. 2019. A genome-wide framework for mapping gene regulation via cellular genetic screens. Cell, 176(1-2), 377-390. doi: 10.1016/j.*cell.*2018.11.029.

13. Jean-Baptiste, K. **McFaline-Figueroa, J.L.,** Alexandre, C.M., Dorrity, M.W., Saunders, L., Bubb, K.L., Trapnell, C. Fields, S., Queitsch, C. and Cuperus, J.T. 2019. Dynamics of Gene Expression in Single Root Cells of Arabidopsis thaliana. Plant Cell, 31(5), 993-1011. doi: 10.1105/tpc.18.00785.

14. Hill, A.J.*, **McFaline-Figueroa, J.L.*,** Starita, L.M., Gasperini, M.J., Matreyek, K.A., Packer, J., Jackson, D., Shendure, J. and Trapnell, C. 2018. On the design of CRISPR-based single-cell molecular screens. Nat Methods, 15(4), 271-274. doi: 10.1038/nmeth.4604. ***Authors contributed equally to the work**.

15. Pliner, H., Packer, J., **McFaline-Figueroa, J.L.,** Cusanovich, D., Daza, R., Aghamirzaie, D., Srivatsan, S., Qiu, X., Jackson, D., Minkina, A., Adey, A., Steemers, F., Shendure, J. and Trapnell, C. 2018. Cicero predicts cis-regulatory DNA interaction from single-cell chromatin accessibility data. Mol Cell, 71(5), 858-871. doi: 10.1016/j.molcel.2018.06.044.

16. Cao, J., Cusanovich, D.A., Ramani, V., Aghamirzaie, D., Pliner, H.A., Hill, A.J., Daza, R.M., **McFaline-Figueroa, J.L.**, Packer, J.S., Christiansen, L., Steemers, F.J., Adey, A.C., Trapnell, C and Shendure, J. 2018. Joint profiling of chromatin accessibility and gene expression in thousands of single cells. Science, 361(6409), 1380-1385. doi: 10.1126/science.aau0730.

17. Mikheev, A.M., Mikheeva, S.A., Severs, L.J., Funk, C.C., Huang, L., **McFaline-Figueroa, J.L.**, Schwensen, J., Trapnell, C., Price, N.D., Wong, S. and Rostomily, R.C. 2018. Targeting TWIST1 through loss of function inhibits tumorigenicity of human glioblastoma. Mol Oncol, 12(7), 1188-1202. doi:10.1002/1878-0261.12320.

18. **McFaline-Figueroa, J.L.**, Braun, C., Stanciu, M., Nagel, Z., Mazzucato, P., Sangaraju, D., Cerniauskas, E., Barford, K., Vargas, A., Chen, Y., Tretyakova, N., Lees, J.A., Hemann, M.T., White, F.M. and Samson, L.D. 2015. Minor changes in expression of the mismatch repair protein MSH2 exert a major impact on glioblastoma response to temozolomide. 2015. Cancer Res, 75(15), 3127-3138. doi: 10.1158/0008-5472.CAN-14-3616.

19. Prestwich, E., Mangerich, A., Pang, B., **McFaline, J.L.**, Lonkar, P., Sullivan, M.R., Trudel, L.J., Taghizadeh, K., Dedon, P.C. 2013. Increased levels of inosine in a mouse model of inflammation. Chem Res Toxicol, 26(4), 538-546, doi: 10.1021/tx300473n.

20. Valiathan, C., **McFaline, J.L.**, Samson, L.D. 2012. A Rapid survival assay to measure drug-induced cytotoxicity and cell cycle effects. DNA Repair. 11(1), 92-98. doi: 10.1016/j.dnarep.2011.11.002.

21. Olipitz, W., Wiktor-Brown,D.., Shuga, J., Pang, B., **McFaline, J.L.**, Lonkar, P., Thomas, A. Mutamba, J.T., Greenberger, J., Samson, L.D., Dedon, P.C., Yanch, J.C., Engelward, B.P. 2012. Integrated molecular analysis indicates undetectable DNA damage in mice after continuous irradiation at ~400-fold natural background radiation. Environ Health Perspect. 120(8), 1130-1136, doi: 10.1289/ehp.1104294.

22. Mangerich, A., Knutson, C.G., Parry, N.M., Muthupalani, S., Ye, W., Prestwich, E.G., Cui, L., **McFaline, J.L.**, Mobley, M., Ge, Z., Taghizadeh, K., Wishnok, J.S., Wogan, G.N., Fox, J.G.,

Tannenbaum, S.R., Dedon, P.C. 2012. Infection-induced colitis in mice causes dynamic and tissue-specific changes in stress response and DNA damage leading to colon cancer. PNAS, 109(27), E1820-9, doi: 10.1073/pnas.1207829109.

23. Pang, B., **McFaline, J.L.**, Dong, M., Cunningham, R.P., Dedon, P.C. 2012. Defects in purine metabolism lead to substantial incorporation of hypoxanthine into DNA and RNA. PNAS. 109(7), 2319-2324, doi: 10.1073/pnas.1118455109.

24. Fox, J.G., Feng, Y. Theve, E.J., Fry, R.C., La Fiala, J., Doernte, A.L., Williams, M., Raczynski, A.R., **McFaline, J.L.**, Essigmann, J.M., Schauer, D.B., Tannenbaum, S.R., Dedon, P.C., Weinman, S.A., Lemon, S.M., Rogers, A.B. 2009. Gut microbes define liver cancer risk in mice exposed to chemical and viral transgenic hepatocarcinogenesis. Gut. 59, 88-97, doi: 10.1136/gut.2009.183749.

25. Rai, P., Onder, T.T., Young, J.J., Pang, B., **McFaline, J.L.**, Dedon, P.C., Weinberg, R.A. 2009. Continuous elimination of oxidized nucleotides is necessary to prevent onset of cellular senescence. PNAS. 106, 169-174, doi: 10.1073/pnas.0809834106.

26. Taghizadeh, K., **McFaline, J.L.**, Pang, B., Sullivan, M., Plummer, E., Dedon, P.C. 2008. Quantification of DNA damage products resulting from deamination, oxidation and reaction with products of lipid peroxidation by liquid chromatography isotope dilution tandem mass spectrometry. Nat Protoc. 3, 1-12, doi: 10.1038/nprot.2008.119.

27. Meira, L.B., Bugni, J.M., Green, S.L., Lee, C.W. Pang, B., Borenshtein, D., Rickman, B.H., Rogers, A.B., Moroski-Erkul, C.A., **McFaline, J.L.**, Schauer, D.B., Dedon, P.C., Samson, L.D. 2008. DNA damage induced by chronic inflammation is a major contributor to colon carcinogenesis. J Clin Invest. 118, 2516-252, doi: 10.1172/JCI35073.

28. Son, J., Pang, B., **McFaline, J.L.**, Taghizadeh, K., Dedon, P.C. 2008. Surveying the damage: the challenges of developing nucleic acid biomarkers of inflammation. Mol Biosyst. 4, 902-908.

29. Dedon, P.C., DeMott M.S., Elmquist, C.E., Prestwich, E.G., **McFaline, J.L.**, Pang, B. 2007. Challenges in developing DNA and RNA biomarkers of inflammation. Biomark Med. 1, 293-312. doi: 10.2217/17520363.1.2.293.

Patent applications

1. Srivatsan, S., McFaline-Figueroa, J.L., Ramani, V., Cao, J., Booth, G., Shendure, J., Trapnell, C., Steemers, F.J. HIGH-THROUGHOUT SINGLE-NUCLEI AND SINGLE-CELL LIBRARIES AND METHODS OF MAKING AND USING. Application number: 17276667.

Pre-prints

1. Vicente, J.J., Khan, K., Tillinghast, G., **McFaline-Figueroa, J.L.**, Sancak, Y., Stella, N. 2023. Mitosis exit followed by death in interphase prevents the development of polyploid giant cancer cells. bioRxiv. doi: 10.1101/2023.08.31.555795.

2. He, S. *, Jin, Y. *, Nazaret, A. *, Shi, L., Chen, X., Rampersaud, R., Dhillon, B.S., Valdez, I., Friend, L.E., Fan, J.L., Park, C.Y., Mintz, Y-H., Carrera, D., Fang, K.W., Mehdi, K., Rohde, M., **McFaline-Figueroa, J.L.**, Blei, D., Leong, K.W., Rudensky, A.Y. #, Plitas, G. #, Azizi, E#. 2022. Starfysh reveals heterogeneous spatial dynamics in the breast tumor microenvironment. bioRxiv.

Invited Talks

Probing Human Disease with Single-cell Technologies Conference. Cancún, Mexico, February 2024.
Cellular and Molecular Engineering (CMBE) Annual Meeting. San Juan, Puerto Rico, January 2024 (selected from abstracts).
Department of Biomedical Engineering, Cornell University, December 2023.
Genome Engineering Seminar Series, Harvard Medical School, Harvard University, October 2023.
Department of Medicinal Chemistry, University of Toledo, November 2022.
Genome Sciences 20th Anniversary symposium, Department of Genome Sciences, University of Washington, November 2022.
CRISPR and Beyond: Perturbations at Scale to Understand Genomes. Wellcome Genome Campus, Hinxton, U.K. September 2022.
48th Northeast Bioengineering Conference, hosted by Columbia University, April 2022.
Department of Systems Biology, Harvard University, March 2022.
Herbert Irving Comprehensive Cancer Center Seminar Series, Columbia University, February 2022.
Department of Biomedical Engineering, Rensselaer Polytechnic Institute, January 2022.
Clinician Engineering Hub Virtual Conference, December 2021.
Health and Environmental Sciences Institute (HESI) Emerging Systems Toxicology for the Assessment of Risk (eSTAR) Annual Meeting, October 2021.
Biomedical Engineering Society Webinar Series, Biomedical Engineering Society, July 2021.
Society of Toxicology Annual Meeting. March 2021.
Engineering in Medicine Symposium, Columbia University. February 2021.
Emerging Scholars in Genome Sciences Symposium. Center for Public Health Genomics, University of Virginia. September 2020.
Department of Biology, University of Massachusetts Boston. March 2020.
Department of Biomedical Engineering, Columbia University. February 2020.
Department of Pathology, New York University. February 2020.
Institute for Systems Genetics, New York University. January 2020.
Department of Chemistry and Broad Institute, MIT. December 2019.
Trainee Symposium on Human Genomics. Department of Genetics, Yale University. December 2019.

Teaching

BMENE4500: Functional Genomics Methods & Applications.
BMENE6003: Computational Modeling of Physiological Systems. Genomics Module.

Professional Memberships

American Society of Human Genetics.
Biomedical Engineering Society.

Service

Peer-review

Biochemical Journal, Cell Reports, Development, DNA Repair, Journal of Clinical Periodontology. Nature Biotechnology, Nature Cancer, Nature Communications, Nature Genetics, Nature Methods, Science

Study Sections

Ad-hoc reviewer, fellowship review panel. Cell Biology, Developmental Biology and Bioengineering (F05-Q). Ad-hoc reviewer, Therapeutic Approaches to Genetic Diseases (TAG). Ad-hoc reviewer, special emphasis panel, Genes, Genomes and Genetics (GGG).

Conferences and Workshops

Rising Stars in Engineering in Health Workshop (Columbia/Yale/JHU/Cornell). Workshop on Graduate School Opportunities, Columbia University.

Committees

Undergraduate Committee, Department of Biomedical Engineering, Columbia University. Diversity Equity and Inclusion Committee, Department of Biomedical Engineering, Columbia University.

Participation in Outreach Programs

EE Just Scholars Program, Irving Institute for Cancer Dynamics summer research program, Amazon SURE summer research program, HYPOTHEkids NY Bioforce high school summer research opportunity, Bridge to PhD post-baccalaureate program.