

GARRETT FARRELL BEEGHLY

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EDUCATION AND TRAINING

University of Toronto Institute of Biomedical Engineering Postdoctoral Research Fellow	Toronto, ON 2025 – Present
Cornell University College of Engineering PhD in Biomedical Engineering, Minor in Stem Cell Biology	Ithaca, NY 2018 – 2024
University of Cambridge Department of Engineering Whitaker Research Fellow	Cambridge, UK 2017 – 2018
University of Virginia School of Engineering and Applied Science BS in Biomedical Engineering, Minor in Business	Charlottesville, VA 2013 – 2017

SELECTED AWARDS AND HONORS

Research Expertise Advancement Program Weill Institute for Cell Biology	2024
Kirschstein National Research Service Award (F31) National Cancer Institute	2023
Teaching Assistant of the Year Meinig School of Biomedical Engineering	2021
Center for Teaching Innovation Fellowship Cornell University	2021
NSF Graduate Research Fellowship National Science Foundation	2019
Presidential Life Science Fellowship Cornell University	2018
Tau Beta Pi Fellowship Tau Beta Pi National Engineering Honor Society	2018
Whitaker Research Fellowship Institute of International Education	2017
Harrison Undergraduate Research Award University of Virginia	2016
Rodman Honors Scholarship University of Virginia	2013

RESEARCH EXPERIENCE

University of Toronto Postdoctoral Research Fellow Advisor: Milica Radisic, PhD Project: Stem cell-mediated fabrication of functional cardiac microtissues	Toronto, ON Jul 2025 – Present
Cornell University Postdoctoral Research Associate Advisor: Claudia Fischbach, PhD Project: Regulation of membrane tension in primary adipocytes	Ithaca, NY Jan 2025 – Jun 2025
Cornell University Graduate Research Assistant Advisor: Claudia Fischbach, PhD Project: Adipose tissue as a biophysical mediator of breast cancer invasion	Ithaca, NY Aug 2018 – Dec 2024
Max Planck Institute for the Science of Light Visiting Scientist Advisor: Jochen Guck, PhD Project: Contact-free measurements of adipose tissue mechanics	Erlangen, DE Jun 2023 – Jul 2023
New York – Presbyterian Hospital NIH T35 Trainee Advisor: Jason Spector, MD Project: Characterization and decellularization of human adipose tissue	New York, NY Jun 2019 – Jul 2019

University of Cambridge Whitaker Research Fellow
Advisors: Jacqueline Shields, PhD and Yan Yan Shery Huang, PhD
Project: Microfabricated models of the tumor-draining lymph node

Cambridge, UK
Aug 2017 – Jul 2018

University of Virginia Undergraduate Research Assistant
Advisor: Jennifer Munson, PhD
Project: Patient-informed models of the glioblastoma microenvironment

Charlottesville, VA
Mar 2015 – May 2017

TEACHING EXPERIENCE

Cornell University Center for Teaching Innovation Fellow
Advisor: Derina Samuel, PhD
Courses: University-Wide Teaching Conference, GET SET Workshops

Ithaca, NY
Fall 2021 – Spring 2023

Yale University Guest Lecturer
Instructor: Corey O'Hern, PhD
Course: Physical Biology Integrated Workshop (MBB 591)

New Haven, CT
Fall 2021 – Fall 2023

Cornell University Graduate Teaching Assistant
Instructors: Shivaun Archer, PhD and Claudia Fischbach, PhD
Course: Lab Techniques for Molecular, Cellular, and Systems Engineering (BME 4190)

Ithaca, NY
Fall 2020

University of Virginia Undergraduate Teaching Assistant
Instructor: Timothy Allen, PhD
Course: Integrative Design and Experimental Analysis Lab (BME 3080)

Charlottesville, VA
Summer 2016

PUBLICATIONS

GF Beeghly,* A Shakeri,* F Mirzapour-Shafiyi, C Dikyol, N Offen, A Alsaafin, UA Nuber, M Radisic. Guiding the spatial organization of engineered heart tissues. *In revision at Advanced Drug Delivery Reviews*. (2026).

GF Beeghly, MI Pincus, R Varshney, DJ Falcone, MC Rudolph, MA Antonyak, NM Iyengar, C Fischbach. Large adipocytes increase vesicle-mediated lipid release and promote breast cancer malignancy. *In revision at Cell Reports*, preprint available on *bioRxiv*. 645549 (2026). [DOI](#).

BK Knode, **GF Beeghly**, BE Schutrum, D Wang, Y Zheng, A Battistella, R Goswami, CY Eom, A Bozec, J Guck, N Nishimura, S Girardo, CS O'Hern, C Fischbach. Adipose-mimetic granular hydrogels uncover biophysical cues driving breast cancer invasion. *In revision at Cell Biomaterials*, preprint available on *bioRxiv*. 684224. (2026). [DOI](#).

ND Sempertegui, Y Yan, MA Whitman, **GF Beeghly**, S Choi, AD Miller, LA Estroff, C Fischbach. Mineralized bone matrix attenuates breast cancer malignancy by altering MSC mechanoregulation. *Biomaterials*. 123763 (2025). [DOI](#).

GF Beeghly, J Deng, C Fischbach. Protocol to fabricate elastomer microwells for three-dimensional culture of primary adipocytes. *STAR Protocols*. 5, 103264 (2024). [DOI](#).

Y Zheng, D Wang, **GF Beeghly**, C Fischbach, MD Shattuck, CS O'Hern. Computational modeling of the physical features that influence breast cancer invasion into adipose tissue. *APL Bioengineering*. 8, 036104 (2024). [DOI](#).

GF Beeghly,* AA Shimpi,* RN Riter, C Fischbach. Measuring and modelling tumour heterogeneity across scales. *Nature Reviews Bioengineering*. 1, 712–730 (2023). [DOI](#). *Denotes equal contribution

RC Cornelison,* JX Yuan,* KM Tate, A Petrosky, **GF Beeghly**, M Bloomfield, SC Schwager, AL Berr, D Cimini, FF Bafakih, JW Mandell, BW Purow, BJ Horton, JM Munson. A patient-designed tissue-engineered model of the infiltrative glioblastoma microenvironment. *npj Precision Oncology*. 6, 54 (2022). [DOI](#). *Denotes equal contribution

GF Beeghly,* K Amofa,* C Fischbach, S Kumar. Regulation of tumor invasion by the physical microenvironment: Lessons from breast and brain cancer. *Annual Review of Biomedical Engineering*. 24, 29–59 (2022). [DOI](#). *Denotes equal contribution

GF Beeghly, CF Thomas, JX Yuan, AR Harris, JM Munson. Designing patient-driven, tissue-engineered models of primary and metastatic breast cancer. *Bioengineering*. 9, 44 (2022). [DOI](#).

L Ling, JA Mulligan, Y Ouyang, AA Shimpi, RM Williams, **GF Beeghly**, BD Hopkins, JA Spector, SG Adie, C Fischbach. Obesity-associated adipose stromal cells promote breast cancer invasion through direct cell contact and matrix remodeling. *Advanced Functional Materials*. 30, 1910650 (2020). [DOI](#).

DK Logsdon, **GF Beeghly**, JM Munson. Chemoprotection across the tumor border: Cancer cell response to doxorubicin depends on stromal fibroblast ratios and interstitial therapeutic transport. *Cellular and Molecular Bioengineering*. 10, 463–481 (2017). [DOI](#).

CONFERENCE PRESENTATIONS

Invited Presentations

GF Beeghly, C Fischbach. Engineering biomimetic adipose tissue models to dissect microenvironmental regulation of breast cancer. *Terrence Donnelly Centre for Cellular and Biomolecular Research, Toronto, Ontario, May 2025. Invited podium.*

GF Beeghly, C Fischbach. Adipose tissue as a biophysical regulator of tumor cell migration. *American Physical Society Global Physics Summit, Anaheim, California, March 2025. Invited podium.*

GF Beeghly, AA Shimpi, C Fischbach. Biophysical contributions of adipose tissue to breast cancer invasion. *Annual Physics of Cancer Symposium, Leipzig, Germany, September 2022. Invited podium.*

External Presentations

GF Beeghly, MI Pincus, B Cho, DJ Falcone, R Varshney, MC Rudolph, NM Iyengar, C Fischbach. Hypertrophic adipocytes shift from lipase- to vesicle-mediated lipid transfer to promote obesity-associated breast cancer progression. *Biomedical Engineering Society Annual Meeting, Baltimore, Maryland, October 2024. Podium.*

GF Beeghly, D Wang, Y Zheng, NM Iyengar, CS O'Hern, C Fischbach. The role of hypertrophic adipocytes in obesity-associated breast cancer progression. *Biomedical Engineering Society Annual Meeting, Seattle, Washington, October 2023. Podium.*

MI Pincus, **GF Beeghly**, C Fischbach. Examining cortical actin remodeling in adipogenesis and adipocyte hypertrophy. *Biomedical Engineering Society Annual Meeting, Seattle, Washington, October 2023. Poster.*

GF Beeghly, D Wang, Y Zheng, JD Treado, J Druso, NM Iyengar, CS O'Hern, C Fischbach. Biophysical contributions of adipose tissue to breast cancer invasion. *Gordon Research Conference on the Physical Science of Cancer, Galveston, Texas, February 2023. Poster.*

D Wang, JD Treado, **GF Beeghly**, F Arceri, M Murrell, C Fischbach, M Shattuck, CS O'Hern. Mechanical properties of adipose tissue mediate breast cancer invasion. *American Physical Society Meeting, Chicago, Illinois, March 2022. Podium.*

SL Esparza, **GF Beeghly**, JM Munson, SS Verbridge. Agent-based model of spatial fibroblast chemoprotection in the breast cancer microenvironment. *Biomedical Engineering Society Annual Meeting, Orlando, Florida, October 2021. Poster.*

GF Beeghly, BR Seo, JD Treado, D Wang, BD Hopkins, B Cho, AJ Dannenberg, NM Iyengar, JA Spector, CS O'Hern, C Fischbach. Engineered platforms to interrogate and model the impact of adipose tissue biophysical parameters on obesity-associated breast cancer. *National Cancer Institute Physical Sciences Oncology Network Annual Investigators Meeting, August 2021. Poster.*

GF Beeghly, H Munir, M Gerigk, YYS Huang, JD Shields. Engineering model systems to examine tumor-mediated immune dysfunction. *Gordon Research Conference on the Physical Science of Cancer, Galveston, Texas, February 2019. Poster.*

RC Cornelison, JX Yuan, **GF Beeghly**, KM Tate, **JM Munson**. The impact of interstitial fluid flow on cell motility and the tumor microenvironment. *Gordon Research Conference on the Physical Science of Cancer, Galveston, Texas, February 2019. Poster.*

GF Beeghly, H Munir, M Gerigk, YYS Huang, JD Shields. Engineering a microfluidic system to examine tumor-draining lymph node transformation. *Biomedical Engineering Society Annual Meeting, Atlanta, Georgia, October 2018. Poster.*

GF Beeghly*, **DN Tavakol***. Understanding the role of international research experiences on developing integrative and collaborative practices in science. *Biomedical Engineering Society Annual Meeting, Atlanta, Georgia, October 2018. Poster.* *Denotes equal contribution

GF Beeghly, CF Thomas, JX Yuan, AR Harris, JM Munson. Engineering patient-driven models to examine breast cancer behavior after metastasis to the brain. *Biomedical Engineering Society Annual Meeting, Phoenix, Arizona, October 2017. Poster.*

Internal Presentations

GF Beeghly, JA Spector, NM Iyengar, C Fischbach. Combining engineered systems and patient-derived samples to model the tumor microenvironment. *Meinig School of Biomedical Engineering Annual Research Symposium, Ithaca, New York, August 2023. Podium.*

GF Beeghly, BR Seo, JD Treado, D Wang, BD Hopkins, JA Spector, B Cho, AJ Dannenberg, NM Iyengar, CS O'Hern, C Fischbach. Hypertrophic adipocytes as mediators of breast cancer progression. *Cornell Intercampus Cancer Research Symposium, Ithaca, New York, May 2022. Poster.*

GF Beeghly, BR Seo, JD Treado, D Wang, BD Hopkins, JA Spector, B Cho, AJ Dannenberg, NM Iyengar, CS O'Hern, C Fischbach. Hypertrophic adipocytes as mediators of breast cancer progression. *Cornell Annual Stem Cell Retreat, Ithaca, New York, May 2022. Poster.*

GF Beeghly, H Munir, M Gerigk, YYS Huang, JD Shields. Designing a microfluidic platform to monitor immune reprogramming in tumor-draining lymph nodes. *Whitaker International Program Annual Meeting, Budapest, Hungary, April 2018. Podium.*

GF Beeghly, H Munir, M Gerigk, YYS Huang, JD Shields. Microfluidic approaches to modeling lymphatic-mediated interactions in the tumor-immune microenvironment. *Medical Research Council Annual Retreat, Cambridge, United Kingdom, October 2017. Poster.*

GF Beeghly, CF Thomas, JX Yuan, AR Harris, JM Munson. Quantitative analysis of the cellular microenvironment of metastatic breast cancer patient resections. *University of Virginia Undergraduate Research Symposium, Charlottesville, Virginia, April 2017. Poster.*

PROFESSIONAL DEVELOPMENT

Single-Cell Analysis Learning Enrichment Course Participant Memorial Sloan Kettering Cancer Center	New York, NY Dec 2024
Ivy Plus Teaching Transformations Graduate Summit Participant Center for Teaching and Learning, Columbia University	New York, NY Apr 2023
AIMBE Public Policy Institute for Rising Leaders Participant American Institute for Medical and Biological Engineering	Washington, DC Oct 2019

SERVICE AND OUTREACH

Cornell Community Cancer Partnership Volunteer Cancer Resource Center of the Finger Lakes	Ithaca, NY Fall 2018 – Fall 2024
Undergraduate Research Mentor Meinig School of Biomedical Engineering, Cornell University	Ithaca, NY Fall 2021 – Spring 2024
Session on Engineering and Physical Sciences in Oncology Organizer Biomedical Engineering Society Annual Meeting	Seattle, WA Oct 2023
Diversity, Equity, and Inclusion Committee Founding Member Meinig School of Biomedical Engineering, Cornell University	Ithaca, NY Fall 2021 – Spring 2023
Girl Scout Engineering Day Volunteer Cornell Graduate Chapter of the Biomedical Engineering Society	Ithaca, NY Spring 2019 – Fall 2019
Graduate Student Outreach Program Volunteer Cornell University Public Service Center	Enfield, NY Spring 2019

SKILLS AND KNOWLEDGE

Laboratory techniques

Aseptic cell culture, 3D cell culture, spheroid culture, primary cell isolation, mouse handling and care, rheology, natural biomaterials, atomic force microscopy (AFM), confocal microscopy, fluorescence lifetime imaging microscopy (FLIM), immunofluorescence, immunohistochemistry, flow cytometry, fluorescence-activated cell sorting (FACS), magnetic-activated cell sorting (MACS), ELISA, RNA isolation, RT-qPCR, bulk and single-cell transcriptomics, Western blotting, extracellular vesicle purification, microfluidics, Seahorse metabolic flux assays.

Languages and software

R, Bash, Python, HTML, Java, MATLAB, ImageJ, FlowJo, GraphPad Prism, Adobe Illustrator.