KAITLIN P. McCREERY, Ph.D.

https://shorturl.at/bPZ09 kaitlin.mccreery@mpi-muenster.mpg.de /kaitlinpmccreery

RESEARCH SKETCH

I investigate how individual cells are coordinated across spatial scales to promote regeneration: from molecular and cellular, to tissues and organs. My experimental research uses technologies to bridge spatial scales and reveal structure-function relationships in mechanobiology, including atomic force microscopy and next-generation sequencing and extending to *in vitro* and *ex vivo* cell and tissue models. My computational work integrates -omics datasets and predictive modeling to turn mechanistic inferences into testable hypotheses.

EDUCATION

2022 **Ph.D. in Biomedical Engineering**
Certificate in Interdisciplinary Quantitative Biology
University of Colorado Boulder, Boulder, CO

2020 **M.S. in Mechanical Engineering**
University of Colorado Boulder, Boulder, CO

2017 **B.A. in Physics**
Minor in Education
Graduation with Highest Distinction
Duke University, Durham, NC

RESEARCH EXPERIENCE

2023 Postdoctoral Fellow
Max Planck Institute for Molecular Biomedicine
Advisor: Dr. Sara Wickström
Project title: "*Mechano-osmotic signals control chromatin state and exit from pluripotency*"

2017 — 2022 Graduate Research Assistant
University of Colorado Boulder
Advisor: Dr. Corey P. Neu
Thesis title: "*Multiscale Biophysical Signaling Regulates Tissue Morphogenesis and Degeneration*"

2015 — 2017 Undergraduate Researcher
Duke University
Advisor: Dr. Stephen Teitsworth
Thesis title: "*Measurement of resistance switching dynamics in copper sulfide memristor structures*"

2015 — 2017 Undergraduate Researcher
Duke University
Advisor: Dr. Henry Greenside
Project title: "*The electric field of a uniformly charged cubic shell*"

PEER-REVIEWED PUBLICATIONS

7. Lipp, S.N., Jacobson, K.R., Colling, H.A., Tuttle, T.G., Miles, D.T., **McCreery, K.P**., Calve, S. (2023). Mechanical loading is required for initiation of extracellular matrix deposition at the developing murine myotendinous junction. *Matrix Biology* 116 28—48.

6. **McCreery, K.P.**, Luetkemeyer, C.M., Calve, S., Neu, C.P. Hyperelastic characterization reveals proteoglycans drive the nanoscale strain-stiffening response in hyaline cartilage. *Journal of Biomechanics,* 146, 111397.

5. Barthold, J.E., **McCreery, K.P.**, Bellerjeau, C., Bryant, S.J., Whiting, G.L., Neu, C.P. (2022). Particulate ECM biomaterial ink is 3D Printed and naturally crosslinked to form structurally-layered and lubricated cartilage tissue mimics. *Biofabrication* 14(2), 025021.

4. **McCreery, K.P.**, Xu, X., Scott, A.K., Fairjrial, A.K., Calve, S., Ding, X., Neu, C.P. (2021) Nuclear stiffness decreases with disruption of the extracellular matrix in living tissues. *Small* 17(6).

3. **McCreery, K.P.,** Calve, S., Neu, C.P. (2020) Ontogeny Informs Regeneration: explant models to investigate the role of the extracellular matrix in cartilage tissue assembly and development. *Connective Tissue Research* 61(3-4).

2. Lynch, M.E., Neu, C.P., Seelbinder, B., **McCreery, K.P.** (2020). The Role of Mechanobiology in Cancer Metastasis. Mechanobiology 65-78.

1. **McCreery, K.P.** and Greenside, H. (2018). The electric field of a uniformly charged non-conducting cubic surface. *American Journal of Physics* 86(1).

UNDER PEER REVIEW

Barthold, J.E., Cai, L., **McCreery, K.P.**, Fischenich, K., Eckstein, K., Ferguson, V., Emery, N., Breu, G., Neu, C.P. (*Under Review)*. Acellular Cartilage-Bone Allografts Engineered for Long-Term Mechanical Function and Integrative Repair. *Advanced Healthcare Materials.*

Mousoulis, C., **McCreery, K.P.,** Xu, X., Wilson, R.L., Chado, G., Wahlquist, J., Stoykovich, M.P., Ferguson, V.L., Ziaie, B., Neu, C.P. (*Under Review*) Micro-Inducting Atomic Force Microscopy Enhances Lateral Sensitivity and Intracellular Manipulation in Liquid. *Small Methods.*

WORKS IN PREPARATION

McCreery, K.P., Stubb, A.S., Lee, H., Stephens R., Cook A., Kruse, K., Vuoristo S., Miroshnikova Y.A, Wickström, S.A. Mechano-osmotic signals control chromatin state and exit from pluripotency. *Target journal: Nature.*

McCreery, K.P., Scott, A.K., Watson, A.R., Calve, S., Neu, C.P. Muscle Forces Stabilize the Chondrocyte Phenotype in Developing Cartilage. *Target journal*: *Developmental Cell.*

McCreery, K.P., Jacobson, K.R., Tonti, O.T., Luetkemeyer, C.M., Neu, C.P., Calve, S. Enthesis extracellular matrix assembly depends on prenatal movement and adolescent development. *Target journal: Matrix Biology*.

Gallagher, K., **McCreery, K.P.**, Schneider, S.E., and Neu, C.P. A Multiscale View of Premature Senescence in Mechanobiology. *Target journal: Nature Aging*.

NON-REFEREED PUBLICATIONS & PRESS

Science Buffs, Guest Article: **McCreery, K.P.** (2018) "Putting salt particles in their place: optical levitation." https://sciencebuffs.org/2018/10/23/putting-salt-particles-in-their-place-optical-levitation/

Science Buffs, Guest Article: **McCreery, K.P.** (2018) "Graduate student snapshot: Doug Peters." https://sciencebuffs.org/2018/02/13/graduate-student-snapshot-doug-peters/

HONORS & AWARDS

2023	Postdoctoral Research Travel Award ($5,000) Biomedical Engineering Society (BMES)
2017 — 2019	Integrated Graduate Education and Research Trainee Grant ($75,000) National Science Foundation
2017	Graduation with Highest Distinction Duke University
2017	Sigma Pi Sigma National Honors Society American Institute of Physics
2017	Winner, Undergraduate Research Poster Competition Department of Physics, Duke University
2015	Figueroa Family Fellowship Breakthrough Collaborative, San Francisco, CA
2014	Undergraduate Summer Research Fellowship Institute for Genome Sciences & Policy, Duke University

CONFERENCE CONTRIBUTIONS

2024	*Presentation: "*Nuclear mechano-osmotic regulation of cell state and cell fate" Biomedical Engineering Society, Cellular and Molecular Bioengineering, San Juan, PR
2023	*Presentation: "*Mechanical and osmotic regulation of chromatin and transcription" American Society for Cellular Biology, Boston, MA
2022	*Symposium presentation*: "Enthesis mechanical properties and composition are dependent on movement and development" Summer Biomechanics, Bioengineering, Biotransport Conference (SB3C), Cambridge, MD *Poster presentation*: "Autologous muscle forces drive cartilage morphogenesis and stabilize the developing chondrocyte phenotype" Orthopaedic Research Society, Tampa, FL
2018	*State of Colorado Representative:* AAAS Catalyzing Advocacy in Science & Engineering Washington D.C., USA
2017	*Poster presentation*: "Measurement of resistance switching dynamics in copper sulfide memristor structures" American Physical Society March Meeting, New Orleans, LA

2013 *Induction to the Junior Academy for the Advancement of Science*
American Association for the Advancement of Science, Boston, MA

OTHER PRESENTATIONS

2023 *"Science Day" Symposium Presentation:* Nuclear mechano-osmotic regulation of transcription and cell state, Max Planck Institute for Molecular Biomedicine (July 2023)

2022 *Invited seminar*, Barocas+Alford Research Groups, University of Minnesota (July 2022)

2021 *Invited seminar*, Multidisciplinary Graduate School STEMinar series, University of Colorado Boulder (March 2021)

2020 *Invited symposium presentatio*n: "Mechanical changes in cardiac cells in the hypertrophic heart." Graduate Engineering Annual Research & Recruitment Symposium, University of Colorado Boulder (February 2020)

2018 *Invited symposium presentation*: "Probing the interplay of cell and matrix mechanics in living tissues" BioFrontiers Interdisciplinary Quantitative Biology Symposium, University of Colorado Boulder (February 2018)

TEACHING

Fall 2019 Guest Lecturer, MCEN 2023 — Statics & Structures
Lecture series on moments and cross products
Department of Mechanical Engineering, University of Colorado Boulder

Fall 2018 Guest Lecturer, MCEN 2023 — Statics & Structures
Lecture series on force interactions
Department of Mechanical Engineering, University of Colorado Boulder

Summer 2017 Undergraduate Teaching Assistant, General Physics I (Newtonian Mechanics)
Weekly recitation sections, daily office hours
Department of Physics, Duke University

Undergraduate Teaching Assistant, General Physics II (Electricity & Magnetism)
Weekly recitation sections, daily office hours
Department of Physics, Duke University

Summer 2016 Undergraduate Teaching Assistant, Premedical General Physics I (Newtonian Mechanics)
Daily and evening office hours, taught weekly lab sections
Duke University Marine Lab, Beaufort, NC

Undergraduate Teaching Assistant, Premedical General Physics II (Electricity & Magnetism)
Daily and evening office hours, taught lab sections, developed new labs
Duke University Marine Lab, Beaufort, NC

Summer 2015 Dean of Students and Teaching Fellow, 9th grade physics
Breakthrough Collaborative at Summerbridge
Pre-professional teacher training program; developed and taught full curriculum
Elected most influential educator by student popular vote
University High School, San Francisco, CA

MENTORSHIP EXPERIENCE

2023 — present	Postdoctoral Mentor, University of Münster Mirjam Binner Hunki Lee
2022 — present	Research Assistant and PhD Student Mentor, University of Colorado Boulder Emily Bauer
2021 — 2022	Undergraduate Research Assistant Mentor, University of Colorado Boulder Abhijit Kurse
2020 — 2021	Discovery Learning Apprenticeship Mentor, University of Colorado Boulder Sabrina Kurevija
2019 — 2020	Undergraduate Research Assistant Mentor, University of Colorado Boulder Sera Sempson

SERVICE & OUTREACH

2020—2022	Member, planning committee; career panel coordinator IQ Biology 10-year Symposium, University of Colorado Boulder
2020—2022	Presentation judge, Advanced High School Biology category North Carolina Student Association of Science (K-12)
2021	Graduate Student Advisory Board, College of Engineering and Applied Science University of Colorado Boulder
2018—2020	Tutor, Justice System Volunteer Program Boulder County Jail, Boulder, CO
2019	Coordinator for Quantitative Biology Summer Series (reading group) University of Colorado Boulder
2015 — 2022	Poster judge, Biological Sciences category North Carolina State Science Fair
2014—2016	Instructor, Introduction to String Theory Duke Splash, local grades 6-8 visitation day, Duke University
2013 —2016	Math Instructor, Tutor Durham Literacy Center, NC to prepare adults to obtain high school equivalency (GED)