**KAITLIN P. McCREERY, Ph.D.**



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**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**

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| 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**

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| 2025 | Principle Investigator, Multiscale Bioengineering Lab University of Vermont [mccreerylab.com](http://mccreerylab.com/) |
| 2023 | Postdoctoral Scientist 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**

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| 7. | Lipp, S.N., Jacobson, K.R., Colling, H.A., Tuttle, T.G., Miles, D.T., **McCreery, K.P**., Calve, S. (2023). Mechanicalloading is required for initiation of extracellular matrix deposition at the developing murine myotendinousjunction. *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 ECMbiomaterial ink is 3D Printed and naturally crosslinked to form structurally-layered and lubricated cartilagetissue 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**

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|  | **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. *Nature Cell Biology*. |
|  | 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**

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|  | **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*. |
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**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**

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| 2024 | Merit Award, Presentation and Poster WinnerInternational Society for Stem Cell Research |
| 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 DistinctionDuke University |
| 2017 | Sigma Pi Sigma National Honors SocietyAmerican Institute of Physics |
| 2017 | Winner, Undergraduate Research Poster CompetitionDepartment of Physics, Duke University |
| 2015 | Figueroa Family FellowshipBreakthrough Collaborative, San Francisco, CA |

**OTHER PRESENTATIONS**

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| 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 Symposium, CU 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) |

**CONFERENCE CONTRIBUTIONS**

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| 2024 | *Presentation: “Mechano-osmotic signals control chromatin state and exit from pluripotency”*Biomedical Engineering Society Annual Meeting, Baltimore, MD |
| 2024 | *Presentation: “*Nuclear mechano-osmotic regulation of cell state and cell fate”Biomedical Engineering Society, Cellular and Molecular Bioengineering, San Juan, PR |
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| 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 & EngineeringWashington 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 |

**TEACHING**

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| 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 UniversityUndergraduate 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, NCUndergraduate 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 StudentsTeaching 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**

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| 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**

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| 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) |