

Jesse Holt

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Education

Doctorate of Philosophy Candidate in Biophysics University of California, Irvine	2021 (expected)
Dissertation: <i>Exploring the functional dynamics between Piezo1 and myosin-generated forces</i>	Advisor: Dr. Medha Pathak
Master's of Science in Biophysics University of California, Irvine	August 2019
Bachelor of Science in General Biology University of California, San Diego	June 2014
Bachelor of Science in Cognitive Neuroscience University of California, San Diego	June 2014

Professional Experience

PhD Candidate | University of California, Irvine 2016-Present
My dissertation work focuses on developing new biophysical techniques to study how force-activated ion channels are activated by cell-generated forces in live cells and its downstream functions. This imaging-based approach provides important insights into the molecular and biophysical mechanisms by which these channels are endogenously activated.

- Four years of experience in directing and serving as a technical resource for imaging techniques and image analysis practices.
- Four years of combined experience working with HEK-293T, MEF, HFF, mKera, hKera, iPSC, and Neural Stem Cells.
- Experience at set up, maintenance and operation of a custom Olympus IX83 microscope equipped with a cellTIRF illuminator.
- Expertise in detecting, and localizing Piezo1 ion channel events via an elaborate microscopy toolset.
- Extensive experience applying variety of image analysis software suites to research: FIJI, Ilastik, QuPath, Flika, Cellprofiler
- Implemented deep learning algorithms for feature identification, segmentation, and classification.
- Developed effective collaborations and drove several research teams, both within UCI and across multiple institutions.
- Supervised, trained, and managed student researchers who went on to successfully present their work at national conferences.
- Produced research which has been presented at multiple scientific conferences and in peer-reviewed publications.

Research Technologist | Gladstone Institutes June. 2015-Jun. 2016

- Developed novel treatment strategies to improve cognition and other neural functions in patients with neurological disorders by utilizing rodent models simulating these conditions to analyze neurobehavioral functions.
- Cooperated with other scientists within Gladstone on a variety of projects, providing data analysis and interpretation of results.

Research Associate | University of California, San Diego Sept. 2014-June 2015

- Provided research support assisting with rodent behavior, histology, neurochemistry, and electrophysiological recording.

Research Technician | The Scripps Research Institute Apr. 2013-June 2014

- Developed genetic lines of *C. elegans* and implemented drug screening assays to validate disease models of protein misfolding disease, transthyretin amyloidosis,

REU Student Research Trainee | Temporal Dynamics of Learning Center Sept. 2013-June 2014

- Assisted an international, collaborative team of bioengineers and roboticists towards creating effective tools for studying the physiology of sociality and interoception.

Research Intern | University of California, San Diego Mar. 2012-Sept. 2013

- Developed and utilized novel behavioral testing paradigms to assess incidental and associative learning during tasks.
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Publications

- **Holt, J.R.**, Zheng, W, Ma, S., Evans, E.L., Woo, S., Abuwarda, H.A., Loud, M., Patapoutian A., Pathak M.M. (2020) *Spatiotemporal dynamics of Piezo1 localization guides keratinocyte migration*. Manuscript in preparation.
- Atcha, H.A., Jairaman, A., **Holt J.R.**, Meli, V.S., Nagalla R.R., Veerasubramanian P.K., Brumm K.T., Lim H.E., Othy S., Cahalan M.D., Pathak M.M., Liu W.F. (2020) *Mechanically activated ion channel Piezo1 modulates macrophage polarization and stiffness sensing*. Manuscript under review.
- Phan, T.A. 1*, Reitz, Z.*, Jin S., **Holt, J.R.**, Pathak, M.M., Nie, Q., Downing T.L. (2020) *Cell-generated forces contribute to bottleneck during somatic cell reprogramming*. Manuscript under review.
- Ellefsen, K.*, **Holt, J.R.***, Chang, A.*, Nourse, J.L.*, Arulmoli, J., Mekhdjian, A., Flanagan, L.A., Dunn, A.R., Parker, I., and Pathak, M.M. (2019). *Myosin-II mediated traction forces evoke localized Piezo1 Ca²⁺ flickers*. *Communications Biology* **2**. 1-13 (2019). <https://doi.org/10.1038/s42003-019-0514-3>. * Denotes Equal Contribution.
- Quinn, L.K., Schuster, L.P., Aguilar-Rivera, M., Arnold, J., Ball, D., Gygi, E., Heath, S., **Holt, J.R.**, Lee, D.J., Taufatofua, J., Wiles, J., & Chiba, A.A. (2018). *When rats rescue robots*. *Animal Behavior and Cognition*, *5*(4), 368–379. <https://doi.org/10.26451/abc.05.04.04.2018>.

Research Skills

- **Cell Culture:** Human • Mouse • Neural stem cell • Keratinocyte • Fibroblast • Induced Pluripotent Stem Cell (iPSC) • Designed, implemented, and trained cell culture protocols • Cell isolation & preservation
- **Imaging:** Extensive experience in live cell imaging • Total Internal Reflection Fluorescence (TIRF) • Lattice Light Sheet • Differential interference contrast (DIC) • Confocal laser scanning • Förster Resonance Energy Transfer (FRET) • Developed and optimized new imaging assays • μ Manager software
- **Image Analysis:** Image segmentation • Image Denoising • Signal detection • Deep Learning • Machine Learning • Automated image classification • Cell Shape Analysis • Single particle tracking • Wound healing analysis
- **Programming:** Python, Matlab, Java, Originlab
- **Wet Lab Skills:** Immunocytochemistry (ICC) • Electrophysiology • Neurobehavioral assays • substrate micropatterning • biochemistry and molecular biology techniques • microfluidics

Fellowships and Awards

- Ellefsen *et al.* 2019 featured in Communication Biology 2-year Anniversary collection
- HHMI Gilliam Fellowship for Advanced Study Recipient 2019-Present
- MechanoBiology Symposium Opportunity Award 2018
- UCI Center for Multiscale Cell Fate Interdisciplinary Opportunity Project Award 2018
- Eugene Cota Robles Fellowship 2016-2021
- UC Irvine Diversity Recruitment Fellowship 2016
- NSF Research Experience for Undergraduates (REU) Fellowship Trainee: 2013-2014
- American Indian Access Scholarship Recipient: 2010-2014
- Change A Life Foundation Scholarship Recipient 2014

Community Outreach

- Leading 2020 UCI School of Medicine BIPOC Inclusivity Reform
- Founding member of HHMI Transforming Academic Environment (TAE) Initiative
- Founding member of UCI Tribal Graduate Students Association: 2017-Present
- UCI Triathlon Team Coordinator & Coach 2017-Present
- Member of UCI American Indian Society: 2016-Present
- Founding member of UCI SACNAS Chapter: 2017-Present
- Member of UCI's Discover Science Initiative: 2017-Present
- Member of UCI's Center for Complex Biological Systems Science Outreach Program: 2017-Present
- Member of UCSF Science Outreach Program: 2015-2016
- Member of UCSD Interaxon Science Outreach Club: 2013-2014
- California Louis Stokes Alliance for Minority Participation (CAMP) Member: UCSD: 2013-2014
- UCSD Native American Student Association: 2012-2014

Related Professional Training:

- Analytical & Quantitative Light Microscopy Research Training Course at Woods Hole Marine Biological Laboratory
- NEUBIAS Machine Learning and DeepImageJ Training Course
- National Center for Brain Mapping workshop on Deep Learning Algorithms for Microscopy Image Analysis at Woods Hole Marine Biological Laboratory May 10-14, 2019
- 2017 Optical Microscopy & Imaging in the Biomedical Sciences Advanced Research Training Course at Woods Hole Marine Biological Laboratory

References:

Dave Jackson
Dr. Medha Pathak
Dr. Ardem Patapoutian
Dr. Ian Parker
Dr. Francesco Tombola