Kathleen C. Keough

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Research Positions

Gladstone Institute of Data Science and Biotechnology. Bioinformatics fellow, 2020-Present. *Mentor*: Katherine Pollard.
University of California San Francisco. Graduate student, 2015-2020. *Mentors*: Katherine Pollard & Bruce Conklin.
Blood Research Institute of Wisconsin. Research assistant, 2012-2013. *Mentor*: Debra Newman.
Mathematical Biosciences Institute at the Ohio State University. Summer research fellow, National Science Foundation Research Experience for Undergraduates, 2012. *Mentor*: Hans Othmer, University of Minnesota Twin Cities.

Education

University of California San Francisco, MS and PhD in Pharmaceutical Sciences and Pharmacogenomics. 2015-2020.
Milwaukee School of Engineering, BS *Cum Laude* in Biomolecular Engineering, Minor: Marketing and Entrepreneurship. 2009-2013.
Ukrainian Catholic University, Summer Intensive Language and Culture Training Program, National Security Education Program Boren Scholarship. 2011.

Honors & Awards

Distinguished Achievement in Scientific Leadership, Gladstone Institutes. 2019.
Career Advancement Award, Gladstone Institutes. 2019.
Discovery Fellow, UCSF. 2017-2020.
Honors & Dean's Lists, MSOE. 2010-2013.
Academic & Presidential Achievement Scholarships, MSOE. 2009-2013.
Wisconsin Academic Excellence Scholar, State of Wisconsin Higher Education Aids Board. 2009-2013.
Who's Who at American Colleges and Universities, MSOE. 2012-2013.
Senior Design Team Seed Money Grant, MSOE. $500, January 2013.
KEEN Business Plan Competition 2nd Place, MSOE. $1500, February 2013.

Grant for Networking Conference, Biophysical Society. $500. December 2012.
Boren Scholarship, National Security Education Program. $8000. Summer 2011.

Teaching

Teaching Assistant. Biopharmaceuticals Course (BPS111), UCSF. 2016-2017.
Instructor. CRISPR-focused experimental methods, UCSF PSPG Graduate Program Bootcamp. 2016-2017.

Publications

Pre-prints

1. Keough, K.C.*, Shah, P.P.*, Wickramasinghe, N.M., Dundes, C.E., Chen, A., Salomon, R.E.A., Whalen, S., Loh, K.M., Dubois, N., Pollard, K.S., et al. (2020). An atlas of lamina-associated chromatin across thirteen human cell types reveals cell-type-specific and multiple subtypes of peripheral heterochromatin. BioRxiv 2020.07.23.218768. ** indicates co-first authors.*

2. Ryu, H., Inoue, F., Whalen, S., Williams, A., Kircher, M., Martin, B., Alvarado, B., Samee, M.A.H., Keough, K., Thomas, S., et al. (2018). Massively parallel dissection of human accelerated regions in human and chimpanzee neural progenitors. BioRxiv 256313.

Peer-reviewed journals

1. Gordon, D.E., Hiatt, J., Bouhaddou, M., Rezelj, V.V., Ulferts, S., Braberg, H., Jureka, A.S., Obernier, K., Guo, J.Z., Batra, J., …, Keough, K.C., et al. (2020). Comparative host-coronavirus protein interaction networks reveal pan-viral disease mechanisms. Science.

2. Damas, J.*, Hughes, G.M.*, Keough, K.C.*, Painter, C.A.*, Persky, N.S.*, Corbo, M., Hiller, M., Koepfli, K.-P., Pfenning, A.R., Zhao, H., et al. (2020). Broad Host Range of SARS-CoV-2 Predicted by Comparative and Structural Analysis of ACE2 in Vertebrates. Proceedings of the National Academy of Sciences. ** indicates co-first authors.*

3. Keough, K.C., Lyalina, S., Olvera, M.P., Whalen, S., Conklin, B.R., and Pollard, K.S. (2019). AlleleAnalyzer: a tool for personalized and allele-specific sgRNA design. Genome Biology 20, 167.

4. Croker, C., Civen, R., Keough, K., Ngo, V., Marutani, A., Schwartz, B., and Centers for Disease Control and Prevention (CDC) (2015). Aseptic meningitis outbreak associated with echovirus 30 among high school football players--Los Angeles County, California, 2014. MMWR Morb. Mortal. Wkly. Rep. 63, 1228.

5. Tourdot, B.E., Brenner, M.K., Keough, K.C., Holyst, T., Newman, P.J., and Newman, D.K. (2013). Immunoreceptor Tyrosine-Based Inhibitory Motif (ITIM)-Mediated Inhibitory Signaling Is Regulated by Sequential Phosphorylation Mediated by Distinct Nonreceptor Tyrosine Kinases: A Case Study Involving PECAM-1. Biochemistry 52, 2597–2608.

Software

AlleleAnalyzer *(https://github.com/keoughkath/AlleleAnalyzer)* CRISPR personalized paired and single gRNA design with option to optimize gRNA selection to cover groups of individuals based on genetic variants.

Mentoring, Volunteering & Outreach

Summer Intern Co-mentor. Mentored an undergraduate student with another postdoc in a project focused on leveraging single-cell ATAC- and RNA-seq data to characterize enhancer activity under stress, culminating in a presentation for the lab group and a poster submitted to a conference. Summer 2020.

Rotation Student Co-mentor. Mentored two rotation students with another postdoc or graduate student for 12 weeks in the Pollard lab at the Gladstone Institutes and UCSF, culminating in presentations for the lab group. Spring, Fall 2020.

PUMAS Intern Mentor. Mentored an undergraduate student from the "Promoting Underrepresented Minorities Advancing in Science" eight week internship program at the Gladstone Institutes. Provided guidance including project direction, coding instruction, statistical analysis, presentation and career skills. Summer 2019.

Student Mentor. Mentored incoming graduate students to the Pharmaceutical Sciences and Pharmacogenomics Program at the University of California San Francisco. Provided advice on a range of topics from living in San Francisco to choosing classes to deciding on a thesis lab. 2016-2020.

Workshop Leader. Led annual workshops on genetic and analytical techniques at the bootcamp for incoming students to the Pharmaceutical Sciences and Pharmacogenomics Program at the University of California San Francisco. 2016-2017.

Bright Girls, Brilliant Journeys. Spoke on a panel of women scientists ranging from undergraduate engineers to a Caltech professor promoting careers in science and engineering to an audience of girls ages 9-17 and their parents. Led a workshop in strawberry DNA extraction. 2017, 2019.

Bay Area Science Festival. Assisted with hosting a science panel discussion for the San Francisco public at the Castro Theatre to promote science in the community. 2015.

Presentations

1. "Broad Host Range of SARS-CoV-2 Predicted by Comparative and Structural Analysis of ACE2 in Vertebrates." Flash talk for the Bakar Institute Meeting at UCSF, virtually due to COVID-19 (May 18, 2020).

2. "A role for enhancer hijacking in the emergence of Human Accelerated Regions". Short talk at the 3D Genome: Gene Regulation and Disease Keystone Symposium the Fairmont Springs Conference Center in Banff, Canada (March 21, 2019).

3. "ExcisionFinder: a database and tool for allele-specific CRISPR-Cas editing." Keough, Lyalina, Whalen, Conklin, Pollard. Oral presentation for the Pharmaceutical Science and Pharmacogenomics program at the University of California – San Francisco (January 23, 2018).

4. "How changes to our genome change us." Keough, Conklin, Pollard. Oral presentation for the Pharmaceutical Science and Pharmacogenomics program at the University of California – San Francisco (November 27, 2018).

5. "AlleleAnalyzer: a tool for the design and optimization of personalized and allele-specific paired and single CRISPR sgRNAs." Keough, Lyalina, Whalen, Olvera, Conklin, Pollard. Flash talk at the Northern California Computational Biology Symposium at the University of California San Francisco (October 6, 2018).

6. "ExcisionFinder: a tool for the design and optimization of personalized and allele-specific paired and single CRISPR sgRNAs." Keough, Lyalina, Whalen, Olvera, Conklin, Pollard. Poster presented for the Genome Engineering: the CRISPR-Cas Revolution Conference at Cold Spring Harbor Laboratory, Cold Spring Harbor, New York (August 23, 2018).

7. "ExcisionFinder: a database and tool for allele-specific CRISPR-Cas editing." Keough, Lyalina, Whalen, Olvera, Conklin, Pollard. Poster presented to the Gladstone Institutes Scientific Advisory Board at the Gladstone Institutes, San Francisco, California (March 8, 2018).

8. "ExcisionFinder: a database and tool for allele-specific CRISPR-Cas editing." - Keough, Lyalina, Whalen, Conklin, Pollard. Oral presentation for the Pharmaceutical Science and Pharmacogenomics program at the University of California – San Francisco (January 23, 2018).

9. "ExcisionFinder: a database and tool for allele-specific CRISPR-Cas editing." - Keough, Lyalina, Whalen, Conklin, Pollard. Oral presentation for the Pharmaceutical Science and Pharmacogenomics program at the University of California – San Francisco (January 16, 2018).

10. “ExcisionFinder: a computational toolkit to identify ideal allele-specific CRISPR cut sites”. Keough, Conklin, Pollard. Oral presentation for the Gladstone Institute of Cardiovascular Disease at the Gladstone Institutes, San Francisco, California (August 16, 2017).

11. “ExcisionFinder: a computational toolkit to identify ideal allele-specific CRISPR cut sites”. Keough, Conklin, Pollard. Oral presentation for the Gladstone Graduate Student Retreat at the Log Cabin at the Presidio, San Francisco, California (August 3, 2017).

12. “CRISPR/Cas9 Genome Surgery to Eliminate Dominant Negative Disease”. Keough, Liu, Mayerl, Moore, So, Pollard, Conklin. Invited speaker at the ProRetina Research Colloquium in Potsdam, Germany (April 8, 2017).

13. “A CRISPR Toolkit for Genome Surgery.” Keough, Liu, Pollard, Conklin. Oral presentation for the Conklin lab retreat at the San Francisco Exploratorium (May 9, 2017).

14. “Analysis of a Dominant Negative Disease Locus for Targeting by Allele-Specific Editing.” Keough**,** Conklin, Pollard. Poster presentation for the UCSF Quantitative Bioscience Consortium Retreat (December 8, 2016).

15. “Cutting out disease at the origin – literally”. Keough, Pollard, Conklin. Oral presentation for the Pharmaceutical Science and Pharmacogenomics program at the University of California – San Francisco (May 3, 2016).

16. “Evaluation of a Novel Definition of Fever towards Improved Identification of Ebola Virus Disease in Monitored Travelers from an Outbreak Country.” Keough, Croker, Schwartz. Oral presentation given at the Public Health Associate Program Conference at the Centers for Disease Control, Atlanta, GA (April 30, 2015).

17. "Enzyme Engineering to Create Cellulose Derivatives in *Escherichia coli.*" Keough, Axt, Schaenzer. Poster presented at the annual conference of the National Council on Undergraduate Research at the University of La Crosse, WI (April 12, 2013).

18. “Enzyme Engineering to Create Cellulose Derivatives in *Escherichia coli*”. Axt, Keough, Schaenzer. Poster presented at MSOE Annual Biophysics Conference, Milwaukee School of Engineering, Milwaukee, WI (March 23, 2013).

19. “Boolean Modeling of microRNA Expression of the K-Ras/MAPK Pathway and its Implications in Cancer.” Keough, Othmer. Poster presented at the Mathematical Biosciences Institute Capstone Conference at the Ohio State University (August 2012).

Journal Reviewer

Referee:

2020 The CRISPR Journal

Co-referee:

2020 Nucleic Acids Research
2020 Genome Research
2019 Bioinformatics
2019 Nature Communications

Professional Memberships

American Society for Human Genetics. 2020-Present.