

ELEKTRA KANTZARI ROBINSON

(408) 858-2748 | ekrobins92@gmail.com

PROFILE

- I am a passionate molecular biologist with a background in innate immunity, eager to study host-microbe interactions.
- My research is hypothesis-driven and utilizes numerous *in vivo* and *in vitro* molecular biology techniques.
- I have a strong track record of collaborating, project management, mentoring junior scientists, and effectively communicating my work.

EDUCATION

- **University of California, Santa Cruz; Molecular, Cell, and Developmental Biology, Ph.D. Candidate;** Sept. 2015- present; Expected Graduation: Nov. 2021 (*exact start date negotiable*)
- **University of California, Santa Cruz; Molecular, Cell, and Developmental Biology, BS;** Sept. 2010- June 2014

TECHNICAL SKILLS

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| • <i>in vivo</i> mouse infection models | • Northern blotting | • Tissue Processing (Protein and RNA) |
| • Cell culture | • Western blotting | • RNA-seq (Analysis Basics) |
| • Lentivirus production | • RT-qPCR | • Data analysis (<i>in vivo</i> and <i>in vitro</i>) |
| • CRISPR/CRISPRi/CRISPRa | • Flow Cytometry | • Command Line (Python Basics) |
| • Molecular Cloning | • ELISA | • GraphPad Prism |

RESEARCH EXPERIENCE

Molecular, Cellular and Developmental Biology Training Track, UCSC, Mar. 2016- Present

Ph.D. Thesis

Principle Investigator – Susan Carpenter

Thesis background:

- Non-coding RNA molecules are critical mediators of inflammation, including both long non-coding RNAs and untranslated regions of mRNAs (**Robinson et al.** 2019, BBA Review).
- My research identifies a novel Aim2 isoform *in vitro* and characterizes how lincRNA-Cox2 modulates innate immunity *in vivo*.

Inflammation drives alternative first exon usage to regulate immune genes including a novel iron-regulated isoform of Aim2:

- In collaboration with the Angela Brooks lab, short-read and long-read sequencing technologies identified that alternative first exon usage is the dominant alternative isoform in primary human and mouse macrophages during lipopolysaccharide (LPS) stimulation.
- I utilized RT-qPCR, RegRNA 2.0, molecular cloning, site-directed mutagenesis, flow cytometry, and western blotting, to identify and characterize a novel inflammatory specific Aim2 isoform to be regulated by iron.
- This finding is paradigm-shifting for those who study Aim2, an inflammasome protein. (**Robinson et al.** 2021, eLife)

Assessing the RNA mechanism and *in vivo* regulatory role of lincRNA-Cox2 during acute inflammation:

- Using a *in vivo* LPS septic shock model, I determined that lincRNA-Cox2 is important in host defense and has tissue specific regulatory functions.
- In bone marrow derived macrophages (BMDMs), I showed that lincRNA-Cox2 functions both in *cis* to regulate its neighboring protein coding gene Ptgs2 and in *trans* to regulate immune genes.
- The approaches used to support these findings included mouse work, development of CRISPR/Cas9 BMDM cell lines, flow cytometry, molecular cloning, lentivirus generation and RNA sequencing of spleen and lung tissue homogenates. (**Robinson et al.** 2018, Cell Reports)
- I determined lincRNA-Cox2 is most expressed in lung tissue, therefore I next utilized a lung specific infection model.
- Using an LPS induced acute lung injury (ALI) model with lincRNA-Cox2 mutant, transgenic and mutant/transgenic mice, I determined that lincRNA-Cox2 functions in *trans* to regulate Ccl3, Ccl4, Ccl5 and Il6 in primary alveolar macrophages.
- The approaches I used to support these findings include flow cytometry for analysis, *in vivo* ALI mouse model, tissue harvesting/homogenizing, bronchiolar lavages, ELISAs, culturing primary alveolar macrophages, and qPCR. Sorting and chimera bone marrow transplantation experiments were performed in collaboration. (**Robinson et al.** 2021, bioRxiv).

Santa Cruz Biotechnology, Quality Control Dept., July 2014- July 2015

Senior Research Assistant

Manager – Christopher App

Assessing western antibody specificity and characterizing CRISPR/Cas9 KO cell lines:

- I effectively ran, developed, and analyzed over 100 western blots a week to test the effectiveness of new Mouse Sera Monoclonal Antibodies and “high functioning” transfected cell lines.
- Validated novel guide RNAs in the CRISPR/Cas9 knockdown system for research use by designing, performing, and analyzing over 100 western blots a week.
- I exceeded my quota of analyzed products each month by working effectively and efficiently.

Chemistry and Biochemistry Dept., UCLA, June- Sept. 2013

Undergraduate Research

Principle Investigator – Jorge Torres

Characterizing small molecular inhibitors of cell division:

- I learned how to cell culture HeLa cells, perform immunofluorescence (IF), live imaging, and western blot experiments.
- The results showed that 12 of the 17 potential anti-cancer drugs induced a multipolar spindle phenotype, either polymerizing or depolymerizing, leading to eventual apoptosis via mitotic arrest during metaphase.

Ocean Sciences Dept., UCSC, Apr. 2012- Jun. 2014

Undergraduate Research

Principle Investigator- Ana Christina Ravelo

Enhanced subarctic pacific stratification and nutrient utilization during glacials over the last 1.2 Myr:

- Prior to our study, long-term temperature records of the Bering Sea had not been constructed in this detail.
- I processed hundreds of sediment core samples, including crushing sediment samples, and freeze-drying them for analyzing, as well as preparing carbon-free samples by acidifying them using glacial acetic acid. (Knudson and Ravelo *et al.* 2016)

HONORS AND AWARDS

- **Travel Scholarship**, Next Gen Immunology (NGI2020), Weizmann Institute of Science, 2020
- **Ray Owen Young Investigator Poster Award**, Midwinter Conference of Immunologists, 2020
- **Achievement Rewards for College Scientists (ARCS) Foundation Fellowship**, ARCS Foundation Northern California, 2018
- **Advanced to Ph.D. Candidacy with Honors**, MCD Dept., 2017
- **Ray Owen Young Investigator Poster Award**, Midwinter Conference of Immunologists, 2017
- **Departmental Training Grant (MCD department, UCSC)**, MCD Dept., UCSC, 2015-2017

PROFESSIONAL DEVELOPMENT

- **UCSC Graduate Leadership Seminars**, UCSC Division of Graduate Studies, 2019-2020
 - Learned about major trends in contemporary leadership, uncovered core values for adaptive leadership, developed effective negotiation and conflict resolution skills and discussed ways to make collaborative workspaces positive, productive environments for diverse perspectives and backgrounds.
- **Career Planning**, MCD Dept., UCSC, 2018
 - A ten-week course that exposes graduate students to diverse career options in industry and academia and helps them develop individual development plans to direct their graduate training to their selected career goals.

MENTORING

- **Mentoring**, Carpenter Lab, UC Santa Cruz, 2016-present
 - I designed and managed multiple projects for 7 undergraduate and 5 graduate students.

SELECTED PUBLICATIONS

1. **Robinson EK**, Worthington AK, Poscablo DM, Shapleigh B, Salih MM, Halasz H, Seninge L, Mosqueira B, Smaliy V, Forsberg EC, Carpenter S. 2021b. LincRNA-Cox2 functions to regulate inflammation in alveolar macrophages during acute lung injury (preprint). *Immunology*. doi:10.1101/2021.07.15.452529
2. **Robinson EK**, Jagannatha P, Covarrubias S, Cattle M, Smaliy V, Safavi R, Shapleigh B, Abu-Shumays R, Jain M, Cloonan SM, Akeson M, Brooks AN, Carpenter S. 2021. Inflammation drives alternative first exon usage to regulate immune genes including a novel iron-regulated isoform of Aim2. *Elife* 10:e69431. doi:10.7554/eLife.69431
3. **Robinson EK**, Covarrubias S, Zhou S, Carpenter S. 2021a. Generation and utilization of a HEK-293T murine GM-CSF expressing cell line. *PLoS One* 16:e0249117. doi:10.1371/journal.pone.0249117
4. **Robinson EK**, Covarrubias S, Carpenter S. 2020. The how and why of lncRNA function: An innate immune perspective. *Biochim Biophys Acta Gene Regul Mech* 1863:194419. doi:10.1016/j.bbagr.2019.194419
5. **Robinson EK**, Elling R, Shapleigh B, Liapis SC, Covarrubias S, Katzman S, Groff AF, Jiang Z, Agarwal S, Motwani M, Chan J, Sharma S, Hennessy EJ, FitzGerald GA, McManus MT, Rinn JL, Fitzgerald KA, Carpenter S. 2018. Genetic Models Reveal cis and trans Immune-Regulatory Activities for lincRNA-Cox2. *Cell Rep* 25:1511-1524.e6. doi:10.1016/j.celrep.2018.10.027
6. Covarrubias S, **Robinson EK**, Shapleigh B, Vollmers A, Katzman S, Hanley N, Fong N, McManus MT, Carpenter S. 2017. CRISPR/Cas-based screening of long non-coding RNAs (lncRNAs) in macrophages with an NF-κB reporter. *J Biol Chem* 292:20911–20920. doi:10.1074/jbc.M117.799155

SELECTED PRESENTATIONS

- “Inflammation drives alternative first exon usage to regulate immune genes including Aim2.” Bay Area RNA Conference. December 2019. (Oral Presentation)
- “Determining how lincRNA-Cox2 Controls Gene Expression in the Lung.” 3rd International Conference: on the long and the short of Non-coding RNAs; 2019 June; Chania, Crete, Greece. (Poster Presentation)