

# Heather R. Borrer

(503) 999-1200 • hborror@uw.edu • Seattle, WA

## EDUCATION

- University of Washington, Seattle, WA** 9/2021 – present  
Ph.D in Molecular & Cellular Biology expected 2026-2027
- University of Washington, Seattle, WA** 9/2012 – 06/2017  
Bachelor of Science in Biochemistry  
Bachelor of Music in Violin Performance
- Cum laude, Interdisciplinary Honors, Phi Beta Kappa

## RESEARCH EXPERIENCE

- Graduate Student Research Assistant** 5/2024 – present  
Fred Hutchinson Cancer Center, Basic Sciences Division, Seattle, WA  
Advisor: Dr. Arvind Rasi Subramaniam
- Graduate Student Research Assistant** 3/2022 – 5/2024  
Fred Hutchinson Cancer Center, Human Biology Division, Seattle, WA  
Advisor: Dr. Alice Berger
- Completed PhD candidacy exam proposing an investigation into genetic and intrinsic regulators of RIT1 protein abundance and RIT1 copy number alterations in lung cancer
  - Developed and performed assay development for a flow cytometry-based CRISPR knockout screen to systematically discover genetic regulators of KRAS protein abundance
- Graduate Rotation Student** 1/2022 – 3/2022  
Fred Hutchinson Cancer Center, Public Health Sciences Division, Seattle, WA  
Advisor: Dr. James Alvarez
- Investigated the role of APOBEC mutagenesis in chromosomal instability in lung cancer recurrence
  - Upon validating inducible APOBEC3B expression and activity, carried out immunofluorescence staining for DNA damage markers and microscopy for changes to cell ploidy in human and mouse cell culture models
  - Findings suggested that constitutive APOBEC3B activity may not impact ploidy nor increase DNA damage
- Graduate Rotation Student** 9/2021 – 12/2021  
University of Washington, Department of Biochemistry, Seattle, WA  
Advisor: Dr. Andrea Wills
- Investigated the intersections of developmental and regenerative signaling processes in *X. tropicalis*
  - Performed assay development for ChIP-seq to identify target genes of beta-catenin in tail regeneration and for live-imaging of beta-catenin nuclear localization
  - Validated injection of exogenous GFP-tagged beta-catenin RNA construct into *X. tropicalis* embryos has biologically relevant consequences

## Lab Manager/Research Scientist I

6/2017 – 8/2022

University of Washington, Department of Pharmacology, Seattle, WA

Advisor: Dr. Richard Gardner

- Conducted independent research on how eukaryotic cells destroy misfolded nuclear proteins to prevent protein aggregation in the nucleus in *S. cerevisiae*
- Found that the degree of protein solubility influences the cell's requirement for chaperone proteins to mediate degradation
- Assisted with other lab members' projects, found that the small ubiquitin-like modifier SUMO transiently modifies chromatin structural proteins during the cellular stress response to ethanol
- Presented findings at lab meetings to PI and graduate students, learned to troubleshoot experiments and independently drive research forward
- Mentored undergraduate research assistants and rotation students
- Maintained lab inventory and coordinated with PI on lab purchases

## Undergraduate Research Assistant

6/2016 – 6/2017

University of Washington, Department of Pharmacology, Seattle, WA

Advisor: Dr. Richard Gardner

- Examined the functional roles for Small Ubiquitin-like Modifier (SUMO) post-translational modifications during cell stress response in *S. cerevisiae*
- Presented research poster at the 2017 UW Undergraduate Research Symposium

## PUBLICATIONS

Ibarra R, **Borrór HR**, Hart B, Gardner RG, and Kleiger G (2021). **The San1 ubiquitin ligase avidly recognizes misfolded proteins through multiple substrate binding sites.** *Biomolecules*. 2021 Nov 2;11(11):1619.

<https://doi.org/10.3390/biom11111619>

Bradley AI, Marsh NM, **Borrór HR**, Mostoller KE, and Gardner RG (2021). **Acute ethanol stress induces sumoylation of conserved chromatin structural proteins in *Saccharomyces cerevisiae*.** *Mol Biol Cell*. 2021 May 15;32(11):1121-1133. <https://doi.org/10.1091/mbc.E20-11-0715>

Jones RD, Enam C, Ibarra R, **Borrór HR**, Mostoller KE, Fredrickson EK, Lin J, Chuang E, March Z, Shorter J, Ravid T, Kleiger G, and Gardner RG (2020). **The extent of Ssa1/Ssa2 Hsp70 chaperone involvement in nuclear protein quality control degradation varies with the substrate.** *Mol Biol Cell*. 31(3):221-233.

<https://doi.org/10.1091/mbc.E18-02-0121>

## MENTORSHIP & COMMUNITY SERVICE EXPERIENCE

### Student Area Director

8/2023 – present

University of Washington, Molecular & Cellular Biology Program, Seattle, WA

- Advise students about classes and rotations in subject interest area
- Work with faculty and student area directors to review and update course offerings

### Mentor, Biochemistry Undergraduate Reading Program

3/2023 – 6/2023

University of Washington, Department of Biochemistry, Seattle, WA

- Led journal club for a small group of undergraduates, supporting advancement of their scientific literacy beyond of the lecture hall
- Attended end-of-the-quarter program undergraduate presentation session and provided feedback

### Undergraduate Mentor

7/2017 – 8/2020

University of Washington, Department of Pharmacology, Seattle, WA

- Mentored Kaitlyn Mostoller, University of Washington Class of 2020
- Supervised and guided progress collaborating on Jones et. al 2020

**Program Assistant**

9/2018 – 3/2020

Bailey-Boushay House, Virginia Mason Medical Center, Seattle, WA

- Provided company and emotional support to patients in weekly 3-4 hour shifts during meal times and one-to-one visits
- Gained perspective on the experience of living with terminal illness and end-of-life care

**Crisis Line/National Suicide Prevention Lifeline Volunteer**

9/2017 – 12/2021

Crisis Connections, Seattle, WA

- Provided emotional support to callers in weekly 4-hour shifts on a variety of needs and topics, including suicidal ideation, episodes of psychosis, grief and loss, and work-related stress
- Connected callers to local resources as appropriate, supervised by licensed mental health clinicians
- Completed rigorous 60hr training course to familiarize phone volunteers with common issues and best practices

**PROFESSIONAL SOCIETY MEMBERSHIP****American Association for Cancer Research**, Associate Member

12/2022 – present

**OTHER LEADERSHIP EXPERIENCE****Scholarship Ensemble: Violinist, Corda Quartet**

9/2016 – 6/2017

School of Music, University of Washington, Seattle, WA

- Co-directed independent rehearsals with string quartet members upon feedback from weekly meetings with ensemble coach for a total of 6hrs/week of ensemble time
- Prepared music for two full-length concerts as official student representatives of the School of Music, requiring close analysis of musical scores and effective artistic coordination

**Club Officer**

9/2015 – 6/2017

Chamber Music Club at UW, University of Washington, Seattle, WA

- Facilitated networking opportunities for student musicians to form chamber music ensembles
- Organized quarterly concerts for student ensembles
- Coordinated rehearsals and room reservations

**LABORATORY & COMPUTER SKILLS****Biology**

Molecular cloning techniques, lentiviral production, transduction of mammalian cells, genomic DNA isolation, RNA extraction, cDNA preparation, RT-qPCR, protein lysate preparation, Western blotting, protein solubility fractionation assays, cycloheximide chase assays, tandem ubiquitin binding assays, *X. tropicalis* embryonic microinjections, microbial culture maintenance, cellular growth assays, spectrophotometry, fluorometry, fluorescence microscopy, immunohistochemistry, flow cytometry, shRNA design, genome-scale CRISPR screens

**Model Systems**Human cell culture, mouse cell culture, *E. coli*, *S. cerevisiae*, *X. tropicalis***Software**

Adobe Illustrator, GraphPad Prism, FlowJo, UCSC Genome Browser

**Programming Languages**

Limited experience in Python, R, and Bash