



EDUCATION

Carroll College Helena, MT
BA, Biochemistry & Molecular Biology, Psychology Minor 2021

PROFESSIONAL APPOINTMENT

Oregon Health & Sciences University Portland, OR
Graduate Student, Biomedical Engineering Program, School of Medicine
CEDAR Collaborative Member, Knight Cancer Institute, School of Medicine 2022 –

RESEARCH EXPERIENCE

Oregon Health & Sciences University - Knight Cancer Institute Portland, OR
Ph.D. Student; Advisor(s): Stuart Ibsen and Adem Yildirim 2022 –

- Investigating spatio-temporal control of activatable monoclonal antibodies.
- Improving biomarker release and immune activation with ultrasound responsive nanoparticles.

Oregon State University-Oregon Health & Sciences University College of Pharmacy Portland, OR
Faculty Research Assistant; Advisor: Gaurav Sahay July 2021 – June 2022

- Analyzed biological buffers effects on storage of mRNA lipid nanoparticles.
- Altered nanoparticles to achieve mRNA delivery for retinal diseased models.
- Manufactured nanoparticles for mRNA delivery as an adjuvant to human cancers.

Oregon Health & Sciences University Portland, OR
Cell, Developmental, and Cancer Biology (CDCB) Intern; Advisor: Gaurav Sahay June – July 2021

- Explored effect of radiation on mRNA nanoparticle delivery in 3 cancer cell lines.

Cell, Developmental, and Cancer Biology (CDCB) Intern; Advisor: Gaurav Sahay June – August 2019

- Investigated novel mRNA nanoparticle delivery in Cystic Fibrosis cell models.

Carroll College Helena, MT
Undergraduate Independent Researcher; Advisor: David M. Hitt January 2020 – May 2021

- Performed organic synthesis of Structure-Activity Relationship (SAR) for 2 novel antibiotics to combat Methicillin-resistant *Staphylococcus aureus* (MRSA).
- Constructed microbiological methods to screen novel antibiotic derivatives of Berkeleylactone A against emerging bacterial strains.

Undergraduate Researcher; Advisor: John G. Rowley August 2020 – May 2021

- Formulated photo responsive phospholipid vesicles that encapsulated fluorescein dye in aim of tracking effective site-specific drug delivery.

Undergraduate Independent Researcher; Advisor: Alyssa Hahn August – December 2019

- Executed metabolite extractions of 26 unique patient samples to analyze atypical biomarkers for Osteoarthritis.

Undergraduate Researcher; Advisor: David M. Hitt January 2019 – May 2019

- Conducted a Suzuki Reaction to generate an organic product that held potential to store solar energy in its chemical bonds.

HONORS AND AWARDS

Oregon Bioengineering Symposium Best Poster Award 2023
Ted R. Lilley CURE Program Student-Mentor Award 2019, 2023
Knight Cancer Research Institute SciOps Collaborative Grant Award 2023

National Academies of Sciences Ford Fellowship Honorable Mention	2023
Pacific Northwest Center for Cryo-EM (PNCC) General Access Proposal Award	2023
Oregon Health & Science University RNAissance Meeting Poster Award	2022
Carroll College Service Leadership Scholarship	2016 – 2020

PUBLICATIONS

- 1) Landry M.R.*; **Henderson M.I.***; Eunseo C.; Herrera M.; Sun C.; Sahay G. Lipid nanoparticle delivered cGAS mRNA activates the STING pathway. *J. Gene Med.* 2023; Under Review.
- 2) **Henderson M.I.***; Eygeris Y.*; Jozic A.; Herrera M.; Sahay G. Leveraging biological buffers for efficient messenger RNA delivery via lipid nanoparticles. *Mol. Pharm.* 2022; 19(11), 4275-4285
- 3) Mukherjee A.; MacDonald K.D.; Kim J.; **Henderson M.I.**; Eygeris Y.; Sahay G. Engineered mutant α -EnaC subunit mRNA delivered by lipid nanoparticles reduces amiloride currents in cystic fibrosis-based cell and mice models. *Science Advances.* 2020; 6(47).
- 4) Xiang L.*; **Henderson M.I.***; Drennan S.; Yildirim A. Acoustically Responsive Peptide-Drug Coated Nanoparticles for Localized Cancer Therapy. In preparation.
- 5) **Henderson M.I.***; Eygeris Y.*; Tschetter W.; Chirco K.R.; Curtis A.; Fries I.; Jozic A.; Ryals R.; Sahay G. Preformed vesicle-mediated delivery of messenger RNA for retinal gene therapy. In preparation.

*Equal co-authors

CONFERENCE PRESENTATIONS

- 1) Knight Campus for Accelerating Scientific Impact – Oregon Bioengineering Symposium (Poster) 2023
Henderson M.I.; Xiang L.; Sabuncu S.; Drennan S.; Yi X.; Mira J.L.M.; Gomes M.; Fischer J.; Yildirim A. Amplifying cancer biomarker release and immune stimulation using ultrasound-responsive nanoparticles.
- 2) Knight Campus for Accelerating Scientific Impact – Oregon Bioengineering Symposium (Poster) 2023
Henderson M.I.; Brasino M.; Armstrong R.J.; Wagnell E.; Ibsen S.D. Modulation of antibody activation via covalently tethered protein-L based blocking peptide.
- 3) Seattle Convention Center – BMES Annual Meeting (Oral) 2023
Henderson M.I.; Brasino M.; Armstrong R.J.; Wagnell E.; Ibsen S.D. Harnessing covalently tethered protein-L based blocking peptides to control antibody function.
- 4) Seattle Convention Center – BMES Annual Meeting (Poster) 2023
Henderson M.I.; Eygeris Y.; Tschetter W.; Chirco K.R.; Curtis A.; Fries I.; Jozic A.; Ryals R.C.; Sahay G. Pre-formed vesicle-mediated delivery of messenger RNA for retinal gene therapy.
- 5) Oregon Health & Science University – CURE Symposium (Poster) 2023
Pham H.; **Henderson M.I.**; Xiang L.; Yildirim A. Engineering Biodegradable Ultrasound-Responsive Nanoparticles.
- 6) Oregon Health & Science University – RNAissance Scientific Meeting (Poster) 2022
Henderson M.I.; Eygeris Y.; Jozic A.; Herrera M.; Sahay G. Leveraging biological buffers for efficient messenger RNA delivery via lipid nanoparticles.
- 7) Oregon Health & Science University – CDCB Symposium (Poster) 2021
Henderson M.I.; Eygeris Y.; Landry M.R.; Kim J.; Sun C.; Sahay G. Don't shoot the messenger: combining mRNA cancer nanomedicines with radiation therapy.

- 8) National Council on Undergraduate Research (NCUR) – Virtual Conference ([Oral](#)) 2021
Henderson M.I.; Mukherjee A.; MacDonald K.; Kim J.; Eygeris Y.; Sahay G. Engineered mutant α -ENaC subunit mRNA delivered by lipid nanoparticles reduces amiloride currents in cystic fibrosis-based cell and mice models.
- 9) Carroll College Student Undergraduate Research Festival (SURF) – Virtual Conference ([Oral](#)) 2021
Henderson M.I.; Hewes P.; McHugh T.; Hitt D.M. Studies Towards the synthesis of novel oxadiazole derivatives for antibiotic screening against *Escherichia coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*.
- 10) Carroll College Student Undergraduate Research Festival (SURF) – Virtual Conference ([Oral](#)) 2021
Henderson M.I.; Butler S.; ZwiJack A.; Rowley J.G. Liposomes vs lipid nanoparticle (LNP) antibiotic entrapment efficiency utilizing fluorescein dye.
- 11) Oregon Health & Science University – CDCB Symposium (Poster) 2019
Henderson M.I.; Mukherjee A.; Sahay G. Hijacking EnaC: An innovative gene therapy-based approach to treat cystic fibrosis.
- 12) American Chemical Society – Montana Section Chapter Spring Meeting (Poster) 2019
Henderson M.I.; Fonte M.; Hitt D. M.; Rowley J. Synthesis of 2-(4-ethoxycarbonylphenyl) thiophene and 5,5'-(4-ethoxycarbonylphenyl)-2,2'-bithiophene: case study of a derivative synthesis project to support a Hammett analysis of an electrochemical oxidative dimerization.

INVITED SEMINARS

- 1) Oregon Health & Science University, Biomedical Engineering Department Special Seminar 2023
- 2) Portland State University Summer Research Academy Tabling Event OHSU Representative 2023
- 3) Marist Catholic High School, Invited STEM Panelist 2023
- 4) Carroll College, *Pre-Medical Club*, Invited STEM Career Panelist 2023

PROFESSIONAL MEMBERSHIPS

- Member, Biomedical Engineering Society (BMES) 2023 –
- Member, American Association for Cancer Research (AACR) 2023 –

LEADERSHIP EXPERIENCE

Oregon Health & Science University

- OHSU Research Week Graduate Research Committee Representative 2023 –
- All-Hill Executive Board | Vice President of Budget/Finance 2023 –
- All-Hill | Graduate Student Organization | Student Representative 2022 –
- Contributed to monthly multi-department communication meetings and seasonal professional development/social events for the 4-5,000 students at OHSU.
- OHSU Weekly Pick-Up Basketball Facilitator 2023 –
- Organizer of weekly indoor basketball matches for ~10+ across-department OHSU members.
- Knight Cancer Institute Soccer Organizer Facilitator 2022 –2023
- Lead facilitator of weekly outdoor soccer matches for ~30+ employees/staff/student body at OHSU.

Carroll College

- Pre-Medical Club (PMC); Senior Officer - Sergeant at Arms Helena, MT
 August 2020 – May 2021
- Collaborated in creating interactive club meetings and assisted members find local clinical work.
 - Established a mentoring program for the success of future club funding and leadership.

Photography Club; Associated Students of Carroll College (ASCC) Representative October 2018

- Coordinated the creation and funding of Carroll College Photography Club.

PROFESSIONAL SERVICE AND OUTREACH

OHSU Food Resource Center

Portland, OR

Pantry Volunteer

October 2022 –

- Improved food availability for peers by center upkeep and distribution of fresh foods weekly.

HELPS International/Cascade Medical Team

Santa Cruz Del Quiché, Guatemala

Sterile Processor, Nursing Assistant, Team Photographer, Surgical Scrub Tech. 2018, 2020, 2022, 2024

- Diligently sterilized hundreds of medical instruments to ensure proper surgical protocol.
- Provided excellent post-operative care for Guatemalan's that underwent surgical operations.
- Generated quality videos and photography to promote future medical missions.
- Invited to showcase photos of women in STEM at Wayne Lyman Morse U.S. Federal Courthouse.

Helena Food Share

Pantry Assistant

April 2020 – May 2021

- Proficiently used team communication to distribute food and quality service to those in need within the greater Helena community.
- Generated a \$200,000 Kids Pack Program draft grant proposal.

Helena Climbers Coalition

Helena, MT

Climbing Member and Guidebook Photographer

September 2018 – May 2021

- Contributed to coalition's guidebook publication through photographing local climbers
 - Mergenthaler, J., Helena Climbers Coalition. *Central Montana Rock*. (Sharp End Publishing, 2022) 2nd edition; pages 80, 83, 87.

Northwest Surgical Specialist, LLP

Springfield, OR

Patient Educational Video Creator

2018

- Created 2 sets of 6 educational videos covering pre, peri, and post operative care for colorectal and esophageal surgery pathway patients.

REFERENCES

Available upon request