

TERREN KATHRYN NIETHAMER, PH.D.

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I am fascinated by endothelial cell biology in the lung, and my research aims to identify molecular and cell biological mechanisms these cells use to promote lung development and regeneration. My background in lung biology, developmental morphogenesis, cell biology, and cell signaling make me ideally suited to pursue this goal.

EDUCATION AND TRAINING

- Postdoctoral Fellowship** at the University of Pennsylvania October 2018-present
Perelman School of Medicine
Advisor: Edward E. Morrisey, Ph.D.
“Endothelial cell signaling in regeneration of the lung”
- Ph.D.** University of California, San Francisco September 2018
Department of Cell and Tissue Biology
Biomedical Sciences Graduate Program

Dissertation: “Ephrin-B1 Regulation of Cell Positioning
in Development and Congenital Disease”

Advisor: Jeffrey O. Bush, Ph.D.
Committee: Ophir D. Klein, M.D., Ph.D. (chair);
Bruce Conklin, M.D.; Zev J. Gartner, Ph.D.
- B.A.** University of Pennsylvania May 2011
Major in Chemistry
Minor in French
Graduated *Summa Cum Laude*
Inducted into Phi Beta Kappa

FUNDING

K99/R00 Pathway to Independence Award (K99HL164960)

Terren K. Niethamer (PI)
Title: Endothelial cell signaling in regeneration of the lung
National Heart, Lung, and Blood Institute, National Institutes of Health
Received an impact score of 10
09/01/2022-present

F32HL152664

Terren K. Niethamer (PI)
Title: Functions of specialized pulmonary endothelial cell types in regeneration of the lung
National Heart, Lung, and Blood Institute, National Institutes of Health
07/01/2020-06/30/2022

T32HL007586

Steven M. Albelda (PI)

Pulmonary Immunology Training Grant

National Heart, Lung, and Blood Institute, National Institutes of Health

07/01/2019-06/30/2020

F31DE026059

Terren K. Niethamer (PI)

Title: Defining the cellular mechanisms of craniosynostosis in a human induced pluripotent stem cell model of craniofrontonasal syndrome

National Institute of Dental and Craniofacial Research, National Institutes of Health

09/01/2016-11/30/2018

National Science Foundation Graduate Research Fellowship

Terren K. Niethamer (Fellow)

9/1/2013-8/31/2016

PUBLICATIONS

Under Review

Niethamer TK, Levin LI, Morley MP, Babu A, Zhou S, Morrisey EE. Atf3 defines a population of pulmonary endothelial cells essential for lung regeneration. *bioRxiv* **2022** doi: 10.1101/2022.10.14.512212. Under review at *eLife*.

Peer-Reviewed Publications

Mincer ST, **Niethamer TK**, Teng T, Bush JO, Percival CJ. Investigating the effects of compound paralogous EPHB receptor mutations on mouse facial development. *Dev Dyn.* **2022** Jul;251(7):1138-1155. doi: 10.1002/dvdy.454.

Sun X, Perl AK, Li R, Bell SM, Sajti E, Kalinichenko VV, Kalin TV, Misra RS, Deshmukh H, Clair G, Kyle J, Crotty Alexander LE, Masso-Silva JA, Kitzmiller JA, Wikenheiser-Brokamp KA, Deutsch G, Guo M, Du Y, Morley MP, Valdez MJ, Yu HV, Jin K, Bardes EE, Zepp JA, **Niethamer T**, Basil MC, Zacharias WJ, Verheyden J, Young R, Bandyopadhyay G, Lin S, Ansong C, Adkins J, Salomonis N, Aronow BJ, Xu Y, Pryhuber G, Whitsett J, Morrisey EE. A census of the lung: CellCards from LungMAP. *Dev Cell.* **2022** Jan 10;57(1):112-145.e2. doi: 10.1016/j.devcel.2021.11.007.

Niethamer TK, Stabler CT, Leach JP, Zepp JA, Morley MP, Babu A, Zhou S, Morrisey EE. Defining the role of pulmonary endothelial cell heterogeneity in the response to acute lung injury. *eLife* **2020**, 9, e53072. doi: 10.7554/eLife.53072

Zepp JA, Morley MP, Loebel C, Kremp MM, Chaudhry FN, Basil MC, Leach JP, Liberti DC, **Niethamer TK**, Ying Y, Jayachandran S, Babu A, Zhou S, Frank DB, Burdick JA, Morrisey EE. Genomic, epigenomic, and biophysical cues controlling the emergence of the lung alveolus. *Science* **2021**, 371, 6534. doi: 10.1126/science.abc3172.

Niethamer TK*, Teng T*, Franco M, Du YX, Percival CJ, Bush JO. Aberrant cell segregation in the craniofacial primordium and the emergence of facial dysmorphology in craniofrontonasal syndrome. *PLoS Genetics* **2020**, 16 (2), e1008300. doi: 10.1371/journal.pgen.1008300

Niethamer TK, Bush JO. Getting direction(s): The Eph/ephrin signaling system in cell positioning. *Developmental Biology* **2019**, 447 (1), 42-57. doi: 10.1016/j.ydbio.2018.01.012

Niethamer TK, Larson AR, O'Neill AK, Bershteyn M, Hsiao EC, Klein OD, Pomerantz JH, Bush JO. EPHRIN-B1 Mosaicism Drives Cell Segregation in Craniofrontonasal Syndrome hiPSC-Derived Neuroepithelial Cells. *Stem Cell Reports* **2017**, 8 (3), 529-537.

O'Neill AK, Kindberg AA*, **Niethamer TK***, Larson AR, Ho HH, Greenberg ME, Bush JO. Unidirectional Eph/ephrin signaling creates a cortical actomyosin differential to drive cell segregation. *J Cell Biol* **2016**, 215 (2), 217-229.

Niethamer TK, Yardeni T, Leoyklang P, Ciccone C, Astiz-Martinez A, Jacobs K, Zervas PM, Gahl WA, Huizing M. Oral monosaccharide therapies to reverse renal and muscle hyposialylation in a mouse model of GNE myopathy. *Molecular Genetics and Metabolism* **2012**, 107, 748-755.

Kakani S, Yardeni T, Poling J, Ciccone C, **Niethamer T**, Klootwijk RD, Manoli I, Darvish D, Hoogstraten-Miller S, Zervas P, Tian E, Ten Hagen KG, Kopp JB, Gahl WA, Huizing M. The *Gne* M712T mouse as a model for human glomerulopathy. *The American Journal of Pathology* **2012**, 180 (4), 1431-1440.

Yardeni T, Jacobs K, **Niethamer TK**, Ciccone C, Anikster Y, Kurochkina N, Gahl WA, Huizing M. Murine isoforms of UDP-GlcNAc 2-epimerase/ManNAc kinase: Secondary structures, expression profiles, and response to ManNAc therapy. *Glycoconjugate Journal* **2013**, 30 (6), 609-618. DOI 10.1007/s10719-012-9459-1.

Molander GA, Beaumard F, **Niethamer TK**. Cross-Coupling of Methylated Phenol Derivatives with Potassium Cyclopropyltrifluoroborate. *J. Org. Chem.* **2011**, 76, 8126-8130.

*authors contributed equally to this work

Complete list of publications in MyBibliography:

<https://www.ncbi.nlm.nih.gov/myncbi/1toN9N-cSohkg/bibliography/public/>

RESEARCH EXPERIENCE

Postdoctoral Fellow

2018-present

University of Pennsylvania, Philadelphia, PA

Advisor: Edward E. Morrisey, Ph.D.

- Defined novel subtypes of endothelial cells (ECs) in the distal lung at homeostasis and during regeneration after viral infection, published in *eLife*
- My current work characterizes novel mechanisms of pulmonary EC regeneration and demonstrates how ECs contribute to maintenance and repair of the alveolar niche
- Won awards for best poster at a local symposium and Gordon Research Conference
- Leading and mentoring a team within the Morrisey lab composed of an undergraduate student and a research technician
- Developing an independent research program that will extend my postdoctoral work to investigate the role of endothelial cell signaling in morphogenesis during alveolar development and repair

Ph.D. Student

2012-2018

University of California, San Francisco, CA

Advisor: Jeffrey O. Bush, Ph.D.

- Determined tissue specificity of dysmorphogenesis and craniofacial defects caused by aberrant ephrin-B1 signaling in a mouse model for craniofrontonasal syndrome
- Collaborated with a morphometrics expert to determine the effects of EphB receptor mutations on facial shape
- Developed a human induced pluripotent stem cell model for aberrant ephrin-B1-mediated cell segregation in craniofrontonasal syndrome
- Elucidated cellular and biochemical mechanisms of ephrin-B1-mediated cell segregation using a cell culture system

Postbaccalaureate Intramural Research Training Award

2011-2012

National Human Genome Research Institute, National Institutes of Health

Advisors: William A. Gahl, M.D., Ph.D.; Marjan Huizing, Ph.D.

- Demonstrated hyposialylation of the glycoproteins nephrin and podocalyxin in a mouse model for *GNE* myopathy
- Rescued sialylation and kidney and muscle disease in a mouse model of *GNE* myopathy using oral and liposome delivery of monosaccharide therapies, contributing to a clinical trial of these therapies for human patients
- Studied Medical Genetics at the Foundation for Advanced Education in the Sciences

NIH Summer Internship Program

June-August 2010

National Human Genome Research Institute, National Institutes of Health

Advisors: William A. Gahl, M.D., Ph.D.; Marjan Huizing, Ph.D.

- Demonstrated hyposialylation of the glycoproteins nephrin and podocalyxin in a mouse model for *GNE* myopathy

Undergraduate Researcher in Chemistry

2009-2011

University of Pennsylvania, Philadelphia, PA

Advisor: Gary Molander, Ph.D.

- Developed a novel method for introducing the cyclopropyl group into organic molecules through my honors independent research project entitled "C-O activation of mesylated phenol derivatives in palladium-catalyzed cross-coupling reactions"
- Evaluated a more cost-effective method for the deprotection of alcohols
- Converted boronic acids to trifluoroborates for use in palladium-catalyzed cross-coupling reactions

Chemist and Summer Intern

Summers 2007 and 2009

Arista Laboratories, Richmond, VA

Advisor: Richard Higby, Ph.D.

- Worked in the Analytical and Research & Development groups
- Operated gas and liquid chromatographs using *Empower* and *Chemstation*
- Learned techniques in gas and liquid chromatography and mass spectrometry

LEADERSHIP, MENTORING, AND OUTREACH ACTIVITIES

The mentorship I have received has played a critical role in my success in biomedical science thus far, and serving and guiding others in their scientific journeys will be one of the most important aspects of my future career. The two essential tenets of my mentorship philosophy are to sponsor my trainees in addition to mentoring them, and to address the individual goals of each student or trainee by adapting my mentorship style to their needs.

Trainees Mentored

- Tiffany Lim** June 2022-present
Undergraduate researcher in the Morrisey lab
Project: Effect of Vegf signaling on CAP2 endothelial cell regeneration after viral lung injury
- Lillian I. Levin, B.S.** July 2021-present
Research technician in the Morrisey lab
Project: Investigating the role of CAP2 endothelial cell signaling in lung regeneration
- Yu Xin Victoria Du, B.S.** 2017-2018
Undergraduate researcher and research technician in the Bush lab
- Abigail Kindberg, B.S., Ph.D.** 2015-2018
Ph.D. student in the Bush lab
- Megan Hadley, B.S.** Summer 2011
NIH Summer Internship Program student in the Gahl lab

Teaching Experience

- Tutor, BMS 255: Genetics and Genomics** 2015-2018
University of California, San Francisco
- Worked with students individually and in small groups to prepare problem sets and study for exams, work through extra practice problems, and answer course questions
 - The course covers the following topics: model organism genetics (bacteria and bacteriophage, yeast, *C. elegans*, *Drosophila*, zebrafish, and mouse) and human genetics and genomics (including Mendelian genetics, complex trait genetics, and genomic and transcriptomic technologies and experimental design)
- Science and Health Education Partnership** 2015
Aptos Middle School, San Francisco, CA
- Designed and taught eight science lessons in a 7th grade classroom
 - Helped students learn experimental design and data collection through performing experiments including a sheep heart dissection
- Teaching Assistant, BMS 255: Genetics and Genomics** 2014
University of California, San Francisco
- This course is required for all first-year Biomedical Sciences Ph.D. students (approximately 45 students) and covers the topics listed above
 - Attended all course lectures and conducted four review sessions for problem sets, midterms, and final exams for all 45 students during the winter academic quarter
 - Worked with course faculty to prepare exam questions and graded problem sets and exams
 - Learned about methods of course direction for graduate students

Science and Health Education Partnership 2013
Edison Charter School, San Francisco, CA

- Designed and taught four science lessons in 7th and 8th grade classrooms
- Taught basics of experimental design through hands-on experiments including squid dissection, comparative density, and measuring pH

Leadership, Outreach, and Professional Service

Member of the Biomedical Postdoctoral Council 2022-present
Advocacy Committee

Participate in biweekly meetings and advocate for improvements to the postdoctoral experience at the University of Pennsylvania

Conference Co-Organizer, Trainees Only Session 2020-present

NHLBI Progenitor Cell Translational Consortium

Organized the Trainees Only Sessions of the Annual Meetings in 2020 and 2021 and will assist with the upcoming meeting in 2023

Peer Reviewer 2020-present

for *STAR Protocols* (Cell Press)

Member of the BREATH Consortium IMPACT Team 2020-present

Participate in meetings of a team of researchers focused on improving clinical translation of consortium research

Student Interviewer, Biomedical Sciences Graduate Program 2015-2018

Interviewed prospective Ph.D. students for the Biomedical Sciences graduate program at the University of California, San Francisco

Co-Leader, F31 Fellowship Application Workshop 2017

Led a workshop for Biomedical Sciences Ph.D. students to explain the F31 application process and help students improve applications

Mentor, NSF Fellowship Application Workshop 2014-2017

Worked individually with Biomedical Sciences Ph.D. students to improve their application materials for the NSF Graduate Research Fellowship

Volunteer, Bay Area Science Festival 2014 and 2017

Conducted experimental demonstrations and helped with load-in and clean-up

Organizer, Student Sponsored Seminar Speaker 2014

Polled students to determine a student-invited speaker for the Biomedical Sciences Seminar Series; organized the invited speaker's visit from meetings to presentation

Biomedical Sciences Student Admissions Committee 2012-2013

Planned and organized interview weekends for prospective Ph.D. students and gave feedback on candidates

HONORS AND AWARDS

Best Poster, Gordon Research Conference in Lung Development, Injury and Repair	2021
Best Poster, Biomedical Postdoctoral Symposium Symposium for postdoctoral fellows at the University of Pennsylvania	2021
Best Oral Presentation, Gordon Research Seminar in Craniofacial Morphogenesis and Tissue Regeneration	2018
UCSF Graduate Division Travel Award Abstract chosen for funding to travel to the Gordon Research Conference in Craniofacial Morphogenesis and Tissue Regeneration	2018
Outstanding Poster Award, NIH Postbaccalaureate Poster Day	2012
American Chemical Society Scholastic Achievement Award Presented by the Philadelphia Section of ACS to the top-ranking senior majoring in chemistry in each university in the area	2011
Benjamin Franklin Scholar Certificate Recognizes Benjamin Franklin Scholars at the University of Pennsylvania who complete 8 BFS courses and present an independent research project	2011
Scholar-Athlete 4.0 Club Recognizes athletes at the University of Pennsylvania who receive a 4.0 grade point average at least one semester of each academic year	2007-2011
Dean's List, University of Pennsylvania	2007-2011
Women's Varsity Swimming and Diving Team Spirit Award	2011
Inducted into Phi Beta Kappa Inducted as a junior at the University of Pennsylvania	2010

SELECTED PRESENTATIONS

Poster Presentation. *ATF3 promotes endothelial cell response to acute lung injury.* FASEB Conference in Lung Epithelial Biology, August 2022, Saxton's River, VT.

Invited Talk and Poster Presentation. *Pulmonary endothelial cell expression of ATF3 plays a critical role in lung regeneration.* Gordon Research Seminar and Conference in Lung Development, Injury and Repair, November 2021, Waterville, NH.

Invited Talk. *Endothelial ATF3 plays a critical role in lung regeneration.* NHLBI Progenitor Cell Translational Consortium Annual Meeting, September 2021, virtual format.

Invited Talk. *Interaction Between Epithelial Cells and Vasculature in the Lung.* American Thoracic Society Annual Meeting, April 2021, virtual format.

Poster Presentation. *Defining the role of pulmonary endothelial cells in regeneration of the lung.* Biomedical Postdoctoral Council Postdoc Symposium, January 2021, virtual format.

Invited Talk. *Regeneration of the pulmonary vasculature after acute lung injury.* Penn-Children's Hospital of Philadelphia Lung Biology Institute Symposium, October 2020, virtual format.

Breakout Session Presentation. *Role of heterogeneous pulmonary endothelial cells in lung regeneration.* NHLBI Progenitor Cell Translational Consortium Annual Meeting, September 2020, virtual format.

Invited Talk. *Defining the role of pulmonary endothelial cells in regeneration of the lung.* Biomedical Postdoctoral Council Postdoc Symposium, October 2019, Philadelphia, PA.

Poster Presentation. *Defining the role of pulmonary endothelial cell heterogeneity in the response to acute lung injury.* Progenitor Cell Translational Consortium Annual Meeting, September 2019, Boston, MA.

Poster Presentation. *The role of pulmonary endothelial cell heterogeneity in the response to acute lung injury.* Gordon Research Conference in Lung Development, Injury, and Repair, August 2019, Lewiston, ME.

Invited Talk and Poster Presentation. *Working towards a therapeutic strategy for craniofrontonasal syndrome: defining the timing and cell type specificity of aberrant EPHRIN-B1-mediated cell segregation.* Gordon Research Seminar and Conference in Craniofacial Morphogenesis and Tissue Regeneration, February 2018, Lucca, Italy.

Poster Presentation. *How an embryo knows its boundaries: Timing and specificity of EPHRIN-B1-mediated cell segregation in craniofrontonasal syndrome.* International Society for Stem Cell Research Annual Meeting, June 2017, Boston, MA.

Poster Presentation. *How an embryo knows its boundaries: Using induced pluripotent stem cells to model the congenital disease craniofrontonasal syndrome.* International Society for Stem Cell Research Annual Meeting, June 2016, San Francisco, CA.

Invited Talk. *EPHRIN-B1-mediated cell sorting in a human induced pluripotent stem cell model of craniofrontonasal syndrome.* UCSF Biomedical Sciences Program Retreat, October 2015, Granlibakken, Lake Tahoe, CA.

Poster Presentation. *EPHRIN-B1-mediated cell sorting in a human induced pluripotent stem cell model of craniofrontonasal syndrome.* Tri-Institutional Stem Cell Retreat, May 2015, Santa Barbara, CA.

Poster Presentation. *Utilizing Liposomes for Successful Systemic Delivery of Mono-saccharides.* Medical Genetics Branch Site Visit Poster Session, June 2012, Bethesda, MD.

Poster Presentation. *Comparison of Oral and Liposome Delivery of ManNAc to Rescue Renal Hyposialylation.* NIH Postbaccalaureate Poster Day, April 2012, Bethesda, MD.

Poster Presentation. *Palladium-catalyzed C-O Activation of Mesylated Phenol Derivatives with Potassium Cyclopropyltrifluoroborates.* Benjamin Franklin Scholars Research Symposium, Spring 2011, Philadelphia, PA.

PROFESSIONAL AFFILIATIONS

North American Vascular Biology Organization, 2021-Present
Trainee Member

American Heart Association, 2019-2020
Trainee Member

LANGUAGES

English: Native Language

French: Advanced Listener, Intermediate Speaker, Advanced Reading and Writing

Spanish: Novice Listener, Novice Speaker

REFERENCES

Dr. Edward E. Morrisey, Ph.D., Robinette Foundation Professor of Cardiovascular Medicine
Department of Medicine, Cardiovascular Institute
Department of Cell and Developmental Biology
Director, Penn-CHOP Lung Biology Institute
University of Pennsylvania Perelman School of Medicine

Dr. Jeffrey O. Bush, Ph.D., Professor and Department Chair
Department of Cell and Tissue Biology
School of Dentistry
University of California, San Francisco

Dr. Mark L. Kahn, M.D., Edward S. Cooper, M.D./Norman Roosevelt and Elizabeth Meriwether McLure Professor of Cardiovascular Medicine
Department of Medicine, Cardiovascular Institute
University of Pennsylvania Perelman School of Medicine

Dr. Ophir D. Klein, M.D., Ph.D., Vice Dean, Children's Services, Pediatrics
Executive Director, Guerin Children's Hospital, Cedars-Sinai Medical Center
Director, Program in Craniofacial Biology, University of California, San Francisco