

Nicholas W. Chavkin, Ph.D.

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EDUCATION

- 2011 – 2016 **University of Washington**
Ph.D. in Bioengineering
- 2010 – 2011 **University of Southern California**
M.S. in Biomedical Engineering
- 2006 – 2010 **University of Southern California**
B.S. in Biomedical (Biochemical) Engineering

FUNDING

Current

- 2024 – 2027 **K22 NIA Career Development Award** (AG081323 - \$531,000 direct)
“The Role of Hematopoietic Loss of Y Chromosome on Aging Phenotypes”
**Funding initiated at start of tenure-track position*
- 2023 – 2026 **AHA Career Development Award** (23CDA1054358 - \$210,000 direct)
“Age-Related Loss of Y Chromosome on Heart Failure”
- 2023 **UVA Cardiology Funding Award** (Internal - \$20,000 direct)
“Meta-Analysis of Single Cell Cardiac Transcriptome in Human Cardiomyopathies”

POSITIONS

- 2023 – Present **Research Assistant Professor**, University of Virginia School of Medicine
Division of Cardiovascular Medicine
Robert M. Berne Cardiovascular Research Center
Research: Cardiovascular disease mechanisms in age-related pathology
- 2016 – 2023 **Postdoctoral Researcher**, University of Virginia, Boston University, Yale University
Co-Mentors: Dr. Ken Walsh (BU & UVA) and Dr. Karen Hirschi (Yale & UVA)
Robert M. Berne Cardiovascular Research Center Fellow
Whitaker Cardiovascular Institute Fellow
Research: Cellular mechanisms of cardiovascular development and disease
- 2011 – 2016 **Ph.D. Student**, University of Washington
Mentor: Dr. Cecilia Giachelli
NIH F31 NRSA Fellow
Bioengineering Cardiovascular Training Grant Fellow
Research: Role of phosphate transporter, PiT-1, in vascular calcification mechanisms
- 2008 – 2011 **Undergraduate Student**, University of Southern California, University of Washington
Mentors: Dr. Steven Finkel (USC, Academic Year) & Dr. David Baker (UW, Summer)
USC Viterbi School of Engineering Merit Research Scholar
Research: Bacterial engineering for microbial fuel cells (USC) and CO₂ fixation (UW)

PUBLICATIONS

Selected Publications

- Chavkin NW**, Genet G, Poulet M, Genet N, Marziano C, Vasavada H, Nelson EA, Kour A, McDonnell SP, Huba M, Walsh K, Hirschi KK. (2022) Endothelial Cell Cycle State Determines Propensity for Arterial-Venous Fate. *Nature Communications*. 13(1): 5891.
- Sano S, Horitani K, Ogawa H, Halvardson J, **Chavkin NW**, Wang Y, Sano M, Mattisson J, Hata A, Danielsson M, Miura-Yura E, Zaghlool A, Evans MA, Fall T, De Hoyos HN, Sundström J, Yura Y, Kour A, Arai Y, Thel MC, Arai Y, Mychaleckyj JC, Hirschi KK, Forsberg LA, Walsh K. (2022) Hematopoietic loss of Y chromosome leads to cardiac fibrosis and heart failure mortality. *Science*. 377(6603): 292-297.
*Accompanied by Perspective in Science, Article by New York Times.
- Chavkin NW**, Sano S, Wang Y, Oshima K, Ogawa H, Horitani K, Sano M, MacLauchlan S, Nelson A, Setia K, Vipra T, Watanabe Y, Saucerman JJ, Hirschi KK, Gokce N, Walsh K. (2021) The Cell Surface Receptors Ror1/2 Control Cardiac Myofibroblast Differentiation. *Journal of the American Heart Association*. 10(13): e019904.
- Chavkin NW**[#], Walsh K, Hirschi KK. (2021) Isolation of Highly Purified and Viable Retinal Endothelial Cells. *Journal of Vascular Research*. 58(1): 49-57. [#]Corresponding Author *Editor's Choice journal distinction
- Chavkin NW**, Chia JJ, Crouthamel MH, Giachelli CM. (2015) Phosphate uptake-independent signaling functions of the type III sodium-dependent phosphate transporter, PiT-1, in vascular smooth muscle cells. *Experimental Cell Research*. 333(1): 39-48.

Additional Publications

- Chavkin NW**, Evans M, Walsh K. News & Views on "Identification of cell-intrinsic effects of clonal hematopoiesis in heart failure" - How clonal hematopoiesis promotes inflammation at a single cell level. *Nature Cardiovascular Research*. In Press.
- Cochran J, Yura Y, Thel M, Doviak H, Arai Y, Arai Y, Horitani K, Park E, **Chavkin NW**, Kour A, Sano S, Mahajan N, Evans M, Huba M, Sun H, Ban Y, Hirschi KK, Druley T, Ezekowitz J, Dyck J, Walsh K. Clonal hematopoiesis in clinical and experimental heart failure with preserved ejection fraction. *Circulation*. In Press.
- Acharya BR, Fang JS, Jeffery ED, **Chavkin NW**, Genet G, Vasavada H, Nelson EA, Sheynkman GM, Humphries MJ, Hirschi KK. (2023) Connexin 37 sequestering of activated-ERK in the cytoplasm promotes p27-mediated endothelial cell cycle arrest. *Life Science Alliance*. 6(8): e202201685.
- Genet N, Genet G, **Chavkin NW**, Paila U, Fang JS, Vasavada HH, Goldberg JS, Acharya BR, Bhatt NS, Baker K, McDonnell SP, Huba M, Sankaranarayanan D, Ma GZM, Eichmann A, Thomas JL, Ffrench-Constant C, Hirschi KK. (2023) Connexin 43-mediated neurovascular interactions regulate neurogenesis in the adult brain subventricular zone. *Cell Reports*. 42(4): 112371.
- Correia-Branco A, Mei A, Pillai SS, Jayaraman N, Sharma R, Paquette AG, Neradugomma NK, Benson C, **Chavkin NW**, Mao Q, Wallingford MC. (2023) SLC20a1/PiT-1 is required for chorioallantoic placental morphogenesis. *Vascular Biology*. 5(1): e220018.
- Chavkin NW**, Min KD, Walsh K. (2022) Importance of clonal hematopoiesis in heart failure. *Trends in Cardiovascular Medicine*. 32(4): 198-203.
- Chavkin NW**[#], Cain S, Walsh K, Hirschi KK. (2021) Isolation of Murine Retinal Endothelial Cells for Next-Generation Sequencing. *Journal of Visualized Experiments*. (176): 10.3791/63133. [#]Corresponding Author
- Yura Y, Miura-Yura E, Katanasaka Y, Min KD, **Chavkin N**, Polizio AH, Ogawa H, Horitani K, Doviak H, Evans MA, Sano M, Wang Y, Boroviak K, Philippos G, Domingues AF, Vassiliou G, Sano S, Walsh K. (2021) The Cancer Therapy-Related Clonal Hematopoiesis Driver Gene Ppm1d Promotes Inflammation and Non-Ischemic Heart Failure in Mice. *Circulation Research*. 129(6): 684-698.
- Tavakol DN, Chen J, **Chavkin NW**, Tavakol TN, Hirschi KK, Vunjak-Novakovic, G. (2021) Lessons from Biology: Engineering Design Considerations for Modeling Human Hematopoiesis. *Current Stem Cell Reports*. 7: 174-184.

- Chavkin NW**, Leaf EM, Brooks KE, Wallingford MC, Lund SM, Giachelli CM. (2021) Adapter Protein RapGEF1 Is Required for ERK1/2 Signaling in Response to Elevated Phosphate in Vascular Smooth Muscle Cells. *Journal of Vascular Research*. 58(5): 277-285.
- Nelson EA, Qiu J, **Chavkin NW**, Hirschi KK. (2021) Directed Differentiation of Hemogenic Endothelial Cells from Human Pluripotent Stem Cells. *Journal of Visualized Experiments*. (169): 10.3791/62391.
- Chavkin NW**, Hirschi KK. (2020) Single Cell Analysis in Vascular Biology. *Frontiers in Cardiovascular Medicine*. 7: 42.
- Chande S, Caballero D, Ho BB, et Chande S, Caballero D, Ho BB, Fetene J, Serna J, Pesta D, Nasiri A, Jurczak M, **Chavkin NW**, Hernando N, Giachelli CM, Wagner CA, Zeiss C, Shulman GI, Bergwitz C. (2020) Slc20a1/Pit1 and Slc20a2/Pit2 are essential for normal skeletal myofiber function and survival. *Scientific Reports*. 10(1): 3069.
- Wallingford MC, Benson C, **Chavkin NW**, Chin MT, Frasch MG. (2018) Placental Vascular Calcification and Cardiovascular Health: It Is Time to Determine How Much of Maternal and Offspring Health Is Written in Stone. *Frontiers in Physiology*. 9: 1044.
- Wallingford MC, Chia JJ, Leaf EM, Borgeia S, **Chavkin NW**, Sawangmake C, Marro K, Cox TC, Speer MY, Giachelli CM. (2017) SLC20A2 Deficiency in Mice Leads to Elevated Phosphate Levels in Cerebrospinal Fluid and Glymphatic Pathway-Associated Arteriolar Calcification, and Recapitulates Human Idiopathic Basal Ganglia Calcification. *Brain Pathology*. 27(1): 64-76.
- Crouthamel MH, Lau WL, Leaf EM, **Chavkin NW**, Wallingford MC, Peterson DF, Li X, Liu Y, Chin MT, Levi M, Giachelli CM. (2013) Sodium-dependent phosphate cotransporters and phosphate-induced calcification of vascular smooth muscle cells: redundant roles for PiT-1 and PiT-2. *Arteriosclerosis Thrombosis and Vascular Biology*. 33(11): 2625-2632.
- Scialla JJ, Lau WL, Reilly MP, Isakova T, Yang HY, Crouthamel MH, **Chavkin NW**, Rahman M, Wahl P, Amaral AP, Hamano T, Master SR, Nessel L, Chai B, Xie D, Kallem RR, Chen J, Lash JP, Kusek JW, Budoff MJ, Giachelli CM, Wolf M; Chronic Renal Insufficiency Cohort Study Investigators. (2013) Fibroblast growth factor 23 is not associated with and does not induce arterial calcification. *Kidney International*. 83(6): 1159-1168.
- Schindler AG, Messinger DI, Smith JS, Shankar H, Gustin RM, Schattauer SS, Lemos JC, **Chavkin NW**, Hagan CE, Neumaier JF, Chavkin C. (2012) Stress produces aversion and potentiates cocaine reward by releasing endogenous dynorphins in the ventral striatum to locally stimulate serotonin reuptake. *Journal of Neuroscience*. 32(49): 17582-17596.

MyNCBI Bibliography: <https://www.ncbi.nlm.nih.gov/myncbi/1rkjjzZ-wzrQpu/bibliography/public/>

In Progress

- Genet G, Genet N, **Chavkin NW**, Cain S, Paila U, Serbulea V, McDonnell S, Sankaranarayanan D, Huba M, Nelson E, Hirschi KK. Induced Endothelial Cell Cycle Arrest Prevents Arterio-venous Malformations in Hereditary Hemorrhagic Telangiectasia. *Circulation*. Revision Submitted.
- Chavkin NW**[#], Vipra T, Jung CH, McDonnell S, Hirschi KK, Gokce N, Walsh K[#]. Obesity Accelerates Endothelial-to-Mesenchymal Transition in Adipose Tissues of Mice and Humans. *Frontiers in Cardiovascular Medicine*. Under Review. [#]Co-corresponding authors.
- Dunaway L, Luse M, Nyshadham S, Alencar G, **Chavkin NW**, Cortese-Krott M, Hirschi KK, Bulut G, Isakson B. Loss of endothelial cell heterogeneity in arteries after obesogenic diet. *ATVB*. Initial Submission.

HONORS & AWARDS

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| 2023 | AHA Career Development Award |
| 2022 | Travel Award – International Vascular Biology Meeting |
| 2021 | Poster Award – North American Vascular Biology Organization Annual Meeting |

2020	Poster Award – North American Vascular Biology Organization Annual Meeting
2019	Travel Award – BCVS, American Heart Association Scientific Sessions
2018 – 2020	UVA Cardiovascular Research T32 Training Grant
2018	Travel Award – North American Vascular Biology Organization Annual Meeting
2017 – 2018	BU Whitaker Cardiovascular Institute T32 Training Grant
2015 – 2016	F31 NHLBI Predoctoral National Research Service Award
2015	AHA Predoctoral Fellowship (Declined funding)
2014	Travel Award – American Society of Nephrology Kidney Week Conference
2013 – 2015	UW Bioengineering Cardiovascular T32 Training Grant
2009 – 2010	USC Viterbi School of Engineering Merit Research Scholarship

PRESENTATIONS

Invited Talks

2023	“Age-Related Somatic Mutations and Heart Failure”. <i>Weill Cornell Medical College Cardiovascular Research Institute</i> , New York, NY
2022	“Hematopoietic Loss of Y Chromosome Leads to Cardiac Fibrosis and Heart Failure Mortality”. <i>University of Virginia Biochemistry and Molecular Genetics Postdoctoral Symposium</i> , Charlottesville, VA
2021	“Endothelial Cell Cycle State Determines Propensity for Arterial-Venous Fate”. <i>North American Vascular Biology Organization Focus Sessions</i> , Online Seminar
2021	“The Cell Surface Receptors Ror1/2 Control Cardiac Myofibroblast Differentiation”. <i>American Society for Matrix Biology e-Symposium</i> , Online Seminar
2019	“Adipose Tissue and Endothelial Cell Crosstalk”. <i>American Heart Association Scientific Sessions</i> , Philadelphia, PA

Oral Presentations

2023	“Hematopoietic Loss of the Y Chromosome Promotes Cardiac Fibrosis through Epigenetic Regulation of Autosomal Genes in Monocytes and Macrophages”. <i>Keystone Symposium: All Cells Considered</i> , Santa Fe, NM
2023	“Obesogenic Diet Promotes Endothelial-to-Mesenchymal Transition in Adipose Tissue”. <i>Gordon Research Conference on Vascular Cell Biology</i> , Ventura, CA
2022	“Obesogenic Diet Promotes Endothelial-to-Mesenchymal Transition in Adipose Tissue”. <i>International Vascular Biology Meeting</i> , San Francisco, CA
2022	“Endothelial Cell Cycle State Determines Propensity for Arterial-Venous Fate”. <i>Gordon Research Conference on Endothelial Cell Phenotypes in Health and Disease</i> , Castelldefels, Spain
2021	“The Cell Surface Receptors Ror1/2 Control Cardiac Myofibroblast Differentiation”. <i>AHA BCVS Scientific Sessions</i> , Online Seminar
2020	“Endothelial Cell Cycle State Determines Propensity for Arterial-Venous Fate”. <i>North American Vascular Biology Organization Annual Meeting</i> , Online Seminar
2019	“Noncanonical Wnt receptors Ror1/2 are induced by fibroblast activation and protect the injured heart by inhibiting myofibroblast recruitment of proinflammatory leukocytes”. <i>American Heart Association Scientific Sessions</i> , Philadelphia, PA
2015	“Phosphate uptake-independent cell signaling through PiT-1 promotes elevated phosphate-induced ERK1/2 phosphorylation, osteochondrogenic differentiation, and

calcification in vascular smooth muscle cells". *North American Vascular Biology Organization Annual Meeting*, Hyannis, MA

- 2014 "PiT-1 Signaling through ERK1/2 Promotes Smooth Muscle Cell Osteochondrogenic Phenotype Change and Calcification". *American Society of Nephrology Kidney Week Conference*, Philadelphia, PA
- 2013 "Phosphate Transport-Dependent and –Independent functions of the Sodium Dependent Phosphate Transporter, PiT-1, in Vascular Smooth Muscle Cell Mineralization". *American Society of Nephrology Kidney Week Conference*, Atlanta, GA

Poster Presentations

- 2023 "Age-Related Accumulation of Leukocytes with Loss of Y Chromosome in Lungs, Kidneys, and Hearts during Aging in Males". *American Aging Association Annual Meeting*, Oklahoma City, OK
- 2022 "Obesogenic Diet Promotes Endothelial-to-Mesenchymal Transition in Adipose Tissue". *AHA BCVS Scientific Sessions*, Chicago, IL
- 2021 "Endothelial Cell Cycle State Determines Propensity for Arterial-Venous Fate". *North American Vascular Biology Organization Annual Meeting*, Online Conference
- 2019 "Endothelial cell cycle state determines propensity for arteriovenous specification". *North American Vascular Biology Organization Annual Meeting*, Asilomar, CA
- 2018 "Late G1 arrest occurs in endothelial cells during arterial specification". *Gordon Research Seminar on Endothelial Cell Phenotypes in Health and Disease*, Lucca, Italy
- 2017 "Cell cycle regulation in maturation and maintenance of endothelial cell specification". *Yale University Vascular Biology and Therapeutics Retreat*, New Haven, CT
- 2017 "Development and maintenance of arterial endothelial cells induces sustained G1 arrest". *Boston University Medical Center Evans Research Days*, Boston, MA
- 2016 "Role of Rap1 guanine nucleotide exchange factor, RapGEF1, in signalling through sodium dependent phosphate transporter, PiT-1, in vascular smooth muscle cells". *International Vascular Biology Meeting*, Boston, MA
- 2014 "Engineering the sodium-dependent phosphate transporter, PiT-1, in vascular smooth muscle cells to elucidate novel cell signaling mechanisms that mediate matrix mineralization". *NIBIB Training Grantees Meeting*, Bethesda, MD
- 2013 "Engineering PiT-1 in Vascular Smooth Muscle Cells: Role of Phosphate Uptake in Matrix Calcification". *Biomedical Engineering Society Annual Meeting*, Seattle, WA

SCIENTIFIC COMMUNITY SUPPORT

Book Chapters

Acharya BR*, **Chavkin NW***, Hirschi KK. (2022) Chapter 1 - Development of, and environmental impact on, endothelial cell diversity. In Z. S. Galis (Ed.). *The Vasculome: From Many, One* (pp. 5-15). Elsevier, Inc.

Organization Memberships

- 2023 – Present American Aging Association
- 2019 – Present American Heart Association
- 2015 – Present North American Vascular Biology Organization
- 2019 – Present American Society of Matrix Biology
- 2013 – 2014 American Society of Nephrology

Conference and Seminar Planning

2020 – Present	NAVBO Online Programming Committee Member
2020 & 2022	GRS Conference Co-Chair
2020 – 2022	UVA CVRC Seminar Series Trainee Meeting Moderator
2019 – Present	UVA CVRC Career Development Seminar Series Organizer
2017 – 2020	NAVBO Education Committee Member
2017	NAVBO Pre-Conference Meeting Co-Chair

Peer Review

Served as reviewer on submitted manuscripts for journals:
Journal of Vascular Research, Matrix Biology

Assisted in reviewing submitted manuscripts for journals:
Science, Nature, Nature Cardiovascular Research, Cell Stem Cell, Circulation, Nature Communications, Circulation Research, ATVB, Advanced Science, Cell Reports, Developmental Cell, JCI Insights, Cell Cycle, iScience, Annual Review of Physiology, American Journal of Pathology, International Journal of Molecular Sciences, Journal of Developmental Biology, Oncotarget, Pigment Cell and Melanoma Research

MENTOR EXPERIENCE

2023 – Current	Taneesha Sardana University of Virginia Research Technician
2018 – 2022	Tanvi Vipra University of Virginia Undergraduate Researcher UVA Harrison Undergraduate Research Award (2021)
2018 – 2021	Karishma Setia University of Virginia Undergraduate Researcher
2017	Kiarra Lavache Yale Summer Researcher
2013 – 2015	Kadin Brooks University of Washington Undergraduate Student Researcher Capstone Student Stanford Amgen Scholars Program Awardee (2015) Mary Gates Research Award (2014) Mary Gates Research Award (2015)
2013	Tiffany Gray University of Washington Summer Research Student Building Bridges to Bioengineering Scholar

TEACHING EXPERIENCE

2022 - 2023	PHY8053 (Vascular Biology, Lecturer) , University of Virginia Lecture: “Myocardial Remodelling after Cardiac Injury”
2022	PHY8100 (Extreme Physiology, Lecturer) , University of Virginia Lecture: “Lessons Learned from Centenarians”
2016	BIOEN345 (Failure Analysis and Human Physiology, TA) , University of Washington
2011	BME405L (Measurements & Instrumentation, TA) , University of Southern California
2011	BME302L (Medical Devices, TA) , University of Southern California

SERVICE & OUTREACH

- 2023 **University of Virginia Biology Outreach and Inclusion Program**
Participated in Science Saturdays where UVA scientists host a booth with fun and educational activities for children.
- 2021 – Present **Academic Tenure-Track and Career Kickstarter (ATTACK) Group**
Founded and continue to run a trainee-based group that meets monthly to discuss academic tenure-track topics outside of standard postdoctoral lab training.
- 2018 **Yale Cardiovascular Research Center**
Participated in outreach day for local high school students to tour the Yale Cardiovascular Research labs and shadow several experiments.
- 2011 – 2016 **University of Washington Engineering Discovery Days**
Organized the Giachelli Lab booth for Engineering Discovery Days designed to interest middle- and high-school students.
- 2011 – 2013 **Seattle Youth Tutoring Program**
Mentoring program for students from elementary school to high school.
Work on science, math, language arts, and history homework.
Teach basic math and reading skills, prepare high school students for college.
- 2008 – 2011 **University of Southern California Troy Camp**
Student-run philanthropy that sends underprivileged children to summer camp.
Outreach to campers to teach science for 1st-5th Graders.
Fall 2010: Elected position of Director of Grant Writing for Troy Camp.
Wrote grants that awarded \$47,755, \$8,000, and \$5,300.

REFERENCES

Kenneth Walsh, Ph.D.

Lockhard B. McGuire Professor of Internal Medicine
Director, Hematovascular Biology Center (HBC)
Robert M. Berne Cardiovascular Research Center
University of Virginia, School of Medicine
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Karen Hirschi, Ph.D.

Alumni Professor of Cell Biology
Director, Developmental Genomics Center
Associate Director of Scientific Programs, MSTP
University of Virginia, School of Medicine
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Cecilia Giachelli, Ph.D.

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