DEPARTMENT OF

PHARMACOLOGY & PHYSIOLOGY

2023 YEAR IN REVIEW

Meet the Department's Newest Faculty Member

Powerhouse: Mitochondrial Dysfunction in Alzheimer's Disease

INSIDE THIS ISSUE:

SCHOOL OF MEDICINE & DENTISTRY
UNIVERSITY of ROCHESTER

Message From The Chair

2023 was another banner year for the Department of Pharmacology and Physiology!

During the past year, our department secured $13M in new research grants and published >40 original research articles and reviews. Our department currently manages a research portfolio >$55M in total extramural grant support and is ranked #25 among all US Pharmacology departments (and #21 among all US Physiology departments) in NIH funding. Our graduate program awarded three PhD degrees, ten MS degrees, matriculated a strong new cohort of eight PhD and nine MS students, and three of our trainees received competitive extramural fellowship awards. Importantly, the department also successfully recruited a new tenure-track faculty member (Dr. John Onukwufor, see cover story on p.2) and we are in the midst of an exciting new faculty search.

Our cover story explores the research program of our newest faculty member, Dr. John Onukwufor (p. 2). John obtained his PhD in Toxicology at the University of Prince Edward Island and then completed his postdoctoral training first with Dr. Chris Wood at the University of British Columbia and then with Dr. Andrew Wojtovich in the Department of Anesthesiology and Perioperative Medicine here at the University of Rochester. John's research program focuses on the molecular mechanisms by which mitochondrial iron dysregulation contributes to the pathogenesis of Alzheimer's disease. His research program is funded by a NIEHS diversity research supplement to the University of Rochester P30 Environmental Health Sciences Center. John's recruitment strengthens our department's expertise in mitochondrial biology, stress signaling and neuropharmacology, establishes new research in heavy metal toxicity and the neurobiology of Alzheimer's disease, and extends our collaborative interactions with both the Department of Environmental Medicine and the Department of Neuroscience, as well as the Neuroscience and Toxicology graduate programs. In addition to his technical expertise and research interests, John also brings to our department tremendous positive energy, a strong collaborative spirit, and a passion for trainee mentoring. John's research program has already "hit the ground running" as evidenced by his NIEHS funding, exciting research progress, and successful recruitment of a strong group of students and staff to his research team.

As in past years our faculty continue to be honored with several national research, mentorship, and service awards. Suzanne Haber was awarded with both the Gold Medal Award from the Society of Biological Psychiatry and the Barbara Fish Memorial Award from the American College of Neuropsychopharmacology for lifetime contributions to basic and translational psychiatric research. John Lueck's two patents covering the use of modified tRNAs for nonsense mutation suppression were licensed by HC Biosciences for the development of new tRNA-based cancer therapies. It was also a banner year for trainees in the department. Vikas Arige received the 2023 Outstanding Postdoctoral Researcher Award, Caio Tabata Fukushima was selected for a University Sproull Fellowship, Emily Sorensen received the University of Rochester School of Medicine and Dentistry Meliora Award, and both Siddhi Shetty and Brianna Vonderhaar were given Harold C. Hodge Awards. These and other faculty and trainee honors and awards are highlighted in this newsletter (p. 8&9).

The department's Drug Targets and Mechanisms Collaborative Pilot Grant Program, which promotes grass-roots collaborations between our faculty and other researchers in the institution, funded an exciting collaboration between Drs. Denise Hocking and Gail Johnson (p. 11). This project unites Denise's expertise in integrin interactions/signaling with Dr. Johnson's expertise in astrocyte biology to test if adverse effects of long COVID on the central nervous system results in part from integrin-like interactions between the COVID-19 spike protein and integrins on activated astrocytes. This pilot project will not only support generation of key preliminary data for a future collaborative NIH application, but also serves to further strengthen our department's long term collaborative interactions with both the Department of Anesthesiology and Perioperative Medicine and the Department of Neuroscience.

Under Dr. Hocking's steady leadership, the Faculty/Student/Staff Diversity and Inclusion Committee has continued its work to foster a more inclusive and welcoming environment within the department. In fall of 2023, the committee established a new monthly "DEI Movie" series where department faculty, students, and staff are invited to view and then discuss a movie focused on a different topic related to diversity, equity and inclusion. Some of the movies viewed and discussed to date include "Hidden Figures," "15 Minutes of Shame," and "The Invisible War." Entries in this series during the upcoming winter/spring months include "Love, Simon," "I am not your Negro," and "Through Deaf Eyes." These DEI movie sessions are intended to provide a supportive environment to help break down barriers as we continue to work together to build an even more welcoming and inclusive environment in the department where all trainees, faculty and staff feel valued and respected (p. 6).

As always, the newsletter ends with highlighting the Career Stories of several of our successful alumni (p. 15). This year we highlight one alumna from the 1990s (Tara Nealey, Physiology PhD 1992) and two alumni from the early 2000s (Scott Cameron, Pharmacology PhD, 2003, MD 2009; Amy Parkhill, Pharmacology PhD, 2004). Together, these three highly successful alumni provide excellent examples of the different, exciting professional and career directions of our graduates. Tara is an accomplished Biotechnology and Life Sciences patent attorney for Polsinelli LLC in St. Louis, MO. Scott is a successful clinician-scientist at the Cleveland Clinic Lerner Research Institute who leads a research program focused on the role of platelet reprograming in cardiovascular and aortic aneurysmal diseases. Amy is a founding faculty member and academic leader of the Wegmans School of Pharmacy at St. John Fisher University. We continue to be incredibly proud of the graduates of our program and their remarkable success and accomplishments across a wide range of diverse career paths in academia, biotech/pharma, government, non-profit organizations and the private sector.

I continue to be exceptionally proud of the accomplishments of our faculty, trainees, staff, and alumni. Our researchers are pushing the boundaries of their respective fields, our educators are preparing students for successful careers in medicine and research, and our staff work tirelessly to support the department's research, education, service, and missions.

Finally, I would like to wish everyone throughout our extended Pharmacology and Physiology family continued personal and professional success during the upcoming year! Meliora!

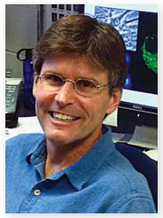
Robert T. Dirksen, PhD

Lewis Pratt Ross Professor, Chair of Pharmacology and Physiology

Department Leadership Team

Jean M. Bidlack, PhD
Professor and Associate Chair

Denise C. Hocking, PhD
Professor and Faculty and Staff Diversity Officer



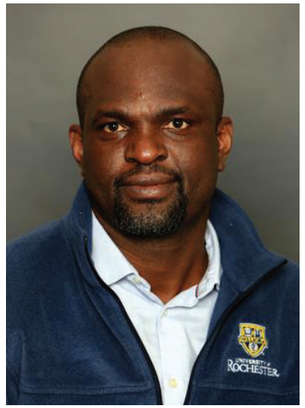
Robert S. Freeman, PhD
Professor and Director of Med Pharm Graduate Studies

David M. MacLean, PhD
Associate Professor and Director of Graduate Studies

John D. Lueck, PhD
Assistant Professor and Director of Cellular and Molecular Pharmacology and Physiology Program

Cover Image: John O. Onukwufor, PhD | Newsletter Editor: Jennifer Brennan

The research of
John Obinna Onukwufor, PhD

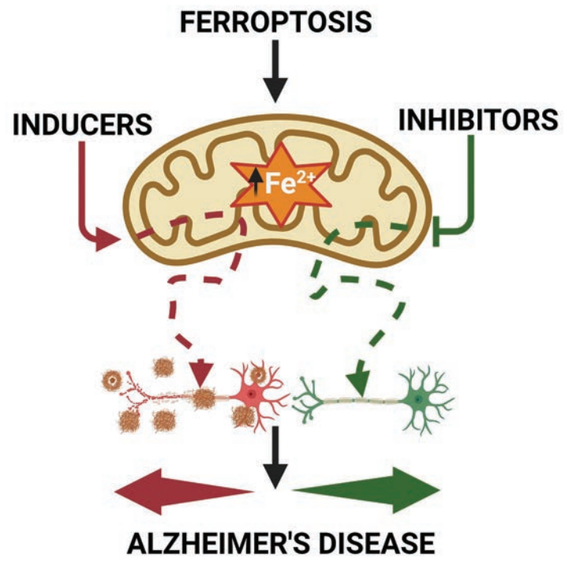


Dr. John Obinna Onukwufor, Research Associate Professor of Pharmacology and Physiology with a secondary appointment in Environmental Medicine, begins his appointment as a tenure-track Assistant Professor of Pharmacology and Physiology and Environmental Medicine in July 2024. Dr. Onukwufor, received his undergraduate degree in Animal Science and Master's degree in Reproductive Physiology from the University of Nigeria, Nsukka (UNN). He subsequently received a PhD in Toxicology from Atlantic Veterinary College, at the University of Prince Edward Island, Canada under the supervision of Dr. Collins Kamunde. During his Ph.D research, Dr. Onukwufor studied the effects of multiple environmental stressors (metal, temperature and hypoxia) on mitochondrial bioenergetic function in fish. He completed his initial post-doctoral fellowship training in comparative physiology studying stress adaptation in fish in the laboratory of Dr. Chris M. Wood at the University of British Columbia, Canada. Dr. Onukwufor then moved to the University of Rochester to obtain additional training in the molecular mechanisms of stress signaling and reactive oxygen species production in C. elegans during a second post-doctoral fellowship in the laboratory of Dr. Andrew P. Wojtovich.

In 2021, Dr. Onukwufor, was promoted to Research Assistant Professor of Pharmacology and Physiology and awarded the first University of Rochester internal K99/R00 award. The UR-K99/R00 award enabled Dr. Onukwufor to begin to develop and establish his independent research program on metal toxicity and Alzheimer's disease pathogenesis. Dr. Onukwufor recently secured a 2-year NIH-NIEHS P30 Diversity Supplement to study the mechanisms of environmental metal neurotoxicity in the pathogenesis of Alzheimer's disease and facilitate his transition as a faculty member of the Environmental Health Sciences Center (EHSC).

Dr. Onukwufor's research program is elucidating the molecular mechanisms that underlie divalent metal neurotoxicity and mitochondrial dysfunction in Alzheimer's disease pathogenesis. The laboratory focuses on understanding how genetic and environmental variables (e.g., temperature, metal and hypoxia) interact to modulate cellular adaptation to stress. Organisms possess an innate ability to withstand lifelong exposure to single and/or concurrent multiple environmental stressors. The Onukwufor laboratory is interested in understanding how these innate capacities enable some organisms to thrive, while others fail under different environmental conditions. The laboratory employs multiple complementary approaches including transgenic overexpression/knockout, C. elegans, and murine models of Alzheimer's disease. Dr. Onukwufor's research program aims to identify specific disease pathomechanisms and novel therapeutic targets for Alzheimer's disease, as well as other neurodegenerative disorders.

Outside of research, Dr. Onukwufor engages in community outreach/service and is committed to mentoring and training the next generation of scientists from historically underrepresented communities.



Schematic. Ferroptosis is an iron-dependent cell death mechanism resulting from mitochondrial iron overload driving reactive oxygen species (ROS)-induced lipid peroxidation. Ferroptosis inducers increase neuronal pathology, while ferroptosis inhibitors restore normal neuronal function.

Left to Right: Lee Trojanczyk, Ali Al-Qazzaz, Kaitlin Chung, Wilson Peng and John Onukwufor

The Paul Horowicz Lecture Fund

The Paul Horowicz Lecture Fund was established to honor the legacy of Dr. Paul Horowicz. An internationally recognized authority in muscle and membrane physiology, Dr. Horowicz was active in many professional organizations, and the recipient of numerous awards and honors. For twenty-six years Dr. Horowicz served as Chair of the Department of Physiology. An exemplary leader and highly respected member of the medical school faculty, he was known by his colleagues not just as an outstanding scientist, but also as a superb mentor who trained some of the very best muscle physiologists, many of who have assumed leadership positions in physiology around the world. This year the department invited Dr. Eduardo Rìos, Professor of Physiology and Biophysics at Rush University Medical Center, and a former postdoctoral trainee of Dr. Martin Schneider in the department to give this esteemed lecture in honor of Dr. Horowicz.

NOVEMBER 16, 2023

Eduardo Rìos, PhD

For Calcium Signaling and Excitation-Contraction Coupling, “I’d Rather Be In Rochester”

Dr. Rìos is Professor of Physiology & Biophysics and Director of the Cellular Signaling Section at Rush University Medical Center.

An international leader in calcium signaling in skeletal muscle, Dr. Rìos received his training in excitation-contraction coupling while working as a postdoctoral fellow with Drs. Martin Schneider and Paul Horowicz from 1978-1983 in the Department of Physiology at the University of Rochester. As Eduardo fondly recalls: “On a snowy May day, I brought my wife and children to Rochester, to postdoc with Martin Schneider and Paul Horowicz. Martin showed me the beauty of calcium signals when treated quantitatively, while Paul taught me to dissect single muscle fibers.” Working with Drs. Schneider and Horowicz, Eduardo made the first simultaneous measurements of voltage sensor charge movement and calcium release during skeletal muscle excitation-contraction coupling. Since joining the faculty at Rush University, Dr. Rìos made numerous seminal discoveries in the field including identification of the dihydropyridine receptor as the voltage senor of excitation-contraction coupling, the critical role of extracellular calcium ion in voltage sensor function, the first measurements and characterization of calcium sparks in skeletal muscle. More recently, his work has focused on how alterations in skeletal muscle calcium signaling impacts glucose metabolism and how alterations in these mechanisms contribute to metabolic disorders including hyperglycemia and diabetes.

Dr. Rìos’ lecture was preceded by a spirited poster session that included over 30 poster presentations from technical staff, students, postdoctoral fellows, and faculty in the department. Posters presentations judged by the faculty and awards were given for the for the best posters across three divisions (students prior to their qualifying exam, students past their qualifying exam, and postdoctoral fellows and research faculty). The day concluded with a wonderful dinner at Char Steak and Lounge Restaurant at the Strathallan Hotel and Spa with Dr. Rìos, department faculty and members of the Horowicz family.

Left to right: Trevor Shuttleworth, Bob Dirksen, Camillo Peracchia, Eduardo Rìos, R. Alberto Venosa, Kari Horowicz, Paul Horowicz Jr., Dede Horowicz, Jim Erwin

OCTOBER 12, 2022

The Wallace O. Fenn Lecture

The Wallace O. Fenn Endowment fund was established to honor the legacy of Dr. Wallace O. Fenn, the first Chair of the Department of Physiology at The University of Rochester and among the most important Physiologists of the 20th Century. Dr. Fenn served as Chair of the Department of Physiology from 1924-1959 and continued to work in the department until his passing in 1971. Dr. Fenn’s scientific contributions were numerous; in particular in the fields of muscle physiology where he demonstrated that potassium was lost in exchange for sodium in contracting muscle, observations that provided the scientific rationale for Hodgkin’s and Huxley’s thesis concerning the initiation and propagation of nerve and muscle impulses. Dr. Fenn also essentially founded the field of high-altitude respiratory physiology where his findings were crucial to understanding the respiratory challenges faced by fighter pilots during World War II. This year the department invited Dr. Scott Earley, Professor of Pharmacology at The University of Nevada, Reno School of Medicine to give this esteemed lecture in honor of Dr. Fenn.

Left to Right: David Yule, Scott Earley, Bob Dirksen

OCTOBER 12, 2022

Scott Earley, PhD

“Age dependent impairment of neurovascular coupling in a Col4a1 mutant”

Dr. Earley is Professor of Pharmacology and Director of the Center for Molecular and Cellular Signaling in the Cardiovascular System, University of Nevada, Reno School of Medicine.

Dr. Earley is an international leader in studies focused at a molecular level to understand how blood flow is regulated in the microcirculation of the brain. This information is critical to understanding physiological homeostatic function of the brain and how alterations in these mechanisms underlie cerebral small vessel diseases including stroke and vascular dementia. Dr. Earley received his training in neurovascular coupling while working as a postdoctoral fellow with Drs. Joseph Brayden and Mark Nelson at the University of Vermont. In early studies, he described a novel functional interaction in vascular smooth muscle between Ca2+ influx through TRPV4 channels and ryanodine receptors to increase Ca2+ “spark” activity and local coupling to Ca2+ activated K+ channels -ultimately resulting in membrane hyperpolarization and smooth muscle relaxation. Subsequently in his own lab, Dr. Earley has made frequent contributions to the our understanding the role of TRP channel family members in vascular smooth muscle and endothelial cell function. His studies are characterized by using sophisticated imaging and electrophysiological techniques in the intact vasculature. In keeping with these themes, Dr. Earley’s lecture detailed how mutations in collagen-encoding genes, which display brain pathology typical of cerebral small vessel disease, lead to aberrant regulation of TRPM4 channel function and a blunted myogenic response.

To begin the day Dr. Earley’s lecture was preceded by a lively poster session held in the Flaum Atrium that included over 25 poster presentations from members of the Department. Poster presentations were judged by the faculty and awards were given for the best posters presented by junior and senior students. A fabulous day of science ended with dinner with a group of faculty at Black and Blue restaurant.

Fostering an Inclusive Environment in Pharmacology and Physiology Through Education

Over the course of the 2022-23 academic year, the Diversity and Inclusion Committee of the Department of Pharmacology and Physiology partnered with URMC's Office for Equity and Inclusion to provide a series of six training sessions related to diversity, equity and inclusion for members of the Pharmacology and Physiology community. Attendance at each of the sessions was excellent, with nearly 130 members of the DPP community participating in the first two sessions, and 30% of the community in attendance for at least 4 sessions. Key topics included communication and conscious listening; recognizing and responding to bias and microaggressions; understanding power and privilege; and learning how to practice ally-ship. Sessions were conducted by Zoom and a highly interactive learning environment was facilitated by OEI's Education and Learning team.

Diversity and Inclusion Committee members: Picture: Left to Right:
Back row: Kaye Thomas, PhD, Michael Wheeler, David Delemos
Front Row: Angela Glading, PhD, Emma Norris, PhD,
and Denise Hocking, PhD

To assess the impact of these training modules, the Diversity and Inclusion Committee conducted a post-session survey. An overwhelming majority of survey respondents (76%) indicated that they were more likely to engage in conversations with others in the DPP community after participating in the training sessions. Moreover, 92% of respondents felt more comfortable recognizing microaggressions and bias in the workplace, while 85% felt equipped to address issues of bias in their work environment. Many survey participants thought the training sessions were a great way to support colleagues of different backgrounds and cultures, and expressed gratitude for this DEI initiative. The importance of cultivating honest and open communication in the department was also emphasized. This year, the DI Committee is again working with OEI to provide introductory training sessions to new members of the DPP community, and developing advanced training modules to be offered to everyone later in the year.

As an additional way to support and enhance communication and learning in the DPP community, the Diversity and Inclusion Committee is also offering a monthly exploration of diversity, inclusion, access, and equity through film. Movies are shown on the second Tuesday of each month, everyone is welcome!

Department of Pharmacology and Physiology and Inclusion, Diversity, Equity, and Access (IDEA) Committee Community Conversations: Movie Time!

Fall 2023 - Spring 2024

Our monthly exploration of diversity, equity and inclusion through film!
2nd Tuesday of Every Month
3:00 p.m. | Fenn Room 4-6325

October 10, 2023
Hidden Figures (2016, Biography) The story of a team of female African-American mathematicians who served a vital role in NASA during the early years of the U.S. space program.

November 14, 2023
15 minutes of Shame (2021, Documentary) From executive producer, Monica Lewinsky, this film looks at public shaming in modern society.

December 12, 2023
Zootopia (2016, Animated Comedy) Oscar Award Winner, Best Animated Feature. Zootopia is a diverse metropolis, where anthropomorphic predators and prey must learn to get along. The story revolves around a rabbit, who is the first of her "kind" to join a police force dominated by predators.

January 9, 2024
The Invisible War (2012, Documentary) Winner, Audience Award, Sundance Film Festival. An investigative report about the epidemic of rape in the military.

February 13, 2024
I Am Not Your Negro (2016, Documentary, History) Filmmaker Raoul Peck looks at James Baldwin's unfinished book 'Remember This House' and examines race in America through Baldwin's words and archival material. The film looks at Black representation in Hollywood and beyond.

March 12, 2024
Love, Simon (2018, Comedy) Simon Spier keeps a huge secret from his family, his friends, and his classmates: he's gay. When that secret is threatened, Simon must face everyone and come to terms with his identity.

April 9, 2024
Through Deaf Eyes (2007, Documentary) Six short documentaries are interwoven to explore 200 years of Deaf life in America. The story of a hidden and complex culture in America, it includes interviews with prominent members of the Deaf community, including actress Marlee Matlin.

May 14, 2024
Disclosure (2020, Documentary) GLAAD Media Award Winner, best Documentary. An in-depth look at Hollywood's depiction of transgender people and the impact of those stories on transgender lives and American culture.

June 11, 2024
Mulan (1998, Animation) To save her father from death in the army, a young maiden secretly goes in his place and becomes one of China's greatest heroines in the process.

July 9, 2024
The Imitation Game (2014, Historical Drama) In 1939, newly created British intelligence agency MI6 recruits Cambridge mathematics alumnus Alan Turing to crack Nazi codes, including Enigma. Turing and team succeed and become heroes, but in 1952, authorities reveal Turing is gay and send him to prison.

August 13, 2024
The Light We Carry (2023, Documentary) Michelle Obama delves into the challenges and life lessons that shaped her second bestselling book in an illuminating conversation with Oprah Winfrey.

Medical Pharmacology Students

MedPharm MS students left to right (Rebecca Boyle, Alexandria Gonzales, Brady MacKay, Rhesel Rivera, Lauren Thompson, Sevinch Fayzullayeva)

Pharmacology and Physiology First-Year PhD and Master's Students Front row: Ei Thanda Tun, Cih-Li Hong, Kazi Samanta Jerin, Siddhi Shetty, Emily Sorensen; Back row: Brooke Wise, Dr. MacLean, Caio Tabata Fukushima, Brianna Vonderhaar, Maedeh Aghahosseini, Jing Luan, Yunzhi Lin, Dr. Lueck

Left to right back row: Ethan Kaiser, Ayomide Betiku, Mikaella Docteur, Kevin Morabito

Left to right front row: Mashael Alkhaled, Mnair Alkhaled, Liv Shoenbeck, Anna Baronos

Student Awards & Honors

Li awarded a two-year Predoctoral Fellowship from the American Heart Association: Chen Li, 4th year graduate student in the laboratory of Dr. Craig Morrell was awarded a two-year American Heart Association Predoctoral Fellowship entitled, "Thrombocytopenia Independently Leads to Monocyte Immune Dysfunction in Sepsis".

Medical Pharmacology Master's Program Alumni Update
Congratulations to current first-year medical students:

Vivian (Vabby) Baker - Liberty University College of Osteopathic Medicine (LUCOM), Lynchburg, VA

Megan Bernsten - Jacobs School of Medicine and Biomedical Sciences, Buffalo NY

Winni Gao - Drexel University School of Medicine, Philadelphia, PA

Ethan Kaiser - Jacobs School of Medicine and Biomedical Sciences, Buffalo, NY

Most Inquisitive Student: Michael Malloy, First-year CMPP Ph.D. student: Congratulations to Michael Malloy, Winner of the Inquisitive Award for asking the most questions during the Pharmacology and Physiology Seminar Series.

The prestigious list of past winners includes Lilly Cisco, Matthew Rook, Vivian (Vabby) Baker, Wenqi Fu, and Rana Alabdali

Sipple awarded a three-year F31 Predoctoral Fellowship from the National Institutes of Health: Matthew Sipple, 4th year graduate student and MSTP fellow in the laboratory of Dr. John Lueck was awarded a three-year NIH F31 Predoctoral Fellowship entitled, "Genetic and Pharmacologic Elimination of Myotonia from Myotonic Dystrophy Type 1."

Robert L. and Mary L. Sproull Fellowship
The Sproull Fellowship is the most prestigious fellowship awarded by the University of Rochester. Named in honor of Robert L. Sproull, distinguished physicist and the University's seventh president, this fellowship is awarded to incoming doctoral students with the most exceptional academic records and research talent. Caio Tabata Fukushima is the 2023 recipient of the University Sproull Fellowship. Caio received his BS in Biochemistry from the University of Rochester. Caio excelled academically over a diverse range of interests including Biochemistry, American Sign Language, Computer Science and Linguistics. Caio balanced his academics with multiple extracurricular activities including holding positions as Pep Band Co-President, Vice-President of the Brazilian Student's Association and Secretary of the ASL club. Caio also found time to work in the lab of Dr. Paul Brooke's on mitochondrial function during ischemic reperfusion injury. We look forward to Caio's continued contributions to the University of Rochester.

The Harold C. Hodge Memorial Fund
Dr. Hodge joined the U of R School of Medicine and Dentistry in 1931 as a Rockefeller Fellow in Dentistry and moved through the academic ranks in the then Department of Biochemistry and Pharmacology. When the Department of Pharmacology and Toxicology was formed in 1958, he was named the first Chair, a position he held until his retirement as Professor Emeritus in 1970. He was internationally known for his contributions to pharmacology and toxicology. The Harold C. Hodge Memorial Fund was established in the Department of Pharmacology in 1992.
Our two Hodge 2023 award recipients are first year students Siddhi Shetty and Brianna Vonderhaar. Siddhi obtained her BSc in Chemistry from the Purdue University, with a minor in Mathematics. As an undergraduate, Siddhi conducted research on phospholipase C function and signaling using luminescence based assays. Siddhi has received multiple awards for her work including the Emerging Scholars Award, the Dale. W. Margerum Undergrad Research Scholarship and an Outstanding Poster Presentation Award at the American Chemical Society meeting.

Brianna Vonderhaar, obtained a dual BS in Chemistry (with a Biochemistry concentration) and Biology (with a Cellular and Molecular concentration) at Appalachian State University. Brianna's past research was focused on helping to develop a biosensor for specific enzyme activity. Brianna has received recognition for her academic achievements, including frequenting the Chancellor's and Dean's List, as well as being awarded the Arthur S. Vallone Scholarship.

Outstanding Postdoctoral Research Award

Vikas Arige, PhD, Pharmacology and Physiology

Dr. Arige came to us from IIT Madras India in 2020. Dr. Arige works with Dr. Yule on regulation of calcium signaling by IP3 receptors and since 2020 has published 7 first author papers, including 1 in PNAS, 2 in Cell Calcium, and 1 in the Journal of Cell Science. There are two commentaries associated with his PNAS publication, one in PNAS and one in Cell Calcium. There is an associated first-person interview with the first author for his JCS publication. Overall, Dr. Arige has published 18 papers since 2020. Dr. Arige has given many presentations, including an invited talk at Gordon Research Conference in 2022. Dr. Arige is poised to have a successful career in academia and great potential to be a leader in the Ca2+ signaling field in the coming years.

URSMD Meliora Scholarship: Established in 2021, the University of Rochester School of Medicine and Dentistry Meliora Scholarship recognizes incoming PhD graduate students that demonstrate strength of character and exceptional promise for success. Emily Sorensen is the 2023 recipient of the URSMD Meliora Award. Emily obtained her BS in Molecular Genetics from the University of Rochester, obtaining the Genesee Scholarship, a University of Rochester National Grant, multiple Dean's List placements and an International HOSA/NTS scholarship. During that time, she conducted research in the lab of Dr. Lueck on suppressor tRNA approaches to treat diseases arising from nonsense mutations. Emily's strong academic background, research experience, and passion for molecular genetics make her an outstanding addition to our PhD program.

DEGREES AWARDED

PhD Degrees Awarded

MAY 2023
Esras Furati, PhD
"Insights into the Roles of Aging and Chemokine Signaling During Neuromuscular Regeneration"
Advisor: Dr. Joe Chakkalakal

JULY 2023
Amanda Wahl, PhD
"Redefining The Function of Salivary Duct Cell Populations Utilizing a Structural, Functional, and Computational Approach"
Advisor: Dr. David I. Yule

NOVEMBER 2023
Jarreau Harrison, PhD
"HSPB8 Attenuates Pathological Tau Accumulation"
Advisor: Dr. Gail V. W. Johnson

MS Degrees Awarded

MS Medical Pharmacology Program

MAY 2023
Mashael Alkhaled, MS
Mnair Alkhaled, MS
Efstathia (Anna) Baronos, MS
Ayomide Betiku, MS
Mikaella Docteur, MS
Ethan Kaiser, MS
Kevin Morabito, MS

AUGUST 2023
Liv Schoenbeck, MS

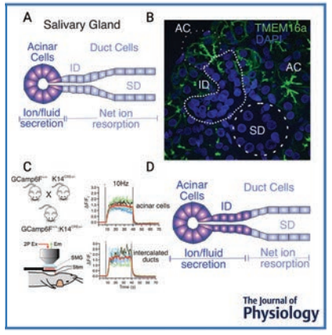
MS Pharmacology Program

MAY 2023
Ei Thanda Tun, MS
Anya Wang, MS

PUBLISHED STUDENT THESIS

Amanda Wahl, PhD

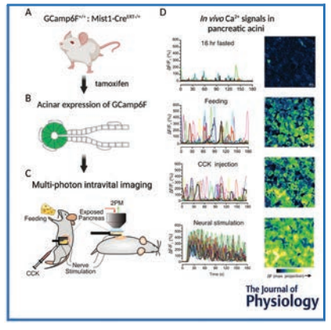
Amanda's thesis work was recently published in Journal of Physiology. Using a combination of immunocytochemistry, in vivo imaging and in situ hybridization, the study demonstrated that salivary intercalated duct cells express all the required machinery for ion and fluid secretion. Further, physiological nerve stimulation of salivary glands in vivo resulted in Ca2+ signals very similar to secretory acinar cells. This work is a paradigm shift from the current dogma that suggested salivary duct cells simply reabsorb ions and do not contribute to fluid volume.



RESEARCH FACULTY ACCOMPLISHMENT

Takahiro Takano, PhD

Congratulations to Takahiro Takano in the Yule lab for the recent acceptance of his paper in the Journal of Physiology: **"Ca2+signals in pancreatic acinar cells in response to physiological stimulation in vivo."** Takahiro used multiphoton imaging in live animals expressing a genetically encoded Ca2+ indicator to record Ca2+ signals in response to nueral stimulation and feeding. Notably, this study represents the first report to document the spatiotemporal characteristics of CA2+ signals in the exocrine pancreas in response to physiological stimuli in vivo.

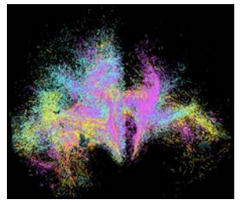


FACULTY ACCOMPLISHMENTS

Suzanne N. Haber, PhD honored for contributions to neuroscience

Suzanne Haber, a professor of Pharmacology and Physiology at the University of Rochester Medical Center, was honored for her outstanding contributions to neuroscience. She is the co-recipient of the American College of Neuropsychopharmacology (ACNP) Barbara Fish Memorial Award. This award goes to an ACNP member who has made outstanding contributions to basic, translational, or clinical neuroscience. Dr. Haber was also given the Gold medal award from the Society of Biological Psychiatry. Haber is the principal investigator of the Conte Center for Research in OCD at the Medical Center. Her lab investigates the cortico-basal ganglia-thalamic system, the neural network that underlies incentive-based learning and decision-making leading to the development of action plans. The pathology of this network is implicated in several mental health disorders, including drug addition, obsessive-compulsive disorder, and schizophrenia.

Dr. Haber's lab, along with a collection of labs at Mass. General and Columbia University, was awarded a major NIH center grant for Large-Scale Imaging of Neuronal Circuits (LINC) Dr. Haber will lead the Circuits team, located here at URMC. Her group will work with 4 other teams devoted to MRI, Optical microscopy, X-ray microscopy and computational approaches to map neural circuit function. Working together, these teams will develop novel technologies for imaging brain connections down to the microscopic scale. They will also deploy these technologies to image cortico-subcortical projections relevant for deep-brain stimulation for motor and psychiatric disorders.document the spatiotemporal characteristics of CA2+ signals in the exocrine pancreas in response to physiological stimuli in vivo.



For more about LINC

FACULTY ACCOMPLISHMENTS CONTINUED

Jean M. Bidlack, PhD received a grant for one-year of funding from NIH in collaboration with Dr. Jane V. Aldrich, PhD from the University of Florida; UG3NS132600 titled "Cyclic Peptides to Treat Cocaine Use Disorder."

Angela J. Glading, PhD received a grant for one year of funding from URMC Biomedical Genetics titled "Role of CCM proteins in non-endothelial hematopoietic cells."

Denise C. Hocking, PhD (PI) and Gail V. W. Johnson, PhD (Co-I) received a grant for one year of funding from the Del Monte Neuroscience Institute Pilot Award Program titled "Effects of SARS-CoV-2 Mimicry on Astrocyte Function."

Paul J. Kammermeier, PhD received a grant for five years of funding from the NIH; R01MH125849 titled "A novel system for controlling dimeric receptor composition to discover unique heterodimer pharmacology."

Whasil Lee, PhD (PI) and Robert T. Dirksen, PhD (Co-I) received a grant for five years of funding from the NIH; R01AR082349 titled "Piezo1 and Piezo2-dependent cartilage health and disease."

John D. Lueck, PhD was awarded a patent that was subsequently licensed by HC Biosciences, for optimized tRNA expression and suppression of nonsense mutations. PCT/US2023/62053, filed February 3, 2023; Optimized sequences for enhanced tRNA expression or/and nonsense mutation suppression.

John D. Lueck, PhD received a grant for two years of funding from the Comis Foundation titled "Nanobody Summer Research Program (Nanobuddies)."

John D. Lueck, PhD received a grant for two years of funding from Universitair Medisch Centrum Utrecht titled "Anticodon-engineered transfer-RNA suppression of CFTR nonsense mutations in patient-derived organoids."

John D. Lueck, PhD received a grant for three years of funding from the Cystic Fibrosis Foundation in collaboration with Dr. David M. Bedwell, PhD from the University of Alabama at Birmingham titled "Recoding Strategies to Target CF Nonsense Mutations."

David M. MacLean, PhD and John D. Lueck, PhD received a grant for one year of funding from the University of Rochester Research Award (URA) titled "Fluorescence reporters of membrane voltage optimized for high throughput assays."

Cesare Orlandi, PhD and Whasil Lee, PhD received a grant for one year of funding from the University of Rochester Research Award (URA) titled "Analysis of orphan GPCR signaling mechanisms using atomic force microscopy."

Cesare Orlandi, PhD received a grant for one year of funding from Eli Lilly and Company titled "Determination of GPR75 constitutive activity and downstream signaling."

Houhui (Hugh) Xia, PhD received a grant for five years of funding from the NIH; R01MH128279 titled "Protein phosphatase 1 isoforms, human de novo mutations and synaptic functions."

David I. Yule, PhD received a grant for three years of funding from NIH in collaboration with Dr. Elena (Helen) Makarenkova, PhD from the Scripps Research Institute; R01DE031044 titled "Salivary gland ionoyte organization and function during homeostasis, repair, and disease."

David I. Yule, PhD received a grant for five years of funding from NIH for the renewal of R01DE014756 titled "Ca2+ and secretory dynamics in salivary acinar cells."

2023 Publications

Chang SL, Seth P, Zhu J, Pendyala G, Bidlack JM, Kumar S. The 27th Scientific Conference of the Society on NeuroImmune Pharmacology: New Delhi, India, March 15-18, 2023. NeuroImmune Pharm Ther. 2023 Apr 10;2(2):187-244. doi: 10.1515/nipt-2023-0006. eCollection 2023 Jun. PMID: 37476290

Tran O, Kerruth S, Coates C, Kaur H, Peracchia C, Carter T, Török K. Ca2+-Dependent and -Independent Calmodulin Binding to the Cytoplasmic Loop of Gap Junction Connexins.

Int J Mol Sci. 2023 Feb 19;24(4):4153. doi: 10.3390/ijms24044153. PMID: 36835569

Asantewaa G, Tuttle ET, Ward NP, Kang YP, Kim Y, Kavanagh ME, Girnius N, Chen Y, Duncan R, Rodriguez K, Hecht F, Zocchi M, Smorodintsev-Schiller L, Scales TQ, Taylor K, Alimohammadi F, Sechrist ZR, Agostini-Vulaj D, Schafer XL, Chang H, Smith Z, O'Connor TN, Whelan S, Selfors LM, Crowdis J, Gray GK, Bronson RT, Brenner D, Rufini A, Dirksen RT, Hezel AF, Huber AR, Munger J, Cravatt BF, Vasiliou V, Cole CL, DeNicola GM, Harris IS. Glutathione supports lipid abundance in vivo. bioRxiv. 2023 Feb 11:2023.02.10.524960.

Magyar ZÉ, Hevesi J, Groom L, Dirksen RT, Almássy J. Function of a mutant ryanodine receptor (T4709M) linked to congenital myopathy. Sci Rep. 2023 Sep 5;13(1):14659. doi: 10.1038/s41598-023-41801-2.PMID: 37670077

O'Connor TN, Zhao N, Orciuoli HM, Brasile A, Pietrangelo L, He M, Groom L, Leigh J, Mahamed Z, Liang C, Malik S, Protasi F, Dirksen RT. Voluntary wheel running mitigates disease in an Orai1 gain-of-function mouse model of tubular aggregate myopathy. bioRxiv. 2023 Sep 29:2023.09.29.559036. doi: 10.1101/2023.09.29.559036. Preprint.PMID: 37808709

Endo Y, Groom L, Wang SM, Pannia E, Griffiths NW, Van Gennip JLM, Ciruna B, Laporte J, Dirksen RT, Dowling JJ. Two zebrafish cacna1s loss-of-function variants provide models of mild and severe CACNA1S-related myopathy. Hum Mol Genet. 2023 Oct 31:ddad178. doi: 10.1093/hmg/ddad178. Online ahead of print.PMID: 37930228

O'Connor TN, van den Bersselaar LR, Chen YS, Nicolau S, Simon B, Huseth A, Todd JJ, Van Petegem F, Sarkozy A, Goldberg MF, Voermans NC, Dirksen RT; RYR-1-Related Diseases International Research Workshop: From Mechanisms to Treatments Pittsburgh, PA, U.S.A., 21-22 July 2022. RYR1 Myopathy Consortium. J Neuromuscul Dis. 2023;10(1):135-154. doi: 10.3233/JND-221609.PMID: 36404556

Strohm AO, O'Connor TN, Oldfield S, Young S, Hammond C, McCall M, Dirksen RT, Majewska AK. Cortical Microglia Dynamics Are Conserved During Voluntary Wheel Running. J Appl Physiol (1985). 2023 Nov 16. doi: 10.1152/japplphysiol.00311.2023. Online ahead of print. PMID: 37969082

Colodete DAE, Silva NR, Pedrazzi JFC, Fogaça MV, Cortez I, Del-Bel EA, Breuer A, Mechoulam R, Gomes FV, Guimarães FS. Behavioral effects induced by the cannabidiol analogs HU-502 and HU-556. Behav Pharmacol. 2023 Jun 1;34(4):213-224. doi: 10.1097/FBP.0000000000000727. Epub 2023 May 10.PMID: 37171460

Fogaça MV, Wu M, Li C, Li XY, Duman RS, Picciotto MR. M1 acetylcholine receptors in somatostatin interneurons contribute to GABAergic and glutamatergic plasticity in the mPFC and antidepressant-like responses. Neuropsychopharmacology. 2023 Aug;48(9):1277-1287. doi: 10.1038/s41386-023-01583-7. Epub 2023 May 4.PMID: 3714266

Li C, Zhang J, Liu H, Yuan H, Cai J, Fogaça MV, Zhang YW. The synergistic mechanism of action of Dajianzhong decoction in conjunction with ketamine in the treatment of depression. Biomed Pharmacother. 2023 Sep;165:115137. doi: 10.1016/j.biopha.2023.115137. Epub 2023 Jul 14.PMID: 37453197

Perrelli A, Ferraris C, Berni E, Glading AJ, Retta SF. KRIT1: A Traffic Warden at the Busy Crossroads Between Redox Signaling and the Pathogenesis of Cerebral Cavernous Malformation Disease. Antioxid Redox Signal. 2023 Mar;38(7-9):496-528. doi: 10.1089/ars.2021.0263. Epub 2022 Nov 1.PMID: 36047808

Haber SN, Lehman J, Maffei C, Yendiki A. The Rostral Zona Incerta: A Subcortical Integrative Hub and Potential Deep Brain Stimulation Target for Obsessive-Compulsive Disorder. Biol Psychiatry. 2023 Jan 18:S0006-3223(23)00010-0.

Martínez-Rivera FJ, Pérez-Torres J, Velázquez-Díaz CD, Sánchez-Navarro MJ, Huertas-Pérez CI, Diehl MM, Phillips ML, Haber SN, Quirk GJ. A Novel Insular/Orbital-Prelimbic Circuit That Prevents Persistent Avoidance in a Rodent Model of Compulsive Behavior. Biol Psychiatry. 2023 Jun 1;93(11):1000-1009. doi: 10.1016/j.biopsych.2022.02.008. Epub 2022 Feb 19.PMID: 35491274

Sundaresan V, Lehman JF, Maffei C, Haber SN, Yendiki A. Self-supervised segmentation and characterization of fiber bundles in anatomic tracing data. bioRxiv. 2023 Oct 2:2023.09.30.560310. doi: 10.1101/2023.09.30.560310. Preprint. PMID: 37873366

Comeau ES, Vander Horst MA, Raeman CH, Child SZ, Hocking DC, Dalecki D. In vivo acoustic patterning of endothelial cells for tissue vascularization. Sci Rep. 2023 Sep 26;13(1):16082. doi: 10.1038/s41598-023-43299-0.PMID: 37752255

Norris EG, Pan XS, Hocking DC. Receptor-binding domain of SARS-CoV-2 is a functional αv-integrin agonist. J Biol Chem. 2023 Mar;299(3):102922. doi: 10.1016/j.jbc.2023.102922. Epub 2023 Jan 18.PMID: 36669646

McCullock TW, Cardani LP, Kammermeier PJ. Signaling specificity and kinetics of the human metabotropic glutamate receptors. Mol Pharmacol. 2023 Dec 8:MOLPHARM-AR-2023-000795. doi: 10.1124/molpharm.123.000795. PMID: 37546908

Morales A, Mohan R, Chen X, Coffman BL, Bendahmane M, Watch L, West JL, Bakshi S, Traynor JR, Giovannucci DR, Kammermeier PJ, Axelrod D, Currie KPM, Smrcka AV, Anantharam A. PACAP and acetylcholine cause distinct Ca2+ signals and secretory responses in chromaffin cells. J Gen Physiol. 2023 Feb 6;155(2):e202213180.

Anderson DE, Broun KG, Kundu P, Jing X, Tang X, Lu C, Kotelsky A, Mannava S, Lee W. PIEZO1 is downregulated in glenohumeral chondrocytes in early cuff tear arthropathy following a massive rotator cuff tear in a mouse model. Front Bioeng Biotechnol. 2023 Sep 5;11:1244975. eCollection 2023. PMID: 37731766. doi: 10.3389/fbioe.2023.1244975

Allaire NE, Griesenbach U, Kerem B, Lueck JD, Stanleigh N, Oren YS. Gene, RNA, and ASO-based therapeutic approaches in Cystic Fibrosis. J Cyst Fibros. 2023 Mar;22 Suppl 1(Suppl 1):S39-S44. doi: 10.1016/j.jcf.2022.12.016. Epub 2023 Jan 17. PMID: 36658041

Rook ML, McCullock TW, Couch T, Lueck JD, MacLean DM. Photomodulation of the ASIC1a acidic pocket destabilizes the open state. Protein Sci. 2023 Nov;32(11):e4800. doi: 10.1002/pro.4800.PMID: 37805833

Allen JP, Garber KB, Perszyk R, Khayat CT, Kell SA, Kaneko M, Quindipan C, Saitta S, Ladda RL, Hewson S, Inbar-Feigenberg M, Prasad C, Prasad AN, Olewiler L, Mu W, Rosenthal LS, Scala M, Striano P, Zara F, McCullock TW, Jauss RT, Lemke JR, MacLean DM, Zhu C, Yuan H, Myers SJ, Traynelis SF. Clinical features, functional consequences, and rescue pharmacology of missense GRID1 and GRID2 human variants. Hum Mol Genet. 2023 Nov 7:ddad188. doi: 10.1093/hmg/ddad188. Online ahead of print. PMID: 37944084

Rook ML, McCullock TW, Couch T, Lueck JD, MacLean DM. Photomodulation of the ASIC1a acidic pocket destabilizes the open state. Protein Sci. 2023 Nov;32(11):e4800. doi: 10.1002/pro.4800.PMID: 37805833

Chaubey AH, Sojka SE, Onukwufor JO, Ezak MJ, Vandermeulen MD, Bowitch A, Vodičková A, Wojtovich AP, Ferkey DM. The Caenorhabditis elegans innexin INX-20 regulates nociceptive behavioral sensitivity. Genetics. 2023 Apr 6;223(4):iyad017. doi: 10.1093/genetics/iyad017.PMID: 36753530

Onukwufor JO, Somo DA, Richards JG, Wood CM. Osmo-respiratory compromise in the mosshead sculpin (Clinocottus globiceps): effects of temperature, hypoxia, and re-oxygenation on rates of diffusive water flux and oxygen uptake. Fish Physiol Biochem. 2023 Oct;49(5):853-866. doi: 10.1007/s10695-023-01226-0. Epub 2023 Aug 1.PMID: 37526893

Franchini L, Orlandi C. Probing the orphan receptors: Tools and directions. Prog Mol Biol Transl Sci. 2023;195:47-76. doi: 10.1016/bs.pmbts.2022.06.011. Epub 2022 Jul 13.PMID: 36707155

Yang L, Arbona RJR, Smith CS, Banks KM, Thomas VK, Palmer L, Evans T, Hurtado R. An evolutionarily conserved pacemaker role for HCN ion channels in smooth muscle. J Physiol. 2023 Apr;601(7):1225-1246.

Baker MR, Fan G, Arige V, Yule DI, Serysheva II. Understanding IP3R channels: From structural underpinnings to ligand-dependent conformational landscape. Cell Calcium. 2023 Jun 22;114:102770. doi: 10.1016.

Bekauri T, Fischer S, Honn KV, Maddipati KR, Love T, Little C, Wood RW, Bonham AD, Linder MA, Yule DI, Emanuelle C, Falsetta ML. Inflammation, lipid dysregulation, and transient receptor potential cation channel subfamily V member 4 signaling perpetuate chronic vulvar pain. Pain. 2023 Oct 26. doi: 10.1097/j.pain.0000000000003088. Online ahead of print.PMID: 37889581

Benson JC, Romito O, Abdelnaby AE, Xin P, Pathak T, Weir SE, Kirk V, Castaneda F, Yoast RE, Emrich SM, Tang PW, Yule DI, Hempel N, Potier-Cartereau M, Sneyd J, Trebak M. A multiple-oscillator mechanism underlies antigen-induced Ca2+ oscillations in Jurkat T-cells. J Biol Chem. 2023 Nov;299(11):105310. doi: 10.1016/j.jbc.2023.105310. Epub 2023 Sep 29.PMID: 37778728

Chakraborty P, Deb BK, Arige V, Musthafa T, Malik S, Yule DI, Taylor CW, Hasan G. Regulation of store-operated Ca2+ entry by IP3 receptors independent of their ability to release Ca2. Elife. 2023 Jul 19;12:e80447. doi: 10.7554/eLife.80447.PMID: 37466241

Neumann J, Van Nieuwenhove E, Terry LE, Staels F, Knebel TR, Welkenhuyzen K, Ahmadzadeh K, Baker MR, Gerbaux M, Willemsen M, Barber JS, Serysheva II, De Waele L, Vermeulen F, Schlenner S, Meyts I, Yule DI, Bultynck G, Schrijvers R, Humblet-Baron S, Liston A. : Disrupted Ca2+ homeostasis and immunodeficiency in patients with functional IP3 receptor subtype 3 defects. Cell Mol Immunol. 2023 Jan;20(1):114. doi: 10.1038/s41423-022-00960-4.PMID: 36471115

Takano T, Yule DI. Ca2+ signals in pancreatic acinar cells in response to physiological stimulation in vivo. J Physiol. 2023 Mar 25.

Takano T, Yule DI. In vivo Ca2+ Imaging in Mouse Salivary Glands. Bio Protoc. 2022 Apr 5;12(7):e4380. doi: 10.21769/BioProtoc.4380. eCollection 2022 Apr 5.PMID: 35530515

Student Publications

Alabdali R, Franchini L, Orlandi C. Gα Protein Signaling Bias at Serotonin 1A Receptor. Mol Pharmacol. 2023 Nov;104(5):230-238. doi: 10.1124/molpharm.123.000722. Epub 2023 Aug 11. PMID: 37567783

Wahl AM, Takano T, Su S, Warner BM, Perez P, Sneyd J, Yule DI. Structural and functional analysis of salivary intercalated duct cells reveals a secretory phenotype. J Physiol. 2023 Oct;601(20):4539-4556. doi: 10.1113/JP285104. Epub 2023 Sep 19.PMID: 37724716

Nobiletti N, Liu J, Glading AJ. KRIT1-mediated regulation of neutrophil adhesion and motility. FEBS J. 2023 Feb;290(4):1078-1095. doi: 10.1111/febs.16627. Epub 2022 Sep 20.PMID: 36107440

Cisco LA, Sipple MT, Edwards KM Thornton CA, Lueck JD. Combinatorial chloride and calcium channelopathy in myotonic dystrophy. J. Clin. Invest. 2023, In Press. J Clin Invest. 2024; 134(1): e173576. https://doi.org/10.1172/ JCI173576.

Foley KF, Ward N, Hou H, Mayer A, McKee C and Xia H. "Regulation of PP1 interaction with I-2, neurabin, and F-actin." Molecular and Cellular Neuroscience (2023); Mar;124:103796

Alumni Career Stories

Scott Cameron, PhD, MD, RPVI (2003 PhD Pharmacology) Cleveland Clinic - Lerner Research Institute; Section Head of Vascular Medicine

I vividly remember my first visit to DPP on a cold January in 1999. I was visiting a friend in Rochester whose father had redesigned some DPP labs. I'd recently completed my undergraduate degree in pharmacology in Scotland and I was considering a PhD or medical school. A chance meeting with Dr. Shey-Shing Sheu that day saw me leave with an application form, and I never looked back. I credit Dr. Dave Yule for me gaining admission for I sensed he had advocated for my application. I ultimately completed my PhD in Dr. Jay Yang's lab on protein kinase modulation of cardiac gap junction proteins. Unlike the British system of instruction, the more informal and encouraging instruction I received in Rochester brought out the very best in me. One sunny day in 2001 while I was 'constitutively expressed' in lab, Channel 13 walked in and disrupted what was to be my perfect Western blot that week. The Channel 13 videographer (Sarah Carpenter) later sent an email to Rochester to ask for my contact information. We were married two years later. After 20 years of marriage, I still marvel at how I met my wife in a pharmacology lab!

After 3 ½ years in Rochester, I took a dual postdoctoral fellow position with Dr. Charlie Lowenstein at Hopkins and worked on endothelial cells while being formally credentialed in clinical chemistry. I was offered my dream job at Stanford as faculty two years later. Sarah convinced me I was taking the position because it was the safest option for our family. At that point, I decided to go back to school and enrolled in the M.D. program in Syracuse. After several years away from the lab and a few interesting experiences (like delivering my now 17-year old daughter), it was clear to me that medicine is algorithmic. When considering where I should go for a combined clinical/basic science fellowship, I commented to Sarah that Rochester was the place that brought me along the most of any institution. Her response: "That's the best reason I've heard for going home" so we packed our flat in NYC and came back to Rochester.

Things were different in my second postdoc. 9 years was a long time away from the bench, and everything involved a kit or a core, and publications required a lot more detail! But my confidence in lab gradually returned. I learned platelet biology from Dr. Craig Morrell and started my own lab at age 38. Even though my first faculty appointment was in a different department, DPP was always welcoming and I was thrilled to be able to publish a couple of papers with Dave Yule and Larry Wagner. Reflecting on everything since I first walked into DPP, here is what I conclude and have since verbalized when giving career talks: The pharmacology PhD program in Rochester provided me with an acute awareness of my strengths and weaknesses. It was never about the credential or publications. Everything after that: postdocs, medical school, residency, fellowship – none of it was easy – but they confirmed what I already knew about myself. Now, the research I do starts with observations in human tissue, and then I move into the mouse or cells. Other than access to human tissue, I'd say the major advantage of working in two worlds is an awareness of the best translational questions to ask. I credit Rochester for everything I've done in the last 24 years.

Amy Parkhill, PhD (2006 Pharmacology) St. John Fisher University; Associate Professor of Wegmans School of Pharmacy

I am one of the founding faculty members at the Wegmans School of Pharmacy at St. John Fisher University. This career was not what I expected at the start of graduate school, but right now after 17 years at St John Fisher, it is difficult for me to imagine a different career path and reflecting back helps me appreciate how URMC helped prepare me to be in academia. I started graduate school at URMC in the Program of Biology and Medicine – which was sort of a nice way of saying that I was undeclared in my major. Given my undergraduate research at Niagara University, I was confident that I would enroll in the Neuroscience program, but that path changed as soon as I took my first pharmacology course. I realized how pharmacology incorporated aspects of all the subjects I loved (Chemistry, Molecular and Cell Biology, Physiology) and wove these topics into real-life context. After this class, I knew that "my graduate home" was within the Department of Pharmacology and Physiology. My passion for pharmacology was further solidified with each class I took – especially Medical

Pharmacology with medical students. While taking this class, I was able to tutor medical students and realized that my dream job would be to explain how drugs work at every level to anyone who would listen.

My graduate work within the lab of Dr. Jean Bidlack focused on studying delta opioid pharmacology. She supported me to present at several national and international conferences and helped solidify my strong attention to detail and love of dose-dependent curves. After graduating with a PhD from Dr. Bidlack's lab and doing a short post-doc, I was fortunate to be hired in that dream job as one of the founding faculty at the Wegmans School of Pharmacy at St. John Fisher University (SJF). At SJF, I primarily teach in the five-semester Systems Pharmacology sequence. I love that I can see and train students about how pharmacology knowledge is applied in clinical settings and guides clinical care decisions.

The training that I received at URMC and in the Department prepared me extremely well for my current career. I use the skills I developed during my time as a PhD student every day when evaluating research on why medications are sometimes popular and then fall out of favor in addition to answering in-depth questions from motivated students. I also use my medicinal chemistry knowledge when explaining metabolism, absorption, and affinity and even show some of my former graphs and experiments as examples of perfect dose-response curves.

In the Department, I also learned and was given ample practice communicating topics to many different types of audiences. Despite being an introvert, I found that I enjoyed preparing and giving Departmental seminars. I also had the opportunity to teach students and technicians, give guest lectures at local universities, and teach Cell Biology as an adjunct at RIT. These experiences, along with my training in medical pharmacology, solidified my interest in becoming a teacher.

Going through the program also taught me the skills I needed to teach myself any subject. This skill was very useful early on at SJF as I was often assigned to teach topics that were not covered in any of my graduate coursework. Surprisingly, I view my lack of clinical knowledge as an asset, because I can approach the topic with a beginner's eyes and it helps me anticipate what students may find challenging or confusing.

Besides solidifying my love of pharmacology, my career in pharmacy education has led me to discover another passion, namely medical outreach and related issues of diversity, equity, and inclusion. Since 2015, I have led groups of pharmacy and sometimes nursing students on medical outreach trips to Central America. I have been fortunate to travel on seven trips to Guatemala, Nicaragua, and El Salvador. During these service trips, we work with local physicians and other medical providers to hold pop-up medical clinics in areas that have little or no access to healthcare. These trips have been some of the most rewarding endeavors of my life. During these trips, I work closely with pharmacy students and international medical providers to provide medical care while also learning the culture and connecting with local people. I have also been the coordinator or co-coordinator of our required Introduction to Diversity class since 2008. Leading this course has enriched me as a teacher and also as a person, as I learn from multiple speakers of diverse backgrounds. In both the course and on the mission trips, it is so rewarding to see student's views change and expand as they have their misconceptions challenged when they hear the stories and challenges that several patients face in the healthcare system. After participating in the course or going on a medical outreach trip, many students have a renewed commitment to use their skills and knowledge to advocate for underserved patients around the world, but also those within their own local communities.

As a faculty member at SJF, I view every day as a learning opportunity to understand more about a subject that I am so passionate about. It is an honor to have the opportunity to teach so many pharmacists in the area and to see their success in their careers. I am hopeful that what they have learned from me in Pharmacology, in Diversity, or on a trip to Guatemala has helped them become a better pharmacist and a better advocate and caregiver to their patients.

Tara Nealey, PhD (1992 Physiology) Polsinelli Law Firm; Chair, Biotech and Life Sciences Patents

I am a patent attorney in St. Louis, MO and Chair of the Biotechnology and Life Sciences Patents practice at national law firm Polsinelli LLC. As a graduate student in the Physiology Department in the late 1980's/early 90's I never imagined I'd be doing what I do now. I've followed a somewhat winding path overall but my decision to pursue a graduate degree at Rochester is one of the best I've ever made.

As an undergraduate, every aspect biology fascinated me. I briefly volunteered in a renal physiology lab, and ultimately applied to graduate physiology programs. Rochester was perfect for me because I was still unsure even about which system I wanted to study. After starting in 1986 and rotating through three labs as required by the program, I asked Dr. John H.R. Maunsell to accept me as his first graduate student. He agreed, and for the next few years I studied the signals of single neurons in the primate visual system. The experiments that formed the basis of my thesis work on inputs to visual cortex were technically very challenging. When finally published, our work gained notice for reaching conclusions partly conflicting with a prevailing theory advanced by well-known scientists at Harvard.

I also met my future husband Dr. Lawrence Snyder, an MD/PhD student then in his PhD stage. After we both graduated in 1992, we arrived in Boston to start postdocs. I was honored with the opportunity to work under distinguished Professor of Ophthalmology and Neurobiology at Massachusetts Eye and Ear/Harvard Medical School, the late Dr. Richard Masland, on the anatomy and physiology of retinal ganglion cells. Dr. Masland was enormously accomplished and remarkably generous with his time and guidance. During my postdoc, I began to consider and investigate other career paths, partly prompted by the rapidly increasing demand for patent professionals with graduate biology training. After learning more about patent law practice, I obtained my patent agent's license in 1997. Around the same time, we moved to St. Louis where the late John Beulick offered me my first law firm job, at the Armstrong Teasdale law firm. He advised not waiting long if I had any plans to attend law school. I immediately enrolled St. Louis University Law School, the one nearby law school with a part-time evening program so I could continue to work by day to gain practical experience. Over the next few years we juggled work and a young family while I also attended law school and my husband started his new lab at Washington University.

As a J.D./PhD since 2000 I've been a patent attorney in private practice. My work entails advising on all aspects of Intellectual Property strategy, for clients of all sizes from small biotech startups to Fortune 100 companies, in human, animal and plant biotechnology areas including more recently neurotech. Over the many years since I graduated, I've always been very grateful for my time at Rochester and the remarkable opportunities to be mentored by world-class scientists.

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2023 Year in Review

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