

The Johns Hopkins University  
School of Medicine



**ANNUAL**  
YOUNG  
INVESTIGATORS' DAY

Thursday, April 17, 2024 • 3–5 p.m.

Reception to follow

Preclinical Teaching Building  
Mountcastle Auditorium





## WELCOME

Welcome to the 47th annual Young Investigators' Day awards. It has been my pleasure to chair the committee that selected this year's awardees. It was a challenge because all the entries were so impressive. Congratulations to everyone who entered the competition — you represent the future of biomedical research.

Regards,

Zhaozhu Qiu, Ph.D.

*Director, Young Investigators' Day Program*

*Johns Hopkins University*

*School of Medicine*

## YOUNG INVESTIGATORS' DAY

**Young Investigators' Day**, established in 1978, recognizes student investigators at the school of medicine and provides them with a forum to present their work.

**The Michael A. Shanoff Research Award** was created in 1977 in memory of Shanoff, who received his M.D. and Ph.D. from the Johns Hopkins Medical Institutions in 1973.

**The David Israel Macht Research Award** was established in 1982 to commemorate the centenary of Macht's birth. He was a 1906 school of medicine graduate and a faculty member in the pharmacology and medicine departments.

**The Martin and Carol Macht Research Award** was established in 1993 to honor Martin Macht, who received his M.D. and Ph.D. from Johns Hopkins and was a trustee of the university for many years. Carol Macht obtained an M.A. and Ph.D. from Johns Hopkins in history of art and archeology.

**The Alicia Showalter Reynolds Research Award** was established in 1996 in memory of Showalter Reynolds, who was a Ph.D. student in the Department of Pharmacology and Molecular Sciences.

**The Mette Strand Research Award**, established in 1998, honors Strand, who was a professor of pharmacology and molecular sciences.

**The Hans J. Prochaska Research Award** was created in 1998 in memory of Prochaska, who earned his M.D. and Ph.D. at Johns Hopkins.

**The Paul Ehrlich Research Awards** are given to candidates in the Ph.D., M.D. and master's programs, and clinical and research fellows, in recognition of their contributions to research.

**The Nupur Dinesh Thekdi Research Award** was established in 2002 in memory of Thekdi, an M.D./Ph.D. student at Johns Hopkins.

**The Bae Gyo Jung Research Award** was created in 2006 by friends and family in memory of Jung, who was a predoctoral student in the biological chemistry department.

**The David Yue Research Award** was established in 2015 in memory of Yue, a professor of biomedical engineering and neuroscience.

**The Paul Talalay Research Award** was established in 2017 to honor Talalay, a professor of pharmacology and molecular sciences. Talalay started the Young Investigators' Day program 47 years ago.

**The Johns Hopkins Medical and Surgical Association Awards for Postdoctoral Investigation** were established in 1981 by the school of medicine to recognize excellence in research by clinical or research fellows at the school. The awards are designated for clinical and laboratory research with direct clinical relevance, and basic laboratory research. The awards are:

**The Alfred Blalock Research Award**

**The A. McGehee Harvey Research Award**

**The Albert Lehninger Research Award**

**The Daniel Nathans Research Award**

**The Helen B. Taussig Research Award**

**The W. Barry Wood Jr. Research Award**

**The Physician Scientist Award** was established in 2018 to recognize outstanding research contributions by a physician scientist at the Johns Hopkins University School of Medicine. This award is supported by the Johns Hopkins School of Medicine Physician Scientist Training Program.

**The Claude and Barbara Migeon Research Awards** recognize outstanding basic research by graduate students and postdoctoral fellows. Claude Migeon (1923–2018) was the director of pediatric endocrinology at the Johns Hopkins University School of Medicine from 1961 to 1994. His early focus on steroid metabolism established the norms of adrenal function during infancy and childhood. He also discovered the genetic cause of some endocrine disorders. Barbara Migeon (1931–2023), a professor emerita of genetic medicine and pediatrics, was known for her pioneering work on the mechanisms and consequences of X chromosome inactivation among females and its relevance to human disease, and for being the founding director of the school of medicine's Ph.D. program in human genetics. This award honors the contributions of Barbara and Claude Migeon as scientists and devoted mentors of many trainees throughout their careers.

**Acknowledgments:** The 47th annual Young Investigators' Day program is made possible by generous contributions from the Johns Hopkins Medical and Surgical Association; the office of the Dean; friends and family of Michael Shanoff; friends and family of David, Martin and Carol Macht; family of Hans J. Prochaska; friends and family of Drs. Paul and Pamela Talalay; the Department of Pharmacology and Molecular Sciences; Dr. Emanuel Libman; Dr. and Mrs. Dinesh C. Thekdi; Dr. and Mrs. John Vela; friends and family of Bae Gyo Jung; friends, family and colleagues of Dr. David Yue; and many friends and members of the Johns Hopkins University School of Medicine.

**3 P.M. WELCOME**

**Theodore L. DeWeese, M.D.**  
*The Frances Watt Baker, M.D., and  
 Lenox D. Baker Jr., M.D.*  
 Dean of the Medical Faculty  
 CEO, Johns Hopkins Medicine

**STUDENT LECTURES****3:05 P.M. THE PAUL TALALAY RESEARCH AWARD**

*Polymeric nanoparticle intracellular mRNA delivery and  
 immunological reprogramming of tumors*

**Sarah Yoseph Neshat**, Ph.D. candidate  
 Biomedical Engineering Program  
 Department of Biomedical Engineering  
 Sponsors: Jordan J. Green, Ph.D., and Joshua Doloff,  
 Ph.D.

**THE MICHAEL A. SHANOFF RESEARCH AWARD**

*Geranylgeranyl-diphosphate is essential for pancreatic cancer  
 tumor growth*

**Casie S. Kubota**, Ph.D. candidate  
 Biochemistry, Cellular and Molecular Biology Program  
 Department of Cell Biology  
 Sponsor: Peter J. Espenshade, Ph.D.

**THE MARTIN AND CAROL MACHT RESEARCH AWARD**

*Developmental spontaneous neural activity tunes early  
 auditory processing circuitry*

**Calvin Kersbergen**, M.D./Ph.D. candidate  
 Neuroscience Program  
 Solomon H. Snyder Department of Neuroscience  
 Sponsor: Dwight E. Bergles, Ph.D.

**THE DAVID YUE RESEARCH AWARD**

*One small step for vesicles, one giant leap for synaptic  
 transmission*

**Tyler H. Ogunmowo**, Ph.D.  
 Biochemistry, Cellular and Molecular Biology Program  
 Department of Cell Biology  
 Sponsor: Shigeki Watanabe, Ph.D.

**PRESENTATION OF STUDENT AWARDS****3:45 P.M. THE PAUL EHRLICH RESEARCH AWARD**

*Parkin Interacting Substrate Drives Neuronal Death in  
 Cerebral Ischemia*

**Jaimin Patel**, M.D. candidate  
 Institute for Cell Engineering  
 Sponsors: Ted M. Dawson, M.D., Ph.D., and Valina L.  
 Dawson, Ph.D.

**THE METTE STRAND RESEARCH AWARDS**

*Regulation of CdnL promotes adaptation to nutrient stress in Caulobacter*  
**Erika Smith**, Ph.D. candidate  
 Biochemistry, Cellular and Molecular Biology Program  
 Department of Biological Chemistry  
 Sponsor: Erin Goley, Ph.D.

*CRISPR-Screens and Algorithms for Functional Characterization of  
 Enhancers*

**Jin Woo Oh**, Ph.D. candidate  
 Biomedical Engineering Program  
 Departments of Biomedical Engineering and Genetic Medicine  
 Sponsor: Michael A. Beer, Ph.D.

**THE MICHAEL A. SHANOFF RESEARCH AWARD**

*Endocytosis blocks plasma membrane exosome biogenesis*

**Yiwei Ai, M.D.**, Ph.D. candidate  
 Biological Chemistry Program  
 Department of Biological Chemistry  
 Sponsor: Stephen J. Gould, Ph.D.

**THE ALICIA SHOWALTER REYNOLDS RESEARCH AWARD**

*HIV-1 reservoir does not decrease despite decades of antiretroviral therapy*

**Natalie McMyn**, Ph.D. candidate  
 Pharmacology and Molecular Sciences Program  
 Department of Medicine  
 Sponsors: Janet D. Siliciano, Ph.D., and Robert F. Siliciano, M.D., Ph.D.

**THE DAVID ISRAEL MACHT RESEARCH AWARD**

*Highly efficient reprogramming of glia into neurons by inhibition of Notch  
 signaling and NFI factors in adult mammalian retina*

**Nguyet Le**, Ph.D. candidate  
 Human Genetics Program  
 Solomon H. Snyder Department of Neuroscience  
 Sponsor: Seth Blackshaw, Ph.D.

**THE BAE GYO JUNG RESEARCH AWARD**

*Mitogen signaling is required during G2 arrest to prevent stress-induced  
 endoreplication*

**Connor McKenney**, Ph.D. candidate  
 Biochemistry, Cellular and Molecular Biology Program  
 Departments of Molecular Biology and Genetics  
 Sponsor: Sergi Regot, Ph.D.

**THE NUPUR DINESH THEKDI RESEARCH AWARD**

*Development of mutation-targeted chimeric antigen receptors for cancer*

**Brian Mog**, M.D./Ph.D. candidate  
 Biomedical Engineering Program  
 The Ludwig Center at Johns Hopkins, Sidney Kimmel Cancer Center  
 Sponsor: Bert Vogelstein, Ph.D.

### THE HANS J. PROCHASKA RESEARCH AWARD

*Screening for lipid nanoparticles that modulate the immune activity of helper T cells towards enhanced antitumor activity*

**Yining Zhu**, Ph.D. candidate  
Biomedical Engineering Program  
Department of Biomedical Engineering  
Sponsor: Hai-Quan Mao, Ph.D.

### CLAUDE AND BARBARA MIGEON RESEARCH AWARD

*Rab30 regulates lipid homeostasis in the hepatocyte during fasting*

**Danielle Smith**, Ph.D. candidate  
Biological Chemistry Program  
Department of Biological Chemistry  
Sponsor: Michael J. Wolfgang, Ph.D.

### POSTBACCALAUREATE AWARD

*Developing an Electrochemical Sensor to Measure DNA Intercalation*

**Saron Yoseph**, postbaccalaureate  
JHU Post-baccalaureate Research Education Program  
Department of Pharmacology  
Sponsor: Netz Arroyo, Ph.D.

## POSTDOCTORAL LECTURES

### 4 P.M. THE HELEN B. TAUSSIG RESEARCH AWARD

*Globally reduced N6-methyladenosine (m6A) in C9ORF72-ALS/FTD dysregulates RNA metabolism and contributes to neurodegeneration*

**Yini Li, Ph.D.**, postdoctoral fellow  
Department of Physiology  
Sponsor: Shuying Sun, Ph.D.

### THE DANIEL NATHANS RESEARCH AWARD

*Allosteric Competition and Inhibition in AMPA Receptors*

**W. Dylan Hale, Ph.D.**, postdoctoral fellow  
Department of Neuroscience  
Sponsor: Richard Huganir, Ph.D., and Edward Twomey, Ph.D.

### THE PAUL EHRLICH RESEARCH AWARD

*An evolutionarily conserved olfactory receptor is required for sex differences in blood pressure*

**Jiaojiao Xu, Ph.D.**, postdoctoral fellow  
Department of Physiology  
Sponsor: Jennifer L. Pluznick, Ph.D.

## PRESENTATION OF POSTDOCTORAL AWARDS

### 4:25 P.M. THE W. BARRY WOOD JR. RESEARCH AWARD

*Molecular mechanisms of cortical interstitial axon branching*

**Jakub Ziak, Ph.D.**, postdoctoral fellow  
Solomon H. Snyder Department of Neuroscience  
Sponsor: Alex Kolodkin, Ph.D.

### THE PAUL EHRLICH RESEARCH AWARDS

*An Amygdalar Oscillator Coordinates Cellular and Behavioral Rhythms*

**Qiang Liu, Ph.D.**, postdoctoral fellow  
Department of Neurology  
Sponsor: Mark Wu, M.D., Ph.D.

*Dynamic microtubule acetylation drives actomyosin contractility through release of sequestered GEF-H1*

**Abhijit Deb Roy, Ph.D.**, postdoctoral fellow  
Department of Cell Biology  
Sponsor: Takanari Inoue, Ph.D.

### THE A. MCGEHEE HARVEY RESEARCH AWARD

*Human birth tissue products as a regenerative medicine to inhibit post-surgical pain through multi-modal action*

**Chi Zhang, Ph.D.**, postdoctoral fellow  
Department of Anesthesiology and Critical Care Medicine  
Sponsor: Yun Guan, M.D., Ph.D.

### THE ALFRED BLALOCK RESEARCH AWARD

*The structural basis for 2'-5'/3'-5'-cGAMP synthesis by cGAS*

**Shuai Wu, Ph.D.**, postdoctoral fellow  
Department of Biophysics and Biophysical Chemistry  
Sponsor: Jungsan Sohn, Ph.D.

### THE ALBERT LEHNINGER RESEARCH AWARD

*Actuation of single downstream nodes in growth factor network steers immune cell migration*

**Dhiman Sankar Pal, Ph.D.**, postdoctoral fellow  
Department of Cell Biology  
Sponsor: Peter N. Devreotes, Ph.D.

### THE CLAUDE AND BARBARA MIGEON POSTDOC RESEARCH AWARD

*Neuronal mechanisms underlying the processing of species-specific vocalizations*

**Yang Zhang, Ph.D.**, postdoctoral fellow  
Department of Biomedical Engineering  
Sponsor: Xiaojin Wang, Ph.D.

### PHYSICIAN SCIENTIST AWARD

*B cell-mediated antigen presentation promotes adverse cardiac remodeling in chronic heart failure*

**Jana Lovell, M.D.**, clinical fellow  
Department of Medicine, Division of Cardiology  
Sponsor: Luigi Adamo, M.D., Ph.D.

### 4:40 P.M. YIDP ALUMNI KEYNOTE SPEAKER

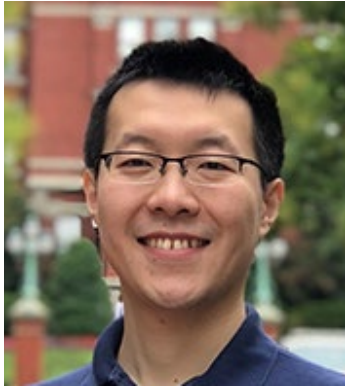
**Drew M. Pardoll, M.D., Ph.D.**

Abeloff Professor of Oncology  
Director, Bloomberg-Kimmel Institute for Cancer Immunotherapy

## POSTER PRESENTATION AND RECEPTION

## Yiwei Ai, M.D.

### *The Michael A. Shanoff Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Exosomes are small extracellular vesicles of 30 to 200 nm in diameter. They have the same topology as the cell, and carrying selected proteins, lipids and nucleic acids. They are secreted by all cells, having important roles in health and disease. Under the mentorship of Dr. Stephen Gould at Johns Hopkins, my

work focused on exosome biogenesis. In the prevailing model, syntenin drives the biogenesis of CD63 exosomes by recruiting Alix and ESCRT machinery to endosomes and leading to multivesicular endosomes mediated pathway of exosome biogenesis. Here I show syntenin drives CD63 exosome biogenesis by simply blocking CD63 endocytosis, thereby allowing CD63 to accumulate at the plasma membrane, and budding from there subsequently. I also showed the role of endocytosis is not limited to syntenin and CD63. I propose a new model based on our observations: Exosomes primarily bud from the plasma membrane, and endocytosis inhibits the protein loading into exosomes. This model revolutionizes our understanding of exosome biogenesis and has a profound impact on exosome-based drug pharmaceutical industry.

**Why did you choose Johns Hopkins for your work?**

I chose to come to Johns Hopkins because of its long history of training future leaders in medicine as well as its unparalleled research opportunities. I also was drawn to the exceptionally collaborative and supportive community.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am deeply honored to be recognized with the Michael A. Shanoff Award and to be listed among its recipients. This accolade strengthens my resolve to continue Dr. Shanoff's legacy through my commitment to a career as a physician-scientist.

**What contributed to your project's success?**

My mentor, Dr. Stephen Gould, has been instrumental in this journey. His encouragement to approach scientific inquiries with innovation and to address fundamental questions has been invaluable. His support and the autonomy he afforded me were pivotal in exploring my scientific curiosities. Mentored by Dr. Gould, I've been able to refine my abilities and grow into a confident, self-reliant researcher.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Johns Hopkins is a hub of exceptional research, thanks to the remarkable efforts of dedicated students and mentors. Young Investigators' Day is a testament to these achievements, marking the endpoint of years of unwavering commitment to scientific exploration. It's also a day to honor mentors for their essential role in nurturing students' achievements. These promising students and fellows are poised to become the next vanguard of research, embodying the superior education they received at Johns Hopkins well into the future.

**What has been your best/most memorable experience while at Johns Hopkins?**

So many come to my mind. Teaching, alongside research, has been an immensely rewarding experience. My involvement in educating community college students, teaching Ph.D. students and instructing medical students across several sessions has been a privilege. It is an honor to share my knowledge with younger scholars.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I plan to defend my Ph.D. thesis in a couple of weeks and return to the field of clinical medicine.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I am very lucky to have met my wife, Mengkun Chen. She's also a medical doctor and a Ph.D. student at Hopkins!

## W. Dylan Hale, Ph.D.

### *The Daniel Nathans Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

My work uncovered the mechanism of action for a class of anti-epileptic drugs that target the most common neurotransmitter receptor in the brain. This discovery will help design future drugs to target epilepsy and other neurological disorders. I led a collaboration between Rick Haganir and Ed Twomey's labs, which initiated

this work, and we also collaborated with Albert Lau's lab at Johns Hopkins and Vasanthi Jayaraman's lab at the University of Texas Health Science Center.

**Why did you choose Johns Hopkins for your work?**

The people at Johns Hopkins are unparalleled. When I was looking for a laboratory for my postdoctoral research, it was clear that the people and the environment at Johns Hopkins were second to none.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

This award has tremendous personal and professional meaning as it wouldn't have been possible without the investment and knowledge of my mentors and peers at Hopkins. Likewise, Daniel Nathans, the namesake of this award, laid the foundation for the molecular biology we used to conduct our studies. In many ways, Daniel Nathan's scientific work at Hopkins is still contributing to discoveries at Hopkins decades later.

**What contributed to your project's success?**

This project would not have been possible without the specific mentorship of my advisers, Rick Haganir and Ed Twomey, and without our wonderful collaborators, Albert Lau and Vasanthi Jayaraman. Furthermore, this work could not have happened without the world-class instrumentation and expertise assembled by the Beckman Center for CryoEM at Johns Hopkins.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day is a wonderful and unique opportunity for students and postdoctoral fellows to take pride in their achievements and demonstrate the results of their training at Hopkins.

**What has been your best/most memorable experience while at Johns Hopkins?**

When my wife and I were expecting my son, the lab put together a baby shower for us. I'll never forget the kindness, generosity and support that we felt from the people around us.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I will be looking for a faculty position very soon!

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

In my free time, I love playing the guitar and banjo, hiking and camping with my wife and son, and exercising.

## Calvin Kersbergen

### *The Martin and Carol Macht Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

My project in the Bergles laboratory focused on identifying how we form connections from an early age between the inner ear and brain to detect and process sound, and if these mechanisms are altered in conditions of early hearing loss. To prepare for sound processing, the immature brain undergoes a training

period before any external environmental sounds can be perceived. This training comes from the immature inner ear, which generates "spontaneous"

neural activity in precise patterns before the ear canal opens. We discovered that these patterns of spontaneous activity are critical for establishing the sensitivity of the auditory system to sound loudness and for defining normal brain representations of sound pitch, both of which are crucial components of communication with each other and the world around us. Next, we generated a model of the most common genetic form of hearing loss, due to disruption of the gene GJB2, and remarkably found that pre-hearing spontaneous activity was preserved and sufficient to induce circuit maturation despite profound deafness following ear canal opening. The preservation of this highly stereotyped activity may explain why patients with GJB2-mediated hearing loss respond well to cochlear prostheses, motivating further development of early therapeutic interventions to restore function.

**Why did you choose Johns Hopkins for your work?**

I chose to attend Johns Hopkins for my clinical and scientific training because of the incredibly kind, thoughtful and humble faculty and students who I met on my interview day and second-look weekend. I knew this was a place where I would obtain superb training in an environment where I would be supported and continually inspired by those around me.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am honored to be recognized with the Martin and Carol Macht Award. I hope that I will be able to follow in the footsteps of prior award recipients who have taken their Hopkins training and developed highly successful and impactful careers.

**What contributed to your project's success?**

The foundation of my project built upon the many amazing discoveries of former graduate students in the Bergles laboratory, including prior Young Investigator Award winners! The incredible scientific environment within the lab helps cultivate this collaboration. My labmates brought together expertise from molecular biology and genetics to optics, computer science and engineering and were able to provide critical guidance and experimental ideas throughout my training. Last but certainly not least, the mentorship and support I received from Dr. Dwight Bergles throughout my training was unmatched, from detailed interpretation of raw data to grant writing and

successful presentations. I hope to be able to pass down the support I've received to future trainees as I continue throughout my career.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Research training is a long path, especially for aspiring clinician-scientists. It is important to recognize these achievements along the way as a reminder that the work we trainees do is meaningful and impactful, especially when the day-to-day successes in science are often rare or fleeting. By celebrating the achievements of trainees and the mentors who have supported them, these awards continue to inspire future generations.

**What has been your best/most memorable experience while at Johns Hopkins?**

My favorite moments have been when I've bridged my two worlds of scientific and clinical training. For example, sharing research findings with a young patient's family, or relying on clinical observations to design the most relevant and impactful experiment in the laboratory. I hope to have many more of these moments as I continue my training and throughout my career.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I will be graduating in May 2024 and starting my residency training in Otolaryngology-Head and Neck Surgery at Massachusetts Eye and Ear/Harvard Medical School.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

Having grown up in Maine, I have always loved the escape that nature provides and try to spend my free time outdoors. I love to ski despite having long ago retired from my days of competitive downhill ski racing. Outside of the winter season, I enjoy spending my time hiking, backpacking, cycling, gardening or golfing with my partner, friends and family.



## Casie Kubota

### *The Michael A. Shanoff Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Organisms must be able to adapt to changes in nutrient availability in order to maintain normal physiology. The mechanisms involved in these homeostatic responses are of interest in many disease contexts, such as diabetes, cardiovascular disease and cancer. In the Espenshade lab, we are interested in studying lipid metabolism in

cancer. Specifically, we are interested in targeting lipid metabolic pathways to treat pancreatic cancer, which historically has very poor patient outcomes. For my project, I designed a CRISPR knockout screen to identify genes that are required for pancreatic tumor growth in mice. Through subsequent follow-up experiments in vitro and in vivo, I demonstrated that the isoprenoid geranylgeranyl diphosphate is essential for tumor growth. These findings validate a method for conducting a genetic screen in mice, and provide evidence that implicates this pathway in pancreatic cancer.

**Why did you choose Johns Hopkins for your work?**

I chose to enroll in a Ph.D. program at Johns Hopkins because of the vibrant, diverse research community at the school of medicine that fosters innovative discoveries and provides an excellent environment for training young scientists.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

Receiving this award is a great honor, personally and professionally. I feel it is a privilege for my work to be acknowledged with this historical award and to be recognized alongside other trainees who have contributed to biomedical research at Johns Hopkins.

**What contributed to your project's success?**

Guidance from my thesis adviser, labmates and faculty collaborators have all contributed greatly to my project's success. Without these mentors, I would not have had the tools I needed to complete my project.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day is an exceptional way to come together as a community and celebrate the work done by fellow trainees in other fields.

**What has been your best/most memorable experience while at Johns Hopkins?**

My most memorable experience at Johns Hopkins was attending a tumor metabolism conference in Banff, Alberta, Canada. I enjoyed exploring the beautiful landscape of Banff National Park while also hearing incredible talks from other leading researchers in the field.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I plan to graduate in the summer this year. I will be transitioning to a postdoctoral fellow position at the Salk Institute following my degree completion.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I was born and raised in Hawai'i on the island of O'ahu. Being so far away from home is the greatest challenge I have faced during graduate school, but the community here has made it well worth the move.

## Nguyet Le

### *The David Israel Macht Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Loss of neurons is the key pathological feature of many retinal degenerative diseases that often result in permanent blindness. While there is currently no effective regenerative therapy to replace neurons, one of the most potentially promising strategies is through direct reprogramming of endogenous Müller

glia into retinal neurons. Despite successful applications in vitro, in vivo

implementation has been hampered by low efficiency. In our study, we present a highly efficient strategy for reprogramming retinal glial cells into neurons by simultaneously inhibiting key negative regulators. Our discovery of the near-complete conversion of glia to neurons demonstrates that there is no clear intrinsic barrier to glial reprogramming in the retina, further strengthening the feasibility of reprogramming as a viable therapeutic strategy for retinal degeneration. This work was done in Dr. Seth Blackshaw's lab.

### **Why did you choose Johns Hopkins for your work?**

As a Baltimore City high school student, I had the opportunity to conduct research at Johns Hopkins during my senior year. The experience of being immersed in cutting-edge research, receiving supportive mentorship and participating in a highly collaborative environment has solidified Hopkins as my top choice for pursuing graduate studies.

### **What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am incredibly honored and humbled to receive the David Israel Macht Research Award. Dr. David I. Macht made numerous distinguished contributions to research and medicine, and I am inspired to continue his legacy as a graduate student.

### **What contributed to your project's success?**

I am grateful to my mentor Seth Blackshaw for his unwavering support and guidance. As my thesis adviser, Seth has given me freedom to explore scientific questions that are of my interest. His enthusiasm and excitement for research have inspired me to make the most of my experience as a graduate student at Hopkins. I also deeply appreciate Dr. Thanh Hoang, who has given me incredible scientific insights, guidance and support ever since I was a rotation student in the lab.

### **What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

I think Young Investigators' Day is an inspiring and amazing opportunity to recognize the scientific achievements of many talented researchers and celebrate all the science happening here at Hopkins.

### **What has been your best/most memorable experience while at Johns Hopkins?**

The most memorable experience was the wonderful time attending conferences together with my labmates.

### **What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I will be wrapping up my thesis project and hoping to graduate by early 2025.

### **Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I enjoy drinking matcha and the traditional method of preparing it.

## **Yini Li**

### *The Helen B. Taussig Research Award*



### **Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

As a postdoctoral fellow in Dr. Shuying Sun's lab, I study how the dysregulation of RNA metabolism contributes to neurodegeneration, particularly in amyotrophic lateral sclerosis (ALS) and frontotemporal dementia (FTD). We provided evidence that showed a prevalent mRNA modification, N6-methyladenosine (m6A), as a previously unknown pathogenic mechanism in the most common familial C9ORF72-associated ALS and FTD. On one hand, we found that the abnormal m6A reduction leads to the transcriptome-wide mRNA dysregulation with significant enrichment in synaptic activity and neuronal functional pathways. On the other hand, we found that m6A reduction disturbed the decay of the causative repeat expansion in the C9ORF72 gene. Our strategies to elevate the m6A levels in the diseased neurons rescued a broad spectrum of post-transcriptional dysregulation and disease-related pathologies, which holds great therapeutic potential.

### **Why did you choose Johns Hopkins for your work?**

Johns Hopkins is a world-class research institution with world-leading researchers, impressive research opportunities and a highly collaborative environment. Also, as a Ph.D. graduate from the C. elegans field, I am immensely grateful that Dr. Shuying Sun offered me an opportunity to pursue my research interests in human diseases. Joining the Sun lab has been an incredibly fortunate opportunity, and it has proven to be an excellent choice for my postdoctoral training.

### **What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am deeply honored to receive this award, which is named after the remarkable female pioneer in pediatric cardiology, Dr. Helen B. Taussig. The work recognized by this award is truly teamwork from many individuals. I believe this award will be a nice addition to my CV. More importantly, it is a motivation for me to continue pursuing my research of interest in translational science, and it will always serve as a reminder of the importance of teamwork in science. Dr. Taussig's legacy of hard work and genuine care for patients motivates me to achieve the translational potential of my research.

### **What contributed to your project's success?**

My project would not have been successful without the guidance from my excellent mentor, my reliable collaborators and my supportive colleagues. Also, the work largely benefited from a previous lab effort on a CRISPR screen.

### **What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

I am grateful for the YIDP, which recognizes the effort from young investigators and allows young investigators to be seen within a broader community.

### **What has been your best/most memorable experience while at Johns Hopkins?**

It is with the Sun lab members when we celebrated every big or small achievement of lab members. I also remember fondly the days that Shuying and I pushed each other to make paper revisions faster. It was a fun experience.

### **What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

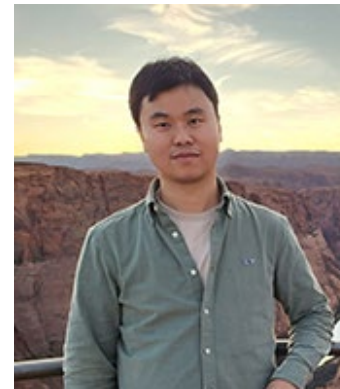
I will be looking for faculty positions.

### **Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I own a giant vineyard in Stardew Valley, Steam, USA.

## **Qiang Liu**

### *The Paul Ehrlich Research Award*



### **Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

I focused on studying the local clock mechanism in regulating rhythmic behaviors. More than 50 years ago, the suprachiasmatic nucleus (SCN) was determined to house the master circadian pacemaker that coordinates nearly all daily biological rhythms in mammals. Since that time, the dominant paradigm for

the organization of the circadian network has postulated that the SCN acts to synchronize local clocks throughout the body. In the brain, these local oscillators are thought to regulate individual rhythmic behaviors, but a discrete extra-SCN brain oscillator has never been previously identified. In addition to cyclical clock gene expression, brain oscillators should also exhibit rhythms of electrical activity. However, no genetic marker exists that labels electrically rhythmic neural circuits. In this project, we leveraged these observations and found that mWAKE labels an extra-SCN brain oscillator in the lateral amygdala (LA). We first show that mWAKE is enriched in a molecularly defined subregion of the LA (anterior-dorsal LA/adLA). Although the core clock protein Per2 cycles throughout the LA, we show that mWAKE-positive, but not mWAKE-negative, adLA neurons exhibit rhythmic intrinsic excitability. In contrast, expressing a clock-dominant negative virus in mWAKE-negative LA neurons does not affect Per2 cycling, even in the cells directly expressing the viral transgene. At a molecular level, the mechanisms

mediating rhythmic excitability outside of the SCN are poorly understood. We show that mWAKE levels rise at night in adLAMWAKE neurons and upregulate BK current to inhibit the excitability of these cells at night. Finally, we show that, rather than modulating an individual behavior, adLAMWAKE neurons utilize distinct projections to produce clock- and mWAKE-dependent rhythmic changes in two different behaviors: touch sensitivity and anxiety. Our investigation of the first discrete extra-SCN brain oscillator also reveals new insights into the nature of the circadian timing network.

**Why did you choose Johns Hopkins for your work?**

I chose Johns Hopkins for my work because of the great scientists here and the highly collaborative teams.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

It's an exciting feeling to receive this award. This award can help me further my professional training and certification goals that I have set for myself and will, in turn, help my future career.

**What contributed to your project's success?**

Working hard and being highly organized and collaborative. My mentor is Mark Wu.

**What has been your best/most memorable experience while at Johns Hopkins?**

When I got the Best Basic Science Oral Presentation award at the Sixth Annual Johns Hopkins Sleep & Circadian Research Day. Because that's the first award I got at Hopkins.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

Looking for faculty positions.

**Tell me something interesting about yourself that makes you unique?**

One sentence from my life experiences: Try to stay positive no matter what the circumstances are.

## Jana Lovell, M.D.

### *The Physician Scientist Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

As part of my T32 research fellowship, I joined the cardio-immunology lab of Dr. Luigi Adamo. Despite modern therapies, mortality and morbidity of chronic heart failure remains high. Inflammation plays a critical role in the development and progression of heart failure after a heart attack, but this connection is

complex precluding the development of specific immunomodulatory therapies to treat heart failure. We have found that B cells contribute to adverse cardiac remodeling through antigen presentation, which may represent a potential novel therapeutic target in chronic heart failure.

**Why did you choose Johns Hopkins for your work?**

I started my medical training as a medical student at Johns Hopkins and continued here for my internal medicine residency and cardiology fellowship. I decided to stay here for fellowship training because of the unique learning environment at Hopkins that fosters excellence in clinical medicine and innovation.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am honored and humbled to be recognized amongst the many excellent physician scientists past and present at Hopkins.

**What contributed to your project's success?**

The support and collaborative efforts of all the members of my lab, as well as the incredible mentorship of Dr. Adamo were instrumental in completing this research.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

It is truly great to see many amazing research projects being highlighted and young trainees at all different stages being honored!

**What has been your best/most memorable experience while at Johns Hopkins?**

The best part of training here has been being able to work with brilliant colleagues both in research and clinically.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I will be finishing my general cardiology fellowship this year, and then I will continue on for an additional year of advanced training in advanced heart failure and transplant.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

Last year, I hiked the Inca Trail to Machu Picchu and survived (barely).

## Connor McKenney

### *The Bae Gyo Jung Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Most cells in our body contain two copies of DNA — one copy from each of our parents. However, many cancer cells undergo a process called whole-genome doubling, through which they acquire approximately twice the amount of DNA of a normal cell. This process is associated with drug resistance and metastasis

throughout the body, so it is an important step in cancer progression. In the Regot Lab, my work has focused on understanding how this process happens; first discovering various causes, then identifying what the causes have in

common, and finally demonstrating how they cause it. These findings changed our understanding of the wiring of the human cell division cycle, and provide a mechanistic basis for the high incidence of whole-genome doubling in cancer.

**Why did you choose Johns Hopkins for your work?**

The quality of both basic research and medicine at Johns Hopkins makes it a unique place to train in biomedical research. I was also drawn in by the friendliness of students and faculty during my interviews.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am very grateful to receive the Bae Gyo Jung Award. This honor is motivating both personally and professionally to continue our work.

**What contributed to your project's success?**

Many things contributed to the project's success, including support from my thesis adviser, everyone from the Regot Lab, and others in the MBG Department. Additionally, the Regot Lab's approach of tool-building and studying single-cell behavior allowed me to visualize some aspects of cell behavior in a way that had not been done before. Cellular processes can be complicated, but being able to see how they work in real time provides a lot of insight.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

The Young Investigators' Day Program is an exciting tradition that brings together the community at Johns Hopkins. Graduate students and postdoctoral fellows spend a lot of time at the bench to drive the research at Hopkins forward, and it is important to recognize and acknowledge their contributions.

**What has been your best/most memorable experience while at Johns Hopkins?**

Some of my most memorable experiences have come from playing sports with other Johns Hopkins affiliates. There are opportunities to get involved in all kinds of sports, and these help to build the community at Hopkins.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

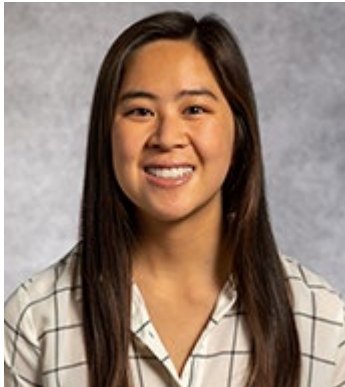
I am evaluating my career options while I prepare to defend my thesis.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I have more plants than I can take care of and a cat who's always hungry. Other than that, I spend my free time playing sports, gaming, hiking and exploring other cities.

## Natalie McMyn

### *The Alicia Showalter Reynolds Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

The lab of Drs. Robert and Janet Siliciano focuses on HIV cure. Antiretroviral therapy (ART) prevents new cycles of HIV replication and disease progression, but it is not curative. If ART is stopped, viral rebound will occur due to the persistence of a population of infected cells that can hide from our immune system,

known as the latent reservoir. The development of effective ART regimens was approximately 27 years ago, so there are few studies looking at the population of people with HIV on ART for over 20 years. Previously, our lab showed that the latent reservoir decays slowly during the first seven years of ART, enough to guarantee lifetime persistence of HIV, but it was unknown if that decay continued after long-term ART (greater than 20 years), or if ART should continue indefinitely. In this study, we discovered that the latent reservoir does not continue to decay and actually increases slowly. These results emphasize that ART should not be discontinued even after 20 years of treatment, and that the latent reservoir remains a barrier to cure.

**Why did you choose Johns Hopkins for your work?**

During my visit to Johns Hopkins for recruitment weekend, I witnessed how friendly and welcoming the faculty and students were to all of us interviewing.

I met with members of the Department of Pharmacology and Molecular Sciences and was warmed by the feeling of community. Everyone knew each other and cared about each other's work and well-being. The environment was filled with collaboration and the passion for research, which solidified my decision to come to this institution.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

It is truly an honor to receive the Alicia Showalter Reynolds Award. This is my first award recognizing my research efforts. It is also a great recognition of everyone who contributed to the project. My mentors knew Alicia Showalter Reynolds while she was a graduate student and told me how she was both kind and intelligent. This award is special because it keeps Alicia Showalter Reynolds in memory and commemorates women in STEM.

**What contributed to your project's success?**

Guidance from my mentors Drs. Robert and Janet Siliciano and the unwavering support from other members of the Siliciano lab were invaluable to this project. In addition to experimental help from both my labmates and collaborators, I had clinical help from doctors and researchers across the country and internationally to recruit 42 people with HIV on long-term ART to this study. With all this collaboration, we responded quickly to a question in the field and demonstrated, within one year, that the latent reservoir remains a barrier to cure even after 20-plus years of treatment.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day is a celebration of brilliant and rigorous work from a diverse set of researchers across the school of medicine. It is a wonderful way to recognize the hard work of students and fellows who have dedicated their time to drive innovative research forward at Johns Hopkins. The ceremony provides the opportunity to share these projects with others outside of our field and for the whole Hopkins community to meet the presenters. I always found it exciting to read about the profiles and discoveries of the awardees in the past.

### **What has been your best/most memorable experience while at Johns Hopkins?**

It is hard to pick just one experience, but my most memorable times have always been while spending time with the friends I have made here. I remember taking a weekend trip to New York, cohort potlucks, the Winter Gala, and meeting Dr. Anthony Fauci at the Conference on Retroviruses and Opportunistic Infections with the rest of my lab.

### **What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

In the next year, I hope to continue following up this project with research on the antibody response in people with HIV on long-term ART. I hope to continue as a research scientist in immunology after my anticipated graduation in the coming semesters.

### **Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

Every time I buy an avocado, I root the seed and grow an avocado plant. At one point, I had a farm with over 40 plants growing, ranging from a few weeks to a few years old. That was how my avocado plant business began. I have sold, given away or traded almost all of them now ... to make room for my many other plants.

## **Brian Mog**

### *The Nupur Dinesh Thekdi Research Award*



### **Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Chimeric antigen receptor (CAR) T cells have produced dramatic outcomes in patients with blood cancers, but have had limited success in solid cancers like pancreatic cancer or glioblastoma. One major challenge in solid tumors is the lack of cancer-specific targets that minimize toxicity to normal tissues. The

genetic alterations essential for the development of cancer can also be used as

immuno-therapeutic targets to specifically kill cancer cells and spare normal tissues. During my Ph.D. with Ken Kinzler and Bert Vogelstein in The Ludwig Center at Johns Hopkins, I developed two types of CAR T cells to target these cancer-specific genetic alterations. The first CAR approach utilized pairs of activating and inhibitory CARs to target the loss of heterozygous genes within cancer cells. In the second approach, components of a CAR were fused with the T cell receptor to target “hot spot” mutations that are presented as peptides on human leukocyte antigens. Both CAR approaches were able to cure mice of cancers containing the targeted genetic alteration without affecting cells representing normal tissues.

### **Why did you choose Johns Hopkins for your work?**

I chose to attend Johns Hopkins for my M.D./Ph.D. because of the rigorous clinical training as well as the unparalleled depth and breadth of the research environment. The most compelling reason for me, however, was the sense of community both within the M.D./Ph.D. program and the broader university: The faculty were incredibly welcoming, and the students at all stages of training were supportive and collaborative.

### **What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am incredibly grateful to have been recognized with the Nupur Dinesh Thekdi Award for the work undertaken during my Ph.D. This award is a testament to the mentors and colleagues who have helped me develop as a scientist. I am honored to both be part of Nupur’s legacy and to be recognized among the past awardees, many of whom I have looked up to throughout my time at Hopkins.

### **What contributed to your project’s success?**

My project’s success is directly attributable to the team science approach fostered by the faculty within the Ludwig Center. The insights, suggestions and experiments contributed by the other graduate students, postdocs and fellows who also trained in the Ludwig Center were absolutely essential for the development of the new CAR approaches described in my Ph.D. The guidance provided by Ken Kinzler, Shibin Zhou and Bert Vogelstein was invaluable in providing scope and direction to the projects.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

The training path to becoming an independent investigator, whether in academia or industry, can best be described as a marathon. Celebrating the important milestones along this journey recognizes the pivotal role graduate students and fellows play in advancing groundbreaking research even during their training.

**What has been your best/most memorable experience while at Johns Hopkins?**

One of my favorite traditions at Hopkins was the annual mini-golf competition at the M.D./Ph.D. program retreat. While I myself never won the competition, it was always fun to come together with friends in the program across all different years to talk about research and just catch up!

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

After graduating from Hopkins, I plan to pursue an internal medicine residency and oncology fellowship with the goal of becoming a physician-scientist who will both care for patients with cancer and also run an academic lab to develop new immunotherapies for solid cancers.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

When I am not in the research lab, you can find me biking with my fiancé throughout the city of Baltimore, hiking with friends or playing board games. I highly recommend trying out Terraforming Mars if you have 12 hours to spare or Wingspan for a faster-paced ecologically accurate game!

## Sarah Yoseph Neshat

### *The Paul Talalay Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

In the Green Lab and Doloff Lab, what I've had the privilege of exploring is unique in that I'm exploring both arms of the immune system when it comes to dysregulation and disease. My research dissertation aims to develop and screen biomaterial-based mRNA nanoparticle formulations to target immune cells, such as

antigen presenting cells, for oncology and autoimmune therapies. There is an urgent need for a therapeutic that can engineer the immune system to prevent disease progression at early stages and have a long-lasting and transformative effect on patients. Recent novel nonviral delivery biotechnologies have great potential to impact medicine and are being investigated in clinical trials with a few in the clinic today, such as the current Moderna and Pfizer/BioNTech mRNA SARS-CoV-2 vaccine in addition to Alnylam's RNAi therapy for rare hereditary diseases — setting precedent for subsequent gene delivery methodologies such as my dissertation.

**Why did you choose Johns Hopkins for your work?**

The biomedical engineering department is affiliated with both the school of medicine and the school of engineering, which allowed me take courses in both schools and fosters a unique collaborative environment among engineers, scientists and clinicians. It was important that I attended a university that values translation of research with the goal of developing technology that can and will impact patient lives. Plus, biomedical engineering is ranked #1!

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

Receiving this award carries personal significance as it acknowledges the collective efforts of our team and the impact of our work. Being recognized alongside the talented winners of previous Young Investigators' Day awards is truly inspiring and an immense honor. Dr. Paul Talalay was a distinguished



professor in the field of cancer prevention, and I aspire to emulate even a fraction of his greatness as a scientist!

### **What contributed to your project's success?**

Several factors contributed to the success of our project. Firstly, the guidance and support provided by my thesis advisers, Dr. Green and Dr. Doloff, were invaluable. Their expertise, mentorship and unwavering encouragement helped steer the project in the right direction and overcome challenges along the way. Additionally, the collaborative atmosphere within the labs, fostered by my dedicated labmates, played a crucial role. We made sure to conduct rigorous science while also having fun. Their insights, feedback and willingness to brainstorm ideas contributed significantly to my project's development. Moreover, my own special skills and interests, coupled with the opportunities provided by the research environment, allowed me to contribute meaningfully to the project's outcomes. Overall, it was a combination of supportive success.

### **What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day serves as a vital celebration of the invaluable contributions that students and fellows make to research at The Johns Hopkins University. It highlights the importance of nurturing and recognizing emerging talent in the scientific community, while also fostering a sense of camaraderie and support among researchers at different stages of their careers. This event not only honors the achievements of young scientists but also inspires them to continue pushing the boundaries of knowledge and innovation in their respective fields!

### **What has been your best/most memorable experience while at Johns Hopkins?**

My most memorable experience at Johns Hopkins has been all of the people I've met along the way. It has been the privilege of collaborating with a diverse and talented array of individuals, including friends, each bringing unique perspectives and expertise to our shared endeavors.

### **What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I am looking forward to graduating this year and immersing myself in a new challenge and the next captivating problem to explore.

### **Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I love to travel (I've been to 38 countries!) and I've enjoyed attending conferences in graduate school where I get to combine my love for exploring new cities with science. Additionally, I have a passion for cooking and delving into the science behind culinary techniques, flavors and creativity.

## **Tyler Hakeem Ogunmowo, Ph.D.**

### *The David Yue Research Award*

### **Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**



I discovered a novel mechanism that enables neuronal contact sites called synapses to rapidly strengthen their signaling and maintain it during high demand. Synapses communicate via signaling molecules called neurotransmitter. Neurotransmitter is packed into synaptic vesicles, and upon neuronal activity, synapses fuse these vesicles at release sites and release neurotransmitter onto postsynaptic receptors for signal transduction. After vesicle fusion, these release sites become vacated and require

new vesicles for continued neurotransmitter release. My work uncovered the function of two proteins that coordinate the replenishment of these release sites after their use by keeping so-called replacement vesicles nearby. This finding is significant to the field of synaptic cell biology as it provides an answer to a long-standing question — how is it that synaptic vesicles are kept close enough to release sites to rapidly replace the vesicles fused during the previous round of release? I conducted my research in the lab of Dr. Shigeki Watanabe.

### **Why did you choose Johns Hopkins for your work?**

Primarily, I chose Johns Hopkins because of its large variety of strong graduate programs. My program, Biochemistry, Cellular and Molecular Biology, provided access to top-tier labs doing all kinds of incredible research,

facilitated faculty interaction and mentorship, and introduced me to numerous other students inside and outside of my program with whom I could collaborate professionally and personally.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

To me, this award helps me to truly appreciate the hard work I have conducted over my six-plus years here at Johns Hopkins. Given the length of a Ph.D., and the nature of the progress being incredibly steady, it is hard to recognize one's achievements because rather than a small number of impactful moments, the success of a Ph.D. is made by the combination of a large number of little moments. Even the impact that should follow something like publishing a paper is diminished by the lengthy submission process. So, awards like this that succinctly recognize all of these small moments and their culmination are invaluable. Professionally, I feel honored to have my research recognized outside of my lab, and especially outside of my field.

**What contributed to your project's success?**

I would like to say hard work and talent, but at times I was not working too hard and felt the opposite of talented. My interest in neuroscience led me to Shigeki's lab, and my ability to do electron microscopy well kept me there, but from that point on, the people around me enabled my success. There are too many to mention, but the most important is my PI, Shigeki. Shigeki's inimitable work ethic motivated me to pursue my project passionately. His scientific ability and intelligence were a constant boon to my scientific questions, knowledge and reasoning. His willingness to encourage me to have countless unique scientific experiences helped me grow and develop into my own type of scientist. So, because of Shigeki, the members of my lab and, through Shigeki, the countless others I met along the way, my project became successful.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

I would like to see more of its kind. Students and fellows are the driving force behind research at Hopkins. Often, they are integral to every step of research. Their contributions can always be recognized more.

**What has been your best/most memorable experience while at Johns Hopkins?**

It's a long list, but I would have to say my recent graduation was the highlight of my time here. However strangely, it took me some time for that to fully sink in.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

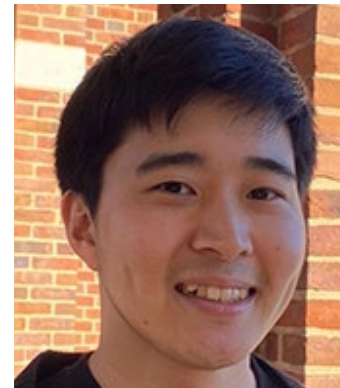
I am looking into a variety of career opportunities. Nothing is set in stone yet!

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I am not sure how special it is, but I am an avid rock climber and have traveled all over the world to climb!

**Jin Woo Oh, Ph.D.**

*The Mette Strand Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Gene regulatory DNA elements, such as enhancers, are enriched with pathogenic mutations associated with devastating diseases such as cancer and schizophrenia. Despite the significant medical implication, functional characterization of individual enhancers has been difficult. For example, many human genes are regulated by complex networks of enhancers, and it remains unclear how these network properties affect phenotypes and how their disruptions cause disease. Further, putative pathogenic regulatory variants are often tested through their conserved counterparts in mice, but mapping human enhancers to mice has long been a computational challenge due to both rapid evolution and sequence complexities of enhancers. In Dr. Michael Beer's lab, we addressed these challenges in two orthogonal approaches. First, we collaborated with multiple labs to functionally characterize a large number of enhancers near genes of high medical significance using CRISPR.

For example, we epigenetically perturbed enhancers that drive stem cell differentiation, and discovered that enhancers can regulate the speed of cell-state transitions. Fetal development is a finely controlled dynamic process with high spatiotemporal precision, and our discovery will help us understand how enhancer mutations may cause developmental disorders. Second, we developed a novel genome-alignment algorithm (gkm-align) that can detect more than 20,000 novel distal enhancers conserved between human and mouse. Using our novel method, we published an expanded catalogue of conserved enhancers, which we believe will streamline functional characterization of human enhancers. I aspire to contribute to advancements in the diagnosis and treatment of regulatory diseases through our research efforts.

**Why did you choose Johns Hopkins for your work?**

I received my undergraduate education at Johns Hopkins in the department of biomedical engineering, and I loved every class I took from the department, especially those related to mathematical modeling of complex biological systems. Two of those courses were taught by my adviser, Dr. Mike Beer. I did not know much about regulatory genomics at that time, but his genuine passion for science resonated with me, and I decided to have my Ph.D. training under his guidance. It turned out I made the right decision.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

Dr. Strand was a phenomenal and selfless scientist who dedicated her life to finding cures for parasitic diseases that affect hundreds of millions of people. As a junior scientist finishing graduate school, I am inspired to emulate her commitment to science, and this award will be a constant reminder of my resolution to devote my career to advancing science.

**What contributed to your project's success?**

All of my scientific contributions were made possible by the ample amount of mentorship I received from my advisor, Dr. Mike Beer, and by the extensive collaborative opportunities that I was fortunate to have. I would like to share this honor with my adviser and all of my collaborators.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Learning that our research is appreciated by the broader scientific community encourages and motivates me to continue working hard to push the boundaries of scientific knowledge by solving important problems.

**What has been your best/most memorable experience while at Johns Hopkins?**

At the end of my first year as a Ph.D. student, I gave a lab presentation on the very first project I worked on as a graduate student. After the talk, my adviser approached me excitedly and told me he was always thankful to have a creative student like me. This gave me the courage to work on difficult and important problems and the energy to bounce back whenever I hit rock bottom after countless failed attempts throughout my Ph.D.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I will graduate this May and continue my career in scientific research. I will explore various opportunities over the years before I settle, and I'm excited for this journey ahead.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

This Young Investigators' Day marks the culmination of my 17 years of studying abroad in the U.S., including 11 years in Baltimore! I believe my independence from a young age has contributed to my growth as an independent scientist. While I will be leaving for Korea for a little while to finally reunite with my family, Baltimore will always hold a special place in my heart as my second home.

## Dhiman Sankar Pal, Ph.D.

### *The Albert Lehninger Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

I did my postdoctoral research with Peter Devreotes in the Department of Cell Biology. Traditionally, research in the Devreotes lab has been focused on chemotaxis using the soil amoeba *Dictyostelium* as the model organism of choice. Chemotaxis is the directed movement of cells along extracellular gradients,

which plays an important role in development and immunity. Although chemotaxis studies of the model system have been invaluable, there has been an urgent need to understand mechanisms of migration in immune cells for the research to be useful to human health and disease. Since studies in immune cell lines are technically more difficult than in the model system, it has discouraged all but a few laboratories from making significant progress in these cellular systems.

When I joined Peter's lab, I saw this roadblock as an opportunity to make fundamental discoveries in the field whilst honing my technical and analytical skills. To this end, I developed new approaches for powerful optogenetic studies in human neutrophils and macrophages. With these optical tools, I elucidated the role of the Ras/PI3K/Akt pathway in immune cell migration. Ras signaling is typically associated with cell growth, but not direct regulation of motility or polarity. However, my studies demonstrated that local activation of Ras-mediated classical growth-control pathways directly modulate actin polymerization, cell shape and migration modes. Thus, my work provided the first mechanistic description of the role of Ras GTPases and Akt in directly controlling human cell migration. I further continued my pursuit of the role of Ras growth pathways in immune cell migration by noting the effects of locally inhibiting Ras GTPases. Based on my previous results, we expected that suppressing Ras activity would stop migration. But I saw the opposite: Reducing Ras activity on the cell membrane polarized cells and improved their migratory ability by increasing actomyosin contractility at the back. The

surprising ability of Ras inhibition to promote migration presents a warning that targeting Ras to inhibit proliferation could have the unanticipated effect of promoting migration and metastasis.

**Why did you choose Johns Hopkins for your work?**

During my graduate studies, I tried to understand the molecular basis of how intracellular pathogens negotiate the harsh phagolysosomal environment of host immune cells. For my postdoctoral work, I was interested to look at host-pathogen interaction from the point of view of the host, specifically in the context of immune cell migration. And what better place to understand the signaling mechanisms governing cell migration than the Devreotes lab at Johns Hopkins! In addition to the expertise, Johns Hopkins attracted me with its rich history of basic/biomedical research and funding.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

It is a huge honor for me to be selected by a committee of accomplished scientists for this award. It will surely be helpful for my career progression. The fact that this award is named after none other than the great biochemist Albert Lehninger gives me added satisfaction, as well as motivation to do more impactful work!

**What contributed to your project's success?**

The Devreotes lab has a friendly and collaborative environment, which I believe has played a substantial role in the development of my multiple projects. I would like to point out that my adviser Peter Devreotes' holistic approach to data analysis and big-picture thinking has greatly helped my work. Additionally, collaboration with Pablo Iglesias at the Whiting School of Engineering and discussions with Douglas Robinson in our department have proven to be highly productive. I am also thankful to the Microscope Facility at the school of medicine, where I was able to generate all the beautiful movies for my papers! Finally, the versatile training in biochemistry/molecular biology/cell biology that I received during my Ph.D. with Rupak Datta at the Indian Institute of Science Education and Research Kolkata, drove this work to its success.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

I think it is a wonderful platform to have brilliant students and fellows present their work in front of the Johns Hopkins scientific community. It also provides a great opportunity for young scientists from across the school of medicine to discuss scientific ideas and open new collaborations. Ultimately, it is very motivating for any young trainee to get recognition from their host institute, so I wholeheartedly support Young Investigators' Day.

**What has been your best/most memorable experience while at Johns Hopkins?**

I had always wanted to learn live-cell fluorescence imaging, which I was able to do extensively during my time at Johns Hopkins and have really enjoyed. Specifically, for my own project, I have an amusing memory. My project was stuck for many months initially, and I was banging my head against a brick wall. However, a wonderful bacterial contamination in one of my cell culture plates on an August afternoon in 2021 solved my problems and changed my fortunes. It goes to show that contaminations may not always be bad! Outside of work, I have always enjoyed time with my labmates and our colorful, "after 3 p.m." conversations in the computer lab or over a few beers at the Ministry!

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I plan to finish up my remaining projects and start looking for faculty positions.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I enjoy traveling, and take every opportunity to take a trip and explore. I love photography, and have been clicking photos since I was a kid. Throughout my school years, I did martial arts and swimming and did fairly well in tournaments. In the near future, I would like to take up pottery.

## Jaimin Patel

### *The Paul Ehrlich Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

795,000 people suffer from stroke annually in the United States. 87% of these strokes are ischemic. This condition is a leading cause of serious long-term disability and the second leading cause of death worldwide. Current management strategies for ischemic stroke, such as alteplase treatment and mechanical thrombectomy, are focused on reperfusion of the ischemic brain regions.

However, neurons continue to die even after these reperfusion therapies are instituted, leading to persistent neurological deficit. No clinically available therapeutics can prevent this phenomenon, limiting the capacity to preserve neurologic function in this patient population. As such, there is a great need to develop therapeutic strategies capable of preventing this secondary form of neurologic injury.

Ischemic stroke and Parkinson's disease share many molecular alterations, including the downregulation of parkin, an E3 ubiquitin ligase with critical neuroprotective functions.

Cytosolic substrates of parkin, such as parkin interacting substrate (PARIS), have been implicated as drivers of neurodegeneration in Parkinson's disease. However, no study to date has examined the role of these substrates in ischemic stroke. My work, under the mentorship of Drs. Ted and Valina Dawson, has been focused on characterizing the role of PARIS in neuronal death following cerebral ischemia. We demonstrated that PARIS becomes upregulated in ischemic stroke through enhanced proteasomal degradation of parkin. Using a PARIS gene knockout mouse model, we discovered that PARIS knockout dramatically reduces infarct volume and neurological deficit following cerebral ischemia.

Finally, we identified that PARIS gene knockdown attenuates both cell autonomous and non-cell autonomous modes of neuronal death using an in vitro model of cerebral ischemia. Together, our results suggest that PARIS is a promising therapeutic target in the context of ischemic stroke.

**Why did you choose Johns Hopkins for your work?**

My interest in Johns Hopkins began when I learned about its outstanding medical education program and research training opportunities, particularly within the neurosciences. However, my experience on interview day indicated the true driver of my decision. I remember the first faculty member I met. He initiated a lengthy discussion on my research experience, but he maintained a warm, welcoming demeanor. Throughout the day, I continued to see members of the Johns Hopkins community uniquely exhibit both collegiality and intellectual curiosity. I knew I wanted these traits in colleagues and mentors, so I decided to pursue my medical education and hone my capabilities in bench research here. I continue to experience this treatment both in the laboratory and in the hospital, so I know I made the right decision.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am deeply honored to be receiving this award. I am grateful to be continuing the legacy of such an influential figure within biomedical research. As the father of chemotherapy and the mind behind the initial syphilis treatment, Dr. Paul Ehrlich was truly a pioneer in translational research. This award will further motivate me in my pursuit of a career as a neurosurgeon-scientist. Above all, it serves as a reminder of the high caliber mentorship and unwavering support of my mentors, Drs. Ted and Valina Dawson. Akin to Dr. Ehrlich, I hope to dedicate my capacity as a researcher toward developing a “magic bullet” that protects against acute and chronic forms of neuronal death.

**What contributed to your project’s success?**

The outstanding mentorship of Drs. Ted and Valina Dawson has been key to the success of this work. They inspire me daily to exercise my creativity, to innovate, and to maintain my knowledge of the literature. Their unwavering support has enabled my persistence in executing this study, and their guidance in study design continues to make me a better scientist. Research associates and specialists Drs. Suyi Cao, Hu Wang, Mohammed Repon Khan, and

Rong Chen are integral members of the team who have pushed this work forward through their expertise and guidance. The relentless support of my parents, brother, partner and friends was essential in maintaining morale and perseverance.

**What thoughts do you have about Young Investigators’ Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

I believe Young Investigators’ Day is a tremendous opportunity, and I am humbled to be a part of it. It provides a unique platform to elevate the excellent work of students and fellows at Johns Hopkins, and it is a testament to the dedication of Johns Hopkins toward the success of its trainees.

**What has been your best/most memorable experience while at Johns Hopkins?**

I remember the moment I made the foundational discovery for my current project. I had gone through almost a year of testing ideas for potential projects to no avail. I had a preliminary result showing that PARIS is upregulated following ischemic stroke in mice, but I had no data showing PARIS is involved in neuronal death in this disease context. I remember looking at the results of a pilot experiment using PARIS gene knockout mice, which showed neuroprotection at one day following ischemia. I remember feeling immense relief and excitement as I realized that all the hours I had spent in the laboratory had finally produced an actionable result. Clinically, I will never forget my experiences on the various surgery services. I have had the privilege of observing the spectrum of care provided by surgeons, from the most complex procedures to conversations about end-of-life considerations. Reminiscing on these experiences continually reminds me of why I am on this career path.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I plan to finish my year of research this summer and my fourth year of medical school in May of 2025. I will be applying to residency positions in neurological surgery beginning this fall.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I enjoy outdoor activities, such as hiking, fishing and camping. My favorite hike is called Angel's Landing in Zion National Park. The hike is difficult, but the view at the top is unmatched. As a result of my partner, I have recently come to appreciate trails in the DMV, such as Annapolis rock and the Old Rag trail at Shenandoah National Park.

## Abhijit Deb Roy, Ph.D.

### *The Paul Ehrlich Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

I study how cells can adapt to their physical surroundings, and I discovered how modifications on specific cellular components called microtubules enable cells to modulate their mechanical properties and migration behavior. I performed my research in the lab of Dr. Takanari Inoue in the Department of Cell

Biology.

**Why did you choose Johns Hopkins for your work?**

I am interested in an interdisciplinary approach to address fundamental scientific questions of biomedical relevance, and Johns Hopkins was an ideal place to do that. I also specifically wanted to work with my mentor, Dr. Takanari Inoue, who is a world-renowned expert in synthetic biology.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

Being awarded the Paul Ehrlich Award is a great honor. It is wonderful to be recognized among the many amazing scientists at Johns Hopkins. At a personal level, it is very humbling to receive an award named after Paul Ehrlich, who used his understanding of basic sciences to help solve biomedical problems. In addition, I use a good deal of microscopy in my cell biology research, and it

is gratifying to receive this particular award since Paul Ehrlich pioneered the techniques to identify different types of cells using microscopy.

**What contributed to your project's success?**

Guidance from Dr. Inoue, my mentor; support from my fellow lab members and other colleagues, hard work and some good luck.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

This is an excellent way to celebrate the wide spectrum of truly amazing research being done at Johns Hopkins.

**What has been your best/most memorable experience while at Johns Hopkins?**

The many, many evenings brainstorming random scientific ideas with my colleagues and friends.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I am starting my own research lab as an assistant professor at the University of Connecticut School of Medicine.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

Before graduate school, I worked at a copper refinery as a chemical process engineer.

## Danielle Smith

### *The Claude and Barbara Migeon Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Hepatocytes, polarized epithelial cells of the liver, play a crucial role in maintaining systemic glucose and lipid homeostasis in the face of an ever-changing nutritional

environment. Hepatocytes are both incredibly metabolically flexible and also have an efficient intracellular trafficking system that allows them to transport cargo across several apical and basolateral domains with high fidelity. Due to this necessity for efficient endocytosis and secretion, the family of Rab GTPases, principal regulators of the intracellular trafficking network, play a particularly important role in hepatocytes. However, despite their importance in vesicle trafficking, the physiological roles of many Rabs in animals have yet to be characterized. Using a combination of mouse models and cell culture studies, my thesis work has defined the role for the Golgi-localized family member Rab30 in liver physiology during fasting. I have uncovered that Rab30 expression is specifically induced by fasting and not by other dietary interventions in the mouse liver. Fasting-induced Rab30 expression is regulated by a master transcriptional regulator of lipid metabolism in the liver called Ppar $\alpha$ . Additionally, Rab30 expression is further amplified in liver-specific carnitine palmitoyltransferase 2 knockout mice (Cpt2<sup>L-/-</sup>) that lack the ability to oxidize fatty acids and have fasting-induced hepatic steatosis, serum dyslipidemia and a hyper-induction of Ppar $\alpha$  transcriptional activity, leading us to the hypothesis that Rab30 contributes to lipid homeostasis. Live-cell super-resolution imaging and biochemical in vivo proximity labeling demonstrate that Rab30-marked vesicles are highly dynamic and interact with proteins at the Golgi apparatus and throughout the secretory pathway. While analysis of liver-specific knockouts of Rab30 reveals its dispensability in the fasting response, analysis of Rab30;Cpt2 double knockout mice, which have a potentiated Ppar $\alpha$  response and enable us to amplify the effect of loss of Rab30 in the liver, reveals a retention of proteins within the livers of fasted mice, a reversal of serum dyslipidemia observed in Cpt2<sup>L-/-</sup> mice, and a corresponding decrease in serum apolipoprotein A4 levels. Together, these data suggest a role for Rab30 in the sorting of secreted proteins and lipoproteins to influence hepatic and circulating triglyceride levels during fasting, particularly during times of excessive lipid burden.

#### **Why did you choose Johns Hopkins for your work?**

Johns Hopkins has a history of research excellence and has great resources and funding in the basic sciences.

#### **What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am honored to have received the Claude & Barbara Migeon Research Award, which recognizes outstanding basic research performed as a trainee at Johns Hopkins. While there is no direct clinical relevance that can be attributed to my research, basic science is important to informing the molecular pathways underlying both normal physiology and disease states. Professionally, receiving this award motivates me to continue investigating fundamental biological problems in physiology.

#### **What contributed to your project's success?**

We have generated many tools (mouse models, viral vectors for in vivo overexpression, cell lines) and used different techniques (electron microscopy, super-resolution live-cell imaging, protein interaction assays) that allowed us to glimpse the role of Rab30 at both the physiological and cellular level. I was lucky to have my mentor, Dr. Michael Wolfgang, for numerous discussions and for his creativity and guidance.

#### **What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

I am extremely thankful for Young Investigators' Day for granting trainees like me a forum for presenting our research. We are very passionate about our research, and this day allows us to share what we have been working hard on with the rest of the Johns Hopkins scientific community.

#### **What has been your best/most memorable experience while at Johns Hopkins?**

Being a part of Dr. Wolfgang's lab allowed me to immerse myself in many different areas of physiology and metabolism outside of my main dissertation project. I have had incredible opportunities that allowed me to externally collaborate with other labs and learn about the physiology of different organisms. The lab culture fosters scientific creativity, and I have learned so much from Dr. Wolfgang and other lab members.

#### **What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I am graduating from my Ph.D. program and will be continuing on to an academic postdoctoral position.



**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I enjoy being active in my free time, especially spending time outdoors on trails, running, and playing in a Baltimore City field hockey league.

## Erika Smith

### *The Mette Strand Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

In response to environmental stressors such as nutrient deprivation, bacteria activate a conserved stress response pathway called the stringent response (SR). In addition to stress survival in non-pathogenic contexts, SR activation is implicated in the virulence and antibiotic tolerance of pathogens. In the Goley

lab, we use the freshwater bacterium *Caulobacter crescentus* as a tractable model to study bacterial adaptation to stress. During SR activation, adaptation and survival are promoted over growth and anabolism. In *Caulobacter*, a major regulator of anabolic genes is the widely conserved transcription factor CdnL. If and how CdnL is controlled during the SR and why that might be functionally important is unclear. Through my thesis research, I have elucidated the mechanisms contributing to downregulation of CdnL during the SR. Preventing CdnL degradation during nutrient deprivation causes misregulation of ribosomal and metabolic genes. Functionally, I found that CdnL clearance allows for efficient adaptation to nutrient repletion, and that cells with the inability to clear CdnL during starvation are outcompeted by wild-type cells when subjected to nutrient fluctuations. These findings indicate that clearance of CdnL during the SR is critical for altering the transcriptome to permit cell survival during nutrient stress. Because CdnL homologs are broadly found and are in important pathogens such as *Borrelia burgdorferi* and *Mycobacterium tuberculosis*, I hypothesize that CdnL regulation is a conserved mechanism of stress adaptation across bacteria.

**Why did you choose Johns Hopkins for your work?**

One of my dreams since high school was to study at Johns Hopkins. Candidly, the inspiration stemmed from my favorite TV show, *House, M.D.* The main character, infectious disease doctor Gregory House, was supposedly educated at Johns Hopkins, and I, too, wanted to be an infectious disease doctor. In college, my ambitions shifted away from being in the clinic and toward being at the bench. In addition to applying to other graduate schools, I also applied to three graduate programs at Johns Hopkins because there were numerous labs here that excited me. Ultimately, I decided to come because of the collegiality and supportive environment. PI, postdoc or graduate student — people are just nice here.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am very honored to have received the Mette Strand Award because I share Dr. Strand's excitement for studying infectious diseases. As a woman in STEM, I am inspired by Dr. Strand to follow my passion for understanding the molecular mechanisms contributing to pathogenesis and to establish a lab of my own. I hope to be as great of a mentor as Dr. Strand was for her students.

**What contributed to your project's success?**

I owe much of the project's success to my mentor, Dr. Erin Goley. She has been so encouraging of my work, and she always finds time to discuss my data and to help me rationalize the findings. She also has the uncanny ability to remember experiments that I performed even when I do not remember doing them. I really appreciate and admire Erin for being both an excellent mentor and a caring person. Additionally, I have been fortunate to collaborate with many amazing people both here and at other institutions. Dr. Peter Chien at UMass Amherst has been particularly helpful, from "Zooming" into my thesis meetings to Slack messaging Erin and me whenever we wanted his insight. It definitely took a village to raise this child, and I appreciate all of the help and support I have gotten along the way. I also just really love the process of doing experiments and analyzing data, so my work has mostly been performed out of curiosity as opposed to necessity.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day is a great way to showcase the diverse research occurring at Johns Hopkins. I admire my peers for their rigor and commitment to their research, and I am very humbled to be a part of this community of dedicated scientists.

**What has been your best/most memorable experience while at Johns Hopkins?**

Some of my favorite memories include the moments spent with my lab. Whether it is in lab meeting or at a brewery, talking about science or talking about nonsense, it is always so much fun and I truly enjoy being around them. I have also had the opportunity to share my graduate school experience with my twin sister, Danielle Smith, who also received an award this year!

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I will be graduating within the next few months. In August, I will be starting a postdoctoral position in the lab of Dr. Philip Adams at the NIH to study RNA regulation in the Lyme disease pathogen, *Borrelia burgdorferi*.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

Outside of the lab, I love being active and spending time outdoors. The mental clarity that a morning run along the Baltimore waterfront brings me almost always helps me start my day on a good note.

**Shuai Wu, Ph.D.**

*The Alfred Blalock Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Dr. Sohn's lab studies various biological stress-sensor proteins, including mammalian cyclic GMP-AMP (cGAMP) synthesis (cGAS).

cGAS plays a crucial role in activating innate immune responses against cytosolic dsDNA in mammals. My research on cGAS involved solving multiple crystal structures of cGAS bound to different substrates, dinucleotide intermediates and divalent metals at various catalytic stages. Our structural findings, combined with biochemical measurements, redefined the molecular mechanism by which cGAS generates 2'-5'/3'-5'-linked cGAMP. The novel structures and mechanistic insights from our study have the potential to guide researchers in developing small molecule therapeutics targeting different active states of cGAS.

**Why did you choose Johns Hopkins for your work?**

I chose Johns Hopkins for my postdoctoral training owing to its outstanding reputation as a research institution renowned for pioneering and groundbreaking research. As it turns out, my choice proved to be the right one.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I want to express my sincere gratitude to the Young Investigators' Day Committee for honoring my research with the Alfred Blalock Research Award. Receiving this award brings me immense honor and happiness. This recognition serves as a strong motivation for me to continue my academic pursuits.

**What contributed to your project's success?**

Being part of Jay Sohn's lab team is an absolute privilege. Without Dr. Sohn's guidance and unwavering support, my project wouldn't have been feasible. I'm particularly thankful for the numerous enlightening discussions with Jay throughout the project and the freedom to explore different possibilities. Moreover, Dr. Sandra B. Gabelli's oversight of crystallographic data collection and processing, coupled with remote access to the National Synchrotron Light Source II, are also vital components for the project's success.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

I see Young Investigators' Day as an excellent platform for recognizing the substantial dedication invested into research endeavors for award recipients.

Furthermore, the award cultivates a valuable network among young researchers at Hopkins for communication and collaboration.

**What has been your best/most memorable experience while at Johns Hopkins?**

Upon observing the electron density of the cGAS reaction intermediate pppGpA on Coot, I was struck by the precision and elegance of the enzyme. This experience highlighted to me the profound capability of X-ray crystallography in elucidating enzymatic reactions.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I would like to apply for a faculty position and establish a lab to continue my research interest in unraveling the mechanism of biological stress-sensor pathways and autophagy.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I like music, which may have been inherited from my father. I enjoy exploring various musical instruments and playing guitar and harmonica from time to time.

## Jiaojiao Xu, Ph.D.

### *The Paul Ehrlich Research Awards*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

I joined Dr. Jennifer Pluznick's lab for postdoctoral training in October 2018. My research focused on two different aspects of gut microbiome and host-interaction: (a) elucidating the influence of gut microbes on glomerular filtration rate in health and disease, and (b) uncovering a novel role of a sensory

receptor (OLFR558) that responds to gut microbial metabolites in blood pressure control. Males have a higher blood pressure than premenopausal

women with ~10 mmHg. In the second project, I found that OLFR558 is required for sex differences in blood pressure. Olfr558 KO females exhibit increased blood pressure whereas KO males have decreased diastolic blood pressure. A rare OR51E1 (human ortholog) missense variant has a statistically significant sex interaction effect with diastolic blood pressure, increasing diastolic blood pressure in women but decreasing it in men. Uncovering the origin of sex differences in blood pressure regulation can help to move the field toward a more thoughtful approach to blood pressure management in both men and women.

**Why did you choose Johns Hopkins for your work?**

The Johns Hopkins University has a distinguished reputation worldwide, and is renowned for its excellence across diverse fields such as medicine, public health and research. The community at Hopkins is not only exceptionally skilled but also welcoming and supportive. My experience here has been delightful, both professionally and personally.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

The Young Investigator Award is highly competitive, and being honored with this accolade has provided me with significant encouragement. It instills a newfound confidence in me to persist in my research endeavors with determination and enthusiasm. This recognition is a powerful motivator, propelling me forward in my academic and professional journey.

**What contributed to your project's success?**

The success of my project can be attributed to various factors, including my keen interests, available opportunities, specialized skills and invaluable guidance. Each of these elements played a crucial role, and without any one of them, completing the project successfully would have been challenging. With a strong interest in sensory receptors in unconventional places, I joined Dr. Pluznick's lab. She offered me to delve into the project focusing on "uncovering the renal functional role of OLFR558." Integral to the execution of these specialized skills, particularly in telemetry surgery and wire myograph techniques for studying mouse mesenteric arteries. While these skills were essential, refining and honing them through continuous practice was imperative for the project's progress and eventual completion. Crucially, effective guidance from Dr. Pluznick and my colleagues proved invaluable.

Their expertise, mentorship and collaborative efforts provided me with the necessary support and direction throughout the project, enabling me to navigate challenges and achieve our objectives successfully.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day is truly remarkable! It serves as a source of inspiration and encouragement for students and fellows alike.

**What has been your best/most memorable experience while at Johns Hopkins?**

One of the most unforgettable experiences for me was learning telemetry surgery on mice. I must admit that mastering this technique was not easy and required dedicated practice. Initially, I struggled to grasp the intricacies of the procedure, despite my efforts over several weeks. It became a consuming challenge, often occupying my thoughts even in my sleep, where I dreamt of successfully performing the surgery.

However, through perseverance and a thorough understanding of the training materials, I eventually achieved success. It was through consistent practice and unwavering determination that I gained the confidence and proficiency needed to excel in this skill. This journey taught me a valuable lesson: With confidence and persistence, daunting tasks can be conquered.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I am currently actively pursuing a faculty position in the job market. I am optimistic about advancing to the next stage. Keeping my fingers crossed for a successful outcome!

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I used to enjoy hiking. However, my focus has shifted as I am now occupied with caring for my little bundle of joy. While it can be tiring, the experience is filled with sweetness and profound happiness.

## Saron Yoseph

### Postbaccalaureate Award



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

As a Post-baccalaureate Research Education Program (PREP) Scholar, I am researching under the mentorship of Dr. Netz Arroyo in the Department of Pharmacology and Molecular Sciences. My project focuses on developing an electrochemical platform for investigating intercalation as a mechanism

of DNA binding. Intercalators are small molecules that insert a part of themselves between the base pairs of double-stranded DNA, causing the DNA to unwind and inhibit replication and other cell functions. With many uses in chemotherapy drugs and treatments for various infections, intercalators are important in developing new medicines to treat such health issues. Medicinal chemists use indirect and complex techniques such as viscometry and X-ray crystallography to confirm intercalation, slowing down drug development efforts to find new intercalators. To provide a direct and efficient way of detecting DNA intercalation, I am developing a DNA-hairpin electrochemical sensor that contains self-complementary DNA, allowing intercalation to occur. I have used phenanthridine as a model system to optimize sensor binding kinetics and gain an improved understanding of sensor performance under variable environmental conditions. Studying the effect of temperature on sensor performance in the absence and presence of an intercalator further confirmed intercalation was occurring as the melting temperature increased in the presence of an intercalator.

**Why did you choose Johns Hopkins for your work?**

As I was preparing to graduate from Howard University in May 2022, I knew I wanted to gain more research experience with a biomedical focus before attending graduate school. Johns Hopkins is a leader in groundbreaking research, especially in the biomedical research field, so the opportunity to join the PREP program and work with Dr. Arroyo was exactly what I needed

to develop my research skills while learning more about the graduate school experience.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

Receiving this award shows me that I have grown since I began working in the Netz lab and can effectively present my research to others. As a young Black woman in the research field, factors such as imposter syndrome and microaggressions have made me feel like I do not belong in this space. However, having my research highlighted with a postbaccalaureate award proves that I belong and excel in this field. As I move on to graduate school, this award will stay with me and remind me that I can accomplish whatever I put my mind to.

**What contributed to your project's success?**

When I joined the Netz Lab, Dr. Arroyo believed in me enough to restore this shelved project and produce a functional platform. With no experience in electrochemistry, I was unsure of my abilities, but his support and belief in me motivated me through failed experiments and roadblocks. Without his amazing mentorship, I could not have grown into the confident researcher I am today. I also have to thank Vincent Clark, a fourth-year Ph.D. student in the Netz Lab who trained and mentored me while in the lab. Lastly, all of the members of the Netz Lab supported me through feedback and discussions that I could not have moved my project forward without.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Johns Hopkins Young Investigators' Day is an excellent opportunity to highlight researchers who are making interesting discoveries. Bringing an idea to fruition with a research question and working through the struggles of scientific investigation to garner exciting results should be highlighted. Recognizing these researchers and their contributions to scientific knowledge shows them that their work made an impact, big or small.

**What has been your best/most memorable experience while at Johns Hopkins?**

My most memorable experience at Johns Hopkins has been the bonding events my PI and lab have planned, from playing Mario Kart after work to

pumpkin carving during the fall season. I had never carved a pumpkin before, but many people in my lab gave me tips on carving a pumpkin successfully, continuing to teach me new things even outside the lab.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

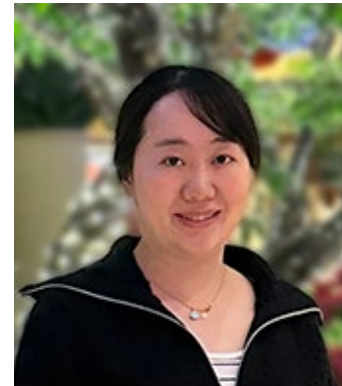
My plans for the next year are to finish up the manuscript I am working on for this research and attend graduate school.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

As a first-generation Ethiopian American, I love to cook, but I especially love to make the Ethiopian dishes my mother made for me while I was growing up. I spent my childhood learning how to replicate her distinct taste, and I enjoy cooking for friends who have never had Ethiopian food. I knew I had mastered her recipes when my family started to tell me my food tasted better than hers, but her cooking will always be the best for me.

## Chi Zhang, Ph.D.

### *The A. McGehee Harvey Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Postsurgical pain causes significant suffering. Continuous reliance on opioid analgesics can lead to severe side effects and accidental death. Therefore, there is an urgent need to develop nonopioid therapies for managing postsurgical pain. We demonstrated that local application of a naturally occurring biologic derived from human birth tissues (amniotic membrane, AM) attenuated established postsurgical hypersensitivity without exhibiting known side effects of opioid use in mice. Importantly, preemptive treatment also prevented postsurgical pain from transitioning to a prolonged state. This effect was achieved through diverse modes of actions, including direct inhibition of nociceptive dorsal root ganglion neurons via CD44-dependent pathways and indirect pain

relief by attenuating immune cell recruitment. We further purified the major matrix component, the heavy chain-hyaluronic acid/pentraxin 3 (HC-HA/PTX3) from human AM that has greater purity and water solubility. HC-HA/PTX3 replicated neuronal and pain inhibition. Mechanistically, HC-HA/PTX3 induced cytoskeleton rearrangements to inhibit sodium current and high-voltage activated calcium current on nociceptive neurons, suggesting it is a key bioactive component mediating pain relief. Collectively, our findings highlight the potential of a naturally derived biologic from human birth tissues as an effective nonopioid treatment for postsurgical pain, and unravel the underlying mechanisms. This study was done in Yun Guan's lab in the Department of Anesthesiology and Critical Care Medicine.

### **Why did you choose Johns Hopkins for your work?**

I chose Johns Hopkins for its reputation in high academic standards, world-class research environment and innovative research opportunities.

### **What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I am deeply grateful to receive the A. McGehee Harvey Award — it is a major milestone in my career development. Personally, it validates my dedication and boosts my confidence to continue pursuing my career goals. Professionally, receiving this award makes my research more visible and will open up new opportunities for potential collaboration, funding and career advancement.

Dr. A. McGehee Harvey was known for his pioneering work in applying research to medical care. Receiving an award in his name is particularly suitable for our work in Dr. Yun Guan's lab, where we strive to identify new targets and optimize strategies for treating pathological pain conditions. I am proud that the translational value of our work was recognized by the YIDP committee, resulting in the A. McGehee Harvey Award.

### **What contributed to your project's success?**

First, I attribute the project's success to the support from my PI, my colleagues, and the Department of Anesthesiology and Critical Care Medicine (ACCM). Dr. Yun Guan, my PI, always motivates me to think openly and encourages me to try out new ideas. Moreover, he mentors such an incredible team, from whom I receive continuous help and learn a lot, which helped me prepare my techniques well before leading this project. I also benefit a lot

from the excellent research environment created by the ACCM department. Every year, the department hosts a Research Day event, where researchers communicate research ideas and findings with each other. Second, the support from my family allows me to focus on my work and advance my career. Most importantly, I have been greatly inspired by my husband, who also did his postdoctoral training at Hopkins and recently started his own lab. His determination and perseverance in the face of challenges always motivate me.

### **What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day provides us with a platform to showcase our work, receive feedback from peers and experts, and build connections within the research community. This event exemplifies the exceptional academic environment at Johns Hopkins, which fosters the growth of the next generation of researchers.

### **What has been your best/most memorable experience while at Johns Hopkins?**

I have had the privilege of getting to know many talented individuals who have brought new perspectives and insights, refreshing my understanding of science and the world.

### **What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

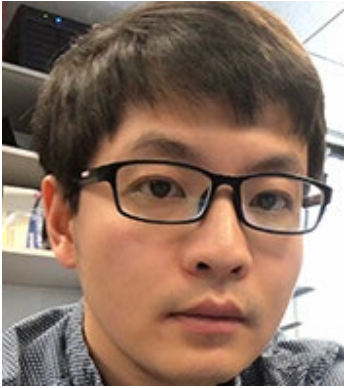
I will start a junior faculty position and apply for funding opportunities to support my independent research.

### **Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I have a deep passion for singing, finding strength in its melodies — a hobby I intend to cherish for life. A few years ago, to celebrate the accomplishment of my Ph.D. training, I recorded an album featuring my favorite songs.

## Yang Zhang, Ph.D.

### *The Claude and Barbara Migeon Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Species-specific vocalizations are important for the survival and social interactions of both humans and vocal animals. My research projects focus on understanding the underlying neural mechanisms for species-specific vocalization processing in the brain. We use a unique nonhuman primate, the common

marmoset (*Callithrix jacchus*, New World primate), as our animal model. The marmoset is one of the two key laboratory primate models, and provides several important advantages over other nonhuman primates: a rich vocal repertoire, a high reproductive rate while in captivity, a relatively short lifespan, a similar hearing range as humans, and a smooth brain allowing easy access to all parts of the cerebral cortex. We demonstrated the continuity and divergence of the dual auditory pathways in the primate brains along the evolutionary path and highlight human-specific brain specialization for speech and language processing, suggesting that the putative neural networks supporting human speech and language processing might have emerged early in primate evolution. Moreover, we revealed the existence of voice patches in the auditory cortex of marmosets, and support the notion that similar cortical architectures are adapted for recognizing communication signals for both vocalizations and faces in different primate species. These findings are significant because they will give us a unique opportunity to provide critical new evidence to modify and expand current models of speech processing, and will open exciting avenues of research in understanding the roles of the auditory dorsal and ventral neural networks in vocal perception and production. Ultimately, understanding these mechanisms will provide new diagnostic and therapeutic avenues for people with speech and communication disorders. I conducted my research in Dr. Xiaoqin Wang's lab in the Department of Biomedical Engineering. Our lab is devoted to understanding the neural basis of auditory perception and vocal communication in a naturalistic environment.

**Why did you choose Johns Hopkins for your work?**

Johns Hopkins is surely a top university with world-recognized reputation. During my Ph.D. training, I had an opportunity to conduct research at JHU for a short period of time as a visiting student. During that period, I was able to experience the research environment at JHU and to have a knowledge of what equipment and facilities are available here. Also during that period, I had a clearer picture of my future career path. Another important reason I chose JHU is because of the great mentorship of Dr. Xiaoqin Wang, my postdoc mentor. Dr. Wang provides us support in every aspect to test our research ideas, and most importantly, he encourages independence. I am confident that the training I have received at JHU, particularly in Dr. Wang's lab, makes me a strong competitor in my field.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

I was very excited to know my work has been rewarded. It is a great motivation for me to know that my work is being recognized by others, and I am reassured that my work is on the right track. And this award is surely a strong add-on to my CV. It proves the importance of my work, and I'm sure it will benefit me greatly in my job-hunting process in the near future.

**What contributed to your project's success?**

The thing that I really like about doing science is that all my projects are driven by my own interests, instead of following other people's thoughts. My mentor, Dr. Xiaoqin Wang, provides me the freedom to design and conduct my own experiments; the entire process is just enjoyable to me. I have gained substantial skills in a broad aspect, including biomedical engineering, computer science, neuroscience and psychology, during both my Ph.D. and postdoc training. These skills provide me flexibility to address a scientific question from different aspects, making my results more solid and convincing and surely contributing to my project's success. Another key factor to my project's success is that Wang Lab is a successful and well-funded lab with all the resources needed. Conducting research can be very money-consuming. Without sufficient funding support from Wang Lab, I wouldn't be able to access and use the equipment and facilities as much as needed. Wang Lab also provides me with the unique model animal, the marmoset, used in this project, which is a very precious resource.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day has been a tradition for JHU medical school for more than 40 years. It is not only a celebration of research success accomplished by students and young fellows, but also an encouragement for them to pursue further success in the future. Doing science is a long journey, and it sometimes can be tough too. Therefore, it's good to know that there are other people along the journey too. We share our stories with each other, we exchange our thoughts both about science and life, and support each other along the way. And I think Young Investigators' Day provides a wonderful opportunity to make all these happen.

**What has been your best/most memorable experience while at Johns Hopkins?**

I use a primate (marmoset monkey) in my research. A couple times, the monkeys escaped when I opened the cage. Capturing an escaping monkey is a battle of wits and courage. I usually chase the escaping monkey to a corner of the room so he/she has no place to go, and then capture with a net. And sometimes I even need help from my colleagues. The funniest thing is when we are trying to capture the escaping monkey, and all the other monkeys in the cages are cheering "whee whee." After years of battles of wits and courage with monkeys, I'm very good at doing it now. There was once an escaping monkey that just refused to go to a corner, and he jumped between the tops of two cages back and forth. I observed the jumping paths for a few seconds, and captured him right in the air.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

Looking for faculty positions.

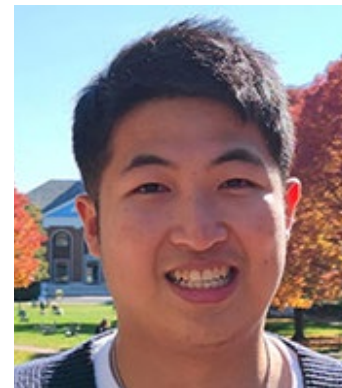
**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I feel I'm very lucky because the work I'm doing happens to be something I really love. What you would love is largely determined by your personality. For me, I love trying new things. For example, I love cooking. Instead of cooking the dishes that I'm already perfect at doing, I kept trying new dishes. Now I can not only do Chinese dishes, I also succeed in Japanese and Korean

styles, and I keep trying to make dishes from all over the world. Another thing for me is I'm not easily frustrated by failures, and I won't easily give up. I think my personality makes me perfect to be a scientist. At work, I'm always highly motivated to test new ideas, to try new methods. And if something goes wrong, I'm always patient enough to work things out. Life and work are mixed together for me, and I enjoy the way they are. At home, I talk with my family about my work and science in general all the time. And my brain keeps working even during sleep — some of my research ideas are exactly the products of dreams.

**Yining Zhu**

*The Hans J. Prochaska Research Award*



**Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Lipid nanoparticles, renowned for their role in delivering messenger RNA for COVID-19 vaccines, have emerged as promising vehicles for cancer immunotherapy. Earlier studies concentrated on enhancing lipid nanoparticles to stimulate robust responses from T helper 1 (Th1) cells, which are pivotal in enabling the immune system to recognize and combat cancer cells. Working in Hai-Quan Mao's lab, I utilized an innovative screening technique to optimize the lipid nanoparticle composition, tailoring it to enhance and maximize immune response activation. Through this endeavor, I found lipid nanoparticles capable of eliciting responses through dual pathways, effectively presenting tumor antigens to both Th1 and Th2 cells, another subset of helper cells. This research stands out for demonstrating the potential of lipid nanoparticles to enhance both Th1 and Th2 responses, orchestrating concerted attacks on cancer by diverse immune cell populations. Such findings offer a versatile strategy for vaccine development applicable across various diseases, thereby broadening the scope of mRNA lipid nanoparticle-based immunotherapies.



### **Why did you choose Johns Hopkins for your work?**

I chose Johns Hopkins because I want to be equipped with the most advanced scientific concepts, engineering principles and clinical insights, all of which are well integrated at Hopkins. I find my career aspiration aligns well with the philosophy of Hopkins education and research. More importantly, the strong connection with Johns Hopkins Medicine and the integration of clinical practices and engineering research are very attractive for me to join here, keep learning and thrive.

### **What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

Receiving this award is profoundly encouraging, motivating me to continue pursuing my research and career goals in biomedical engineering scientific research. I am inspired to contribute further to translating imaginative research into therapeutic applications, following in the footsteps of Dr. Prochaska.

### **What contributed to your project's success?**

I would like to express my gratitude to my PI, Dr. Hai-Quan Mao, for his unwavering support and invaluable opportunities. His guidance has inspired my passion for nanocancer vaccine research. Additionally, I extend my thanks to my lab colleagues and collaborators for their support throughout this journey.

### **What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

Young Investigators' Day provides an invaluable opportunity for x and fellows to engage and connect within our scientific community. I am truly grateful for this opportunity.

### **What has been your best/most memorable experience while at Johns Hopkins?**

While at Johns Hopkins, one of my most memorable experiences was participating in collaborative research projects that brought together students and faculty from various disciplines and different universities. Working alongside experts from different fields was truly rewarding, as we pooled our knowledge and skills to make significant strides in our research.

### **What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I will be graduating within two years, and looking for a postdoc position and eventually a faculty position.

### **Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I adopted a golden retriever (Watson) when I entered the Ph.D. program. I have really enjoyed his company during the journey. Experiencing my personal growth, both in terms of age and scientific research capability, alongside Watson's own growth has been a uniquely enriching experience.

## **Jakub Ziak**

### *The W. Barry Wood Jr. Research Award*



### **Please describe briefly and in simple terms your research discovery. Why is it important in the context of your field? In what lab did you do the research?**

Regulation of directed axon guidance and branching during development is essential for the generation of neuronal networks. My research in the Kolodkin laboratory aims to uncover molecular principles of interstitial axon branching, fundamental phenomena allowing central nervous system neurons to

connect to multiple targets that are spatially distinct. We use novel *in vivo* single cell labeling approaches that enable sparse and robust visualization of individual cortical excitatory neurons, along with the capacity to perform genetic manipulations. These new techniques allow for quantitative assessment of axonal morphologies at the single cell resolution.

We have found that balancing cytoskeletal dynamics through action of microtubule-binding proteins and tubulin posttranslational modifications is an important regulatory element of collateral axon elaboration in cortical projection neurons *in vivo*. Our data describe one of the very first initial intracellular signaling pathways known to cell-autonomously regulate interstitial axon branching in the developing neocortex.

**Why did you choose Johns Hopkins for your work?**

Dr. Alex Kolodkin has tremendous knowledge about neurodevelopment and is an expert writer and fantastic mentor (he also has a good sense of humor). The people I met at the 10th floor while I was interviewing here seemed well guided on their scientific paths, and were enthusiastic and curious. I truly feel honored to be part of Alex's group, and to be part of the neuroscience department.

**What does receiving this award mean to you personally and professionally? Do you have any connection with the particular award you received?**

Being awarded means that other people recognize the importance of our research, and I feel grateful for this, as well as feeling responsible for continuing our investigations. I am also inspired by some aspects of the person this award is named for — there is an adventurous component in Dr. Barry Wood's life story during the tough time of the world war, and I see some similarities with the present.

**What contributed to your project's success?**

The essential component for our investigations is the labeling method that was developed by former lab members Joelle Dorskind and Randal Hand — without their work, it would be difficult to achieve such precise spatial resolution when investigating cortical development. Another key element was numerous discussions with Alex, who has helped me to navigate through the problematics of axon collateral development. Finally, financial support from the EMBO fellowship was greatly appreciated.

**What thoughts do you have about Young Investigators' Day itself, as a celebration of the roles students and fellows play in research at Johns Hopkins?**

I would like to thank to the YIPD committee for their effort and for organizing this very kind event. Having our research appreciated by the community gives me a lot of motivation for the near future.

**What has been your best/most memorable experience while at Johns Hopkins?**

Well, there are several, in fact almost every day is a memorable experience, I like friends and colleagues in the lab and at the 10th floor, and I think the neuroscience community here is fantastic, allowing everyone to grow

and cultivate their skills. A retreat in 2022 at the Pearlstone Center was memorable as well. Getting lightsheet imaging work is also worth mentioning.

**What are your plans over the next year or so? Graduating, looking for faculty positions, etc.?**

I don't really know; we will set up some new experiments, perhaps broaden a little a focus of our research. And who knows, maybe there will be interesting faculty positions to apply for.

**Tell me something interesting about yourself that makes you unique. Do you have any special hobbies, interests or life experiences?**

I like to combine science and art, I like playing music with my wife and I like to hike with family and friends, that's always refreshing. And chess is so much fun!