Division of Intramural Research

NAEHS Council Update

February 2024

Chief of the Center for Climate Change and Health Research
NIEHS is recruiting a Senior Investigator to serve as Chief of a new Center for Climate Change and Health Research (CCCHR) at NIEHS in the Division of Intramural Research (DIR). The CCCHR is a new trans-NIH center focused on advancing our understanding of the impact of climate change on human health. The goals of the CCCHR are to: 1) create a central hub that will facilitate research on the health impacts of climate change; 2) build a cadre of IRP scientists interested in Climate Change and Health (CCH) research and foster cross-cutting and convergent research partnerships; and 3) support the research and career development of both junior and experienced scientists interested in CCH research. The successful candidate will bring dynamic vision and leadership to the CCCHR while serving as a catalyst for innovation for climate change research across the NIH Intramural Research Program. The candidate will be responsible for overseeing the center's research operations, building partnerships with other NIH Institutes, Centers, and Offices, and providing scientific leadership to IRP investigators with joint appointments to the CCCHR. Applicants conducting research focused on understanding the biological mechanisms underlying the effects of climate change on health are encouraged to apply. The ideal candidate will be tenure-eligible based on an outstanding academic record of achievement, leadership capabilities, and broad interests in CCH research. The successful candidate for this position will also maintain an active independent research program. Dr. Paul Wade, Senior Investigator and Chief of the Epigenetics and Stem Cell Biology Laboratory serve as chair of the search committee which launched May 24, 2023.

Tenure-Track Investigator in the Immunity, Inflammation and Disease Laboratory
NIEHS is recruiting a Tenure-Track Investigator to study fundamental mechanisms by which immune and inflammatory responses are triggered and regulated in the lung and other organs and contribute to disease, with a particular focus on asthma, host defense/innate immunity, lung fibrosis, and cardiovascular disease. In addition to building upon current strengths, areas of special interest for future growth of IIDL include: (i) immunometabolism (programming of the immune response by changes in cellular metabolic pathways); (ii) mucosal immunity (lung, gut, other) including the heterogeneity, ontogeny, and/or function of immune, epithelial, and stromal tissue-resident cells; and (iii) systems biology of the immune response. However, we enthusiastically welcome applications from outstanding scientists in all fields of immunology. The successful candidate is expected to lead an innovative, independent research program exploring the mechanism of immune responses that enhances our understanding of the effects of the environment on human health. Applicants should have a Ph.D., M.D. and/or equivalent doctoral degree with at least 3 years of postdoctoral research experience in their field and an outstanding publication record. The emphasis will be on identifying an exceptional scientist with an innovative and productive research program. Dr. Anant Parekh, Senior Investigator and Chief of the Signal Transduction Laboratory serves as chair of the search committee which launched February 27, 2023.

Medical Director of the Clinical Research Unit
NIEHS is inviting applications for a Senior Clinician in the Clinical Research Branch (CRB), Division of Intramural Research (DIR) at the NIEHS campus in Research Triangle Park, NC to serve as Medical Director of the Clinical Research Unit (CRU) and Director of Clinical Operations for the NIEHS Personalized Environment and Genes Study (PEGS), a large cohort of over 19,000 participants, initiated in 2002 to study interaction between genes, the environment and health. PEGS offers outstanding research opportunities to intramural scientists and extramural

collaborators interested in personalized environmental medicine. While it is expected that the successful candidate will be able to collaborate broadly on projects utilizing the CRU and/or PEGS cohort, resources will also be made available for conducting self-initiated research projects. The successful candidate will require evidence of strong leadership skills and significant experience in patient-oriented research, defined as research that requires direct interaction with human subjects. The individual will have a track record of national presentations and publications in respected journals in their field. Research areas may include understanding the mechanisms of human disease, genotype-phenotype studies, therapeutic interventions, and/or clinical trials. Applicants should have an M.D. or equivalent doctoral degree and must possess a current, active, full and unrestricted license to practice medicine in the United States and be eligible to be credentialed for patient care by the NIH Clinical Center. Dr. Michael Fessler, Chief of the Immunity, Inflammation and Disease Laboratory serves as chair of the search committee which was launched on May 25, 2021.

DIR STAFF UPDATES

Chief of the Administrative and Research Services Branch
Ms. Amy Doster was appointed Chief of the Administrative and Research Services Branch in DIR in January 2024. She previously served as Chief of the Administrative Management Branch at the National Institute on Drug Abuse (NIDA). Ms. Doster brings a wealth of administrative experience having served at NIH in a variety of capacities including as Director of the Division of Administrative Services in the NIH Office of Extramural Research and as an Administrative Officer in the National Heart Lung Blood Institute, the National Institute of Allergy and Infectious Disease and at the Warren Grant Magnuson Clinical Center.

New Tenure-Track Investigators
Dr. Julieta Lischinsky from the Neuroscience Institute at New York University Grossman School of Medicine joined the Neurobiology Laboratory as an Earl Stadtman Tenure Track Investigator on January 16, 2024. Dr. Lischinsky will initiate an independent program focused on developing and applying innovative neuroscience approaches to elucidate how social sensory information is encoded and impacts behavior across developmental stages and how these mechanisms are disrupted during early life adversity and in psychiatric conditions, such as autism spectrum disorder (ASD). She has also been selected as a member of the NIH Distinguished Scholars Program.

Dr. Rajula Elango from Harvard Medical School joined the Genome Integrity and Structural Biology Laboratory as a tenure-track investigator on January 28, 2024. Dr. Elango will initiate an independent research program focused on studying DNA damage and repair pathways and how environmental stressors impact these processes.

New Independent Research Scholar
Dr. Mandy Goldberg was selected as an NIH Independent Research Scholar (IRS) and initiated her independent program in the Epidemiology Branch in October 2023. Dr. Dale Sander is her primary mentor, and her independent research program will focus on adolescent beauty product use and breast cancer risk in adulthood. Dr. Goldberg is also a recipient of a K99 award from NICHD (K99HD110645).

DIR COMMITMENT TO DIVERSITY, EQUITY, INCLUSION AND ACCESSIBILITY

NIH Distinguished Scholars Program

Dr. Julieta Lischinsky a new Earl Stadtman Tenure Track Investigator in the Neurobiology Laboratory was selected to participate in the NIH Distinguished Scholars Program based on her demonstrated commitment to lowering barriers to participation in science for individuals traditionally underrepresented in science. Dr. Lischinsky joins four DIR Tenure-Track Investigators previously selected to the DSP: Drs. Joseph Rodriguez (ESCBL), Benedict Anchang (BCBB), Jason Watts (ESCBL) and Carlos Guardia (RDBL) as well as Dr. Dondrae Coble (CMB Chief) a Senior Scientist member of the DSP cohort.

DIR Diversity, Equity, Inclusion and Accessibility (DEIA) Working Group

A voluntary working group of more than 50 members including administrative, scientific, and scientific support employees, trainees, and contractors representing all DIR Laboratories and Branches has been organized and is co-chaired by Dr. Raja Jothi, Senior Investigator in ESCBL and Dr. Steven Tuyishime, Assistant Scientific Director. This working group has been charged with proposing recommendations to the Scientific Director to improve and enhance diversity, equity, inclusion, and accessibility throughout the DIR workforce. Initial recommendations were provided to the Scientific Director and DIR Council in late 2022 and an action plan is currently being developed to prioritize and implement new policies and programs in 2023.

The working group is divided into four thematic subgroups each with two co-leaders:

Subgroup 1: Recruitment and Retention (Joe Rodriguez and Yesenia Rodriguez)
Subgroup 2: Career Development (Jackson Hoffman and Vince Guerrero)
Subgroup 3: Performance, Evaluation, and Recognition (Justin Kosak and Francesco DeMayo)
Subgroup 4: Outreach and Engagement (Anne Marie Jukic and Steve Tuyishime)

SCIENTIFIC UPDATE BY A DIR PRINCIPAL INVESTIGATOR

Empowering Environmental Research Through Novel Statistical Methods

Shanshan Zhao, Ph.D., Senior Investigator
Applied Statistics Group
Biostatistics and Computational Biology Branch
DIR, NIEHS

An individual's social and physical environment can have a large impact on their health outcomes. In this talk, we highlight a series of tools we developed to reveal the social and physical environmental determinants of human health based on large cohort studies, specifically focusing on individual level time-to-event outcomes. Motivated by the NIEHS Sister Study, a prospective cohort of over 50,000 U.S. women with at least one sister with breast cancer at enrollment, we used an accelerated failure time (AFT) model with spatial variation, to describe the geographic pattern of breast cancer incidence and investigated whether environmental exposures and neighborhood socioeconomic status explained the observed geographic disparities. We further explored how to use the observed spatial variation to discover potential environmental risk factors. Lastly, we added temporal variation to our model to understand the influence of important events, such as natural disasters and disease screening policy changes, to breast cancer risks. Results from analyzing Sister Study and SEER data demonstrated the extra insights we gained from utilizing these models.

BSC REVIEW OF THE REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY LABORATORY AND THE CLINICAL RESEARCH BRANCH

The NIEHS DIR Board of Scientific Counselors convened for a joint review of the Reproductive and Developmental Biology Laboratory and Clinical Research Branch, August 27-29, 2023

Members of the Board of Scientific Counselors:

- Anita H. Corbett, Ph.D., Samuel C. Dobbs Professor of Genetics, Cell and Developmental Biology, Emory University, Atlanta, GA
- Walter J. Chazin, Ph.D., Professor of Biochemistry and Chancellor's Chair in Medicine Department of Biochemistry and Chemistry, Vanderbilt University, Nashville, TN
- Katherine B. Ensor, Ph.D., Noah G. Harding Professor of Statistics and Director, Center for Computational and Economic Systems at the George R. Brown School of Engineering, Rice University, Houston, TX
- Ji-Yong Julie Kim, Ph.D., Susy Y. Hung Professor of Obstetrics and Gynecology and Co-Director, Center for Reproductive Science, Northwestern University, Chicago, IL
- Frances M. Leslie, Ph.D., Professor Emerita, Department of Pharmaceutical Sciences, School of Pharmacy, University of California, Irvine, CA
- Jose A. Luchsinger, M.D., Professor of Medicine and Epidemiology and Vice-Chair for Clinical & Epidemiologic Research, Columbia University, New York, NY
- Heather B. Patisaul, Ph.D., BSC Chair, Associate Dean for Research and Professor, Department of Biological Sciences and Center for Human Health and the Environment, North Carolina State University, Raleigh, NC
- Roland A. Owens, Ph.D., Ex-Officio BSC Member, Office of Intramural Research, NIH, Bethesda, MD
- Jerry L. Workman, Ph.D., Investigator and Director Postdoctoral Affairs, Stowers Institute of Medical Research, Kansas City, MO

Ad Hoc Reviewers:

- Indrani C. Bagchi, Ph.D., Professor of Comparative Biosciences and Field Chair in Reproductive Biology, University of Illinois Urbana-Champaign
- John B. Buse, M.D., Ph.D., Chief, Division of Endocrinology, Verne S. Caviness Distinguished Professor, Senior Associate Dean for Clinical Research and Director, UNC Diabetes Care Center and NC Translational and Clinical Sciences Institute, University of North Carolina School of Medicine
- Hugh Clarke, Ph.D., Professor of Obstetrics & Gynecology and Acting Director, Division of Reproductive Biology, McGill University Medicine and Health Sciences
- Robert A. Colbert, M.D., Ph.D., Clinical Director and Chief, Pediatric Translational Research Branch, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), National Institutes of Health (NIH), Bethesda, MD
- Marco Conti, M.D., Fred Gellert Endowed Professor, Department of Obstetrics Gynecology and Reproductive Sciences, University of California San Francisco

- Randy Q. Cron, M.D., Ph.D., Professor, Pediatrics and Medicine and Arthritis Foundation, Alabama Chapter Endowed Chair, University of Alabama at Birmingham
- Polly J. Ferguson, M.D., Marjorie K. Lamb Professor and Executive Vice Chair, Pediatric Rheumatology, Allergy, and Immunology, University of Iowa Carver College of Medicine
- Paolo Forni, Ph.D., Associate Professor, Department of Biological Sciences, University at Albany, SUNY
- Mary Ann Handel, Ph.D., Senior Investigator and Emeritus Professor, The Jackson Laboratory
- Ursula B. Kaiser, M.D., Chief, Division of Endocrinology, Diabetes and Hypertension and George W. Thorn, MD Distinguished Chair in Endocrinology, Brigham and Women's Hospital and Professor of Medicine, Harvard Medical School
- Peter J. Koch, Ph.D., Program Director, Epidermis, Dermis and Skin Senses Program, National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health
- Sam Mesiano, Ph.D. William H. Weir, MD, Professor, Department of Reproductive Biology and Obstetrics and Gynecology, Case Western Reserve University
- Genevieve Neal-Perry, M.D., Ph.D., Distinguished Professor and Chair, Department of Obstetrics and Gynecology, University of North Carolina School of Medicine
- Kevin G. Osteen, Ph.D., Professor, Obstetrics and Gynecology and Department Pathology, Microbiology, and Immunology, Vanderbilt University school of Medicine
- Chirag J. Patel, M.D., Associate Professor of Biomedical Informatics, Harvard Medical School
- Soumen Paul, Ph.D., Professor, Pathology and Laboratory Medicine and Director of Center for Perinatal Research, University of Kansas Medical Center, Kansas City
- Theresa Powell, Ph.D., Professor, Department of Pediatrics, Neonatology Section and Department of Obstetrics and Gynecology, University Colorado Anschutz School of Medicine
- JoAnne S. Richards, Ph.D., AAAS Fellow and Professor Molecular and Cellular Biology, and member of the Dan L Duncan Comprehensive Cancer Center, Baylor College of Medicine
- Olivia Rissland, Ph.D., Associate Professor Department of Biochemistry and Molecular Genetics and the RNA Bioscience Initiative, University of Colorado, Anschutz School of Medicine
- Sharon A. Savage, M.D. Clinical Director and Chief, Clinical Genetics Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health
- Sabrina Wong, R.N., Ph. D., Scientific Director and Senior Investigator, National Institute of Nursing Research, National Institutes of Health
- Mariana F. Wolfner, Ph.D., Distinguished Professor of Molecular Biology and Genetics and Stephen H. Weiss Presidential Fellow, Cornell University
- Yihong Ye, Ph.D., Senior Investigator and Deputy Chief, Laboratory of Molecular Biology, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health

Agenda

Closed - Sunday Evening Session - August 27, 2023 – Zoom Meeting

7:00 – 8:00pm	Welcome and Discussion of Past Board Reviews, Drs. Heather Patisaul, Rick Woychik, Darryl Zeldin, Francesco DeMayo and Janet Hall
8:00 – end	BSC Discussion of Review, Dr. Heather Patisaul and panel

Monday Morning Session - August 28, 2023 - NIEHS Rodbell Auditorium, 101 ABC

8:30 – 8:45am	Welcome, Drs. Heather Patisaul and Rick Woychik
8:45 - 9:10	Laboratory Overview, Dr. Francesco DeMayo
9:10-10:00	Pregnancy and Female Reproduction Group, Dr. Francesco DeMayo
10:00 - 10:15	Coffee Break
10:15 - 11:05	Reproductive Medicine Group, Dr. Carmen Williams
11:05 - 11:55	Reproductive Developmental Biology Group, Dr. Humphrey Yao
11:55-12:40	Closed 1:1 Sessions with Investigators, Drs. DeMayo, Williams and Yao
12:40-1:20	Closed - Working Lunch

Monday Afternoon Session

1:25-2:55pm	Poster Session (Zoom)
2:55-3:30	Closed Meeting with Fellows, Staff Scientists, and Staff Clinicians (Zoom)
3:30-3:45	Break
3:45-4:35	Male Reproduction & RNA Biology Group, Dr. Marcos Morgan
4:35-5:25	Placental Cell Biology Group, Dr. Carlos Guardia
5:25-5:55	Closed - 1:1 Sessions with Investigators Drs. Morgan and Guardia
5:55	Return to Hotel

Tuesday Morning Session - August 29, 2023 - NIEHS Rodbell Auditorium, 101 ABC

8:30-8:55am	Clinical Research Branch, Overview, Dr. Janet Hall
8:55-9:45	Reproductive Physiology & Pathophysiology, Dr. Janet Hall
9:45-10:00	Coffee Break
10:00-10:50	Pediatric Neuroendocrinology Group, Dr. Natalie Shaw
10:50-11:40	Environmental Autoimmunity Group, Dr. Lisa Rider
11:40-12:25pm	Closed - 1:1 Session with Investigators, Drs. Hall, Rider & Shaw
12:25-1:25	Closed - Working Lunch
1:30-2:15	Closed – Meeting with Cores/Programs, Review of Gene Editing and Mouse Model Core Facility, Clinical Research Unit, and Office of Human Research and Community Engagement, Drs.

	Manas Ray, Artiom Gruzdev, Stavros Garantziotis and Joan Packenham
2:15-3:45	Closed BSC Discussion and Completion of Individual Review Assignments
3:45-4:00	Break
4:00-5:00	Closed - Debriefing to NIEHS/DIR Leadership
5:00	Adjourn

BSC REVIEW OF THE EPIGENETICS AND STEM CELL BIOLOGY LABORATORY

The NIEHS DIR Board of Scientific Counselors reviewed the Epigenetics and Stem Cell Biology Laboratory, December 3-5, 2023

Members of the Board of Scientific Counselors:

- Anita H. Corbett, Ph.D., Samuel C. Dobbs Professor of Genetics, Cell and Developmental Biology, Emory University, Atlanta, GA
- Walter J. Chazin, Ph.D., Professor of Biochemistry and Chancellor's Chair in Medicine Department of Biochemistry and Chemistry, Vanderbilt University, Nashville, TN
- Katherine B. Ensor, Ph.D., Noah G. Harding Professor of Statistics and Director, Center for Computational and Economic Systems at the George R. Brown School of Engineering, Rice University, Houston, TX
- Ji-Yong Julie Kim, Ph.D., Susy Y. Hung Professor of Obstetrics and Gynecology and Co-Director, Center for Reproductive Science, Northwestern University, Chicago, IL
- Frances M. Leslie, Ph.D., Professor Emerita, Department of Pharmaceutical Sciences, School of Pharmacy, University of California, Irvine, CA
- Jose A. Luchsinger, M.D., Professor of Medicine and Epidemiology and Vice-Chair for Clinical & Epidemiologic Research, Columbia University, New York, NY
- Heather B. Patisaul, Ph.D., BSC Chair, Associate Dean for Research and Professor, Department of Biological Sciences and Center for Human Health and the Environment, North Carolina State University, Raleigh, NC
- Roland A. Owens, Ph.D., Ex-Officio BSC Member, Office of Intramural Research, NIH, Bethesda, MD
- Jerry L. Workman, Ph.D., Investigator and Director Postdoctoral Affairs, Stowers Institute of Medical Research, Kansas City, MO

Ad Hoc Reviewers:

- Blaine Bartholomew, Ph.D., Professor, Department of Epigenetics and Molecular Carcinogenesis, The University of Texas MD Anderson Cancer Center, Houston, TX
- Robert Blelloch, M.D., Ph.D., Professor of Urology, Obstetrics and Gynecology, School of Medicine, University of California, San Francisco
- Fernando Camargo, Ph.D.**New BSC Member, Professor, Department of Stem Cell and Regenerative Biology, Boston Children's Hospital and Harvard University
- Sumant S. Chugh, MBBS, M.D., Professor, Department of Internal Medicine, Division of Nephrology, Rush University Medical College, Chicago, IL
- Graeme L. Conn, Ph.D., Professor, Department of Biochemistry, Emory University School of Medicine, Atlanta, GA
- Suresh Cuddapah, Ph.D., Associate Professor, Department of Medicine, New York University Grossman School of Medicine, New York, NY
- Ann Dean, Ph.D., Senior Investigator, Laboratory of Cellular and Developmental Biology, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, Bethesda, MD

- Daniel R. Foltz, Ph.D., Professor, Biochemistry and Molecular Genetics, Northwestern University Feinberg School of Medicine, Chicago IL
- Gary L. Glish, Ph.D., Professor, Department of Chemistry, University of North Carolina at Chapel Hill, NC
- Kai Ge, Ph.D., Senior Investigator, Laboratory of Endocrinology and Receptor Biology, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, Bethesda, MD
- Jing Huang, Ph.D., Senior Investigator, Laboratory of Cancer Biology and Genetics, National Cancer Institute, National Institutes of Health, Bethesda, MD
- Dineo Khabele, M.D.**New BSC Member, Mitchell and Elaine Yanow Professor, Department of Obstetrics and Gynecology, Washington University School of Medicine, St. Louis, MO
- Clara L. Kielkopf, Ph.D., Professor, Department of Biochemistry and Biophysics, University of Rochester Medical Center, Rochester, NY
- Han Liang, Ph.D., Professor and Deputy Chair, Department of Bioinformatics and Computational Biology and Professor, Department of Systems Biology, Barnhart Family Distinguished Professor in Targeted Therapies, The University of Texas MD Anderson Cancer Center, Houston, TX
- Piotr Mieczkowski, MSc, Ph.D., Professor, Department of Genetics and Technical Director of Hight Throughput Sequencing Facility, University of North Carolina School of Medicine, Chapel Hill, NC
- Craig L. Peterson, Ph.D., Professor and Vice Chair, Program in Molecular Medicine, University of Massachusetts Medical School, Worcester, MA
- Xiaobing Shi, Ph.D., Professor, Department of Epigenetics, Van Andel Institute, Grand Rapids, MI
- Victor L. Schuster, M.D.**New BSC Member, Professor, Department of Medicine (Nephrology) and Department of Biochemistry and Senior Vice-Dean and Ted and Florence Baumritter Chair in Medicine, Albert Einstein College of Medicine, Bronx, NY
- Paula M. Vertino, Ph.D., Wilmot Distinguished Professor of Cancer Genomics, Departments of Biomedical Genetics and Pathology and Laboratory Medicine and Senior Associate Dean for Basic Research, University of Rochester Medical Center, Rochester, NY
- Gary Wessel, Ph.D., Professor, Department of Molecular, Cellular Biology and Biochemistry, Brown University, Providence, RI
- Keji Zhao, Ph.D., Senior Investigator, Laboratory of Epigenome Biology, National Heart Lung and Blood Institute, National Institutes of Health, Bethesda, MD

Agenda

Closed - Sunday Evening Session - December 3, 2023 – Zoom Meeting

7:00 - 8:00 p.m.	Welcome and Discussion of Past Board Reviews, Drs. Rick Woychik, Darryl Zeldin, Paul Wade and Heather Patisaul
8:00 – end	BSC Discussion of Review, Dr. Heather Patisaul and panel

Monday Morning Session - December 4, 2023 - NIEHS Rodbell Auditorium

8:30 – 8:45 (ET)	Welcome, Drs. Heather Patisaul and Rick Woychik
8:45 - 9:10	Overview, Epigenetics and Stem Cell Biology Laboratory, Dr. Paul Wade
9:10-10:00	Eukaryotic Transcriptional Regulation Group, Dr. Paul Wade
10:00 - 10:15	Break
10:15 - 11:05	Single Cell Dynamics Group, Dr. Joseph Rodriguez
11:05 - 11:55	Transcriptional Responses in Disease Group, Dr. Jason Watts
11:55-12:40	Closed 1:1 Sessions with Investigators Drs. Wade, Rodriguez, and Watts
12:40-1:30	Closed - Working Lunch

Monday Afternoon Session - December 4, 2023 - NIEHS Rodbell Auditorium

1:35-2:25	Systems Biology Group
2:25-2:40	Closed 1:1 Session with Investigator, Dr. Raja Jothi
2:40-2:55	Break
2:55-4:40	Poster Session (Zoom)
4:40-5:10	Closed Meeting with Fellows (Zoom)
5:10-5:35	Closed Meeting with Staff Scientists/Biologists/Chemists
5:35	Return to Hotel

Tuesday Morning Sessions – December 5, 2023 - NIEHS Rodbell Auditorium

8:30-9:20	Stem Cell Biology Group, Dr. Guang Hu
9:20 – 10:10	Macromolecular Structure Group, Dr. Traci Hall
10:10-10:25	Break
10:25-11:15	Chromatin and Gene Expression Group, Dr. Trevor Archer
11:15-12:00	Closed 1:1 Session with Investigators, Drs. Hu, Hall, and Archer
12:00-1:00	Closed - Working Lunch 101 ABC
1:00-1:50	Closed – Meeting with Cores/Programs, Review of Epigenomics and DNA Sequencing Core Facility, Mass Spectrometry Research and Support Group, Drs. Gregory Solomon, Guang Hu, Leesa Deterding, and Jason Williams,
1:50-3:30	Closed BSC Discussion and Completion of Individual Review Assignments
3:30-3:45	Break
3:45-4:45	Closed - Debriefing to NIEHS/DIR Leadership
4:45	Adjourn

NIEHS SCIENCE DAY

The 20th Annual NIEHS Science Days were held on January 22, 2024, in the Rall Building on the NIEHS campus. This event celebrates the achievements of NIEHS scientists from all Divisions. This year the NIEHS Science Day program included 8 oral presentations by fellows and 73 poster presentations. Judging for the awards was done by invited extramural scientists and NIEHS intramural scientists. The event concluded with an award ceremony recognizing NIEHS Mentor and Fellow of the Year for 2023 and the Best Oral presentation and Best Poster presentations at Science Day.

Mentor of the Year
Dr. Carmen Williams, Reproductive and Developmental Biology Laboratory

Fellow of the Year
Dr. Virginia Savy, Reproductive and Developmental Biology Laboratory

Best Oral Presentation
Dr. Virginia Savy, Reproductive and Developmental Biology Laboratory

Best Poster Presentations
Taylor Cosey, Genome Integrity and Structural Biology Laboratory
Dr. Ciro Amato, Reproductive and Developmental Biology Laboratory
Dr. Alicia Ru-Pin Chi, Reproductive and Developmental Biology Laboratory
Dr. Joe Breeyear, Biostatistics and Computational Biology Branch
Dr. Yu-Ying Chen, Reproductive and Developmental Biology Laboratory
Dr. Mert Icyuz, Clinical Research Branch
Dr. Zoe Wright, Signal Transduction Laboratory

DIR PAPERS OF THE YEAR FOR 2023

Ji M, Xu X, Xu Q, Hsiao YC, Martin C, Ukraintseva S, Popov V, Arbeev KG, Randall TA, Wu X, Garcia-Peterson LM, Liu J, Xu X, Andrea Azcarate-Peril M, Wan Y, Yashin AI, Anantharaman K, Lu K, Li JL, Shats I, Li X. Methionine restriction-induced sulfur deficiency impairs antitumour immunity partially through gut microbiota. *Nat Metab*. 2023 Sep;5(9):1526-1543. doi: 10.1038/s42255-023-00854-3. Epub 2023 Aug 3. PMID: 37537369; PMCID: PMC10513933.

Restriction of methionine (MR), a sulfur-containing essential amino acid, has been reported to repress cancer growth and improve therapeutic responses in several preclinical settings. However, how MR impacts cancer progression in the context of the intact immune system is unknown. Here we report that while inhibiting cancer growth in immunocompromised mice, MR reduces T cell abundance, exacerbates tumour growth and impairs tumour response to immunotherapy in immunocompetent male and female mice. Mechanistically, MR reduces microbial production of hydrogen sulfide, which is critical for immune cell survival/activation. Dietary supplementation of a hydrogen sulfide donor or a precursor, or methionine, stimulates antitumour immunity and suppresses tumour progression. Our findings reveal an unexpected negative interaction between MR, sulfur deficiency and antitumour immunity and further uncover a vital role of gut microbiota in mediating this interaction. Our study suggests that any possible anticancer benefits of MR require careful consideration of both the microbiota and the immune system.

Carroll R, Ish JL, Sandler DP, White AJ, Zhao S. Understanding the role of environmental and socioeconomic factors in the geographic variation of breast cancer risk in the US-wide Sister Study. *Environ Res*. 2023 Dec 15;239(Pt 1):117349. doi: 10.1016/j.envres.2023.117349. Epub 2023 Oct 9. PMID: 37821066.

Objective: To describe the geographic pattern of breast cancer incidence in a nationwide prospective cohort and investigate whether environmental exposures and/or neighborhood socioeconomic status explain observed geographic disparities.
Methods: Using accelerated failure time models with a spatial random effect term, we mapped the health region-level association between residential location and breast cancer incidence for 44,707 participants in the Sister Study after controlling for established individual-level breast cancer risk factors. We performed a variable selection process to select environmental exposures [i.e., ambient nitrogen dioxide (NO2) and fine particulate matter (PM2.5), PM2.5 chemical composition, outdoor light at night (LAN), ambient noise, ultraviolet radiation, and greenspace] and neighborhood-level factors [i.e., population density and area deprivation index (ADI)] that predicted breast cancer incidence and quantified the spatial variation explained by the selected factors. We also considered whether the geographic pattern and predictors were similar when restricting to estrogen receptor-positive (ER+) tumors.
Results: We observed a spatial patterning in the incidence of overall breast cancer (Moran's I = 16.7, $p < 0.05$) and ER+ breast cancer (Moran's I = 13.2, $p < 0.05$), with a lower risk observed in the South and Southeast and a greater risk in the Northwest and certain areas of

the Midwest and Northeast. NO2, LAN, and ADI explained 21.4% of the spatial variation in overall breast cancer incidence whereas NO2, PM2.5 chemical composition, LAN, greenspace, and ADI together explained 63.3% of the spatial variation in ER+ breast cancer incidence.
Conclusions: Our findings provide additional evidence for a role of environmental exposures in breast cancer incidence and suggest that geographic-based risk factors may vary according to breast cancer subtype. Our findings support the need for additional research to quantify the relative contributions of geographic-based risk factors for breast cancer.

Gaston SA, Riley NM, Parks CG, Woo JMP, Sandler DP, Jackson CL. Racial/Ethnic Differences in Associations Between Traumatic Childhood Experiences and Both Metabolic Syndrome Prevalence and Type 2 Diabetes Risk Among a Cohort of U.S. Women. *Diabetes Care*. 2023 Feb 1;46(2):341-350. doi: 10.2337/dc22-1486. PMID: 36525647; PMCID: PMC9887611.

Objective: Childhood adversity has been associated with metabolic syndrome (MetS) and type 2 diabetes risk in adulthood. However, studies have yet to investigate traumatic childhood experiences (TCEs) beyond abuse and neglect (e.g., natural disaster) while considering potential racial/ethnic differences.
Research design and methods: To investigate race/ethnicity as a potential modifier of the association between TCEs, MetS, and type 2 diabetes, we used prospectively collected data from 42,173 eligible non-Hispanic White (NHW; 88%), Black/African American (BAA; 7%), and Hispanic/Latina (4%) Sister Study participants (aged 35-74 years) enrolled from 2003 to 2009. A modified Brief Betrayal Trauma Survey captured TCEs. At least three prevalent metabolic abnormalities defined MetS, and self-report of a new diagnosis during the study period defined type 2 diabetes. We used adjusted Cox proportional hazards regression to estimate hazard ratios (HRs) and 95% CIs for type 2 diabetes over a mean ± SD follow-up of 11.1 ± 2.7 years, overall and by race/ethnicity. We also tested for modification and mediation by MetS.
Results: Incident cases of type 2 diabetes were reported (n = 2,479 among NHW, 461 among BAA, and 281 among Latina participants). Reporting any TCEs (50% among NHW, 53% among BAA, and 51% among Latina participants) was associated with a 13% higher risk of type 2 diabetes (HR 1.13; 95% CI 1.04-1.22). Associations were strongest among Latina participants (HR 1.64 [95% CI 1.21-2.22] vs. 1.09 for BAA and NHW). MetS was not a modifier but mediated (indirect effect, HR 1.01 [95% CI 1.00-1.01]; P = 0.02) the overall association.
Conclusions: TCE and type 2 diabetes associations varied by race/ethnicity and were partially explained by MetS.

Ward JM, Ambatipudi M, O'Hanlon TP, Smith MA, de Los Reyes M, Schiffenbauer A, Rahman S, Zerrouki K, Miller FW, Sanjuan MA, Li JL, Casey KA, Rider LG. Shared and Distinctive Transcriptomic and Proteomic Pathways in Adult and Juvenile Dermatomyositis. *Arthritis Rheumatol*. 2023 Nov;75(11):2014-2026. doi: 10.1002/art.42615. Epub 2023 Aug 13. PMID: 37229703; PMCID: PMC10615891.

Objective: Transcript and protein expression were interrogated to examine gene locus and pathway regulation in the peripheral blood of active adult dermatomyositis (DM) and juvenile DM patients receiving immunosuppressive therapies.
Methods: Expression data from 14 DM and 12 juvenile DM patients were compared to matched healthy controls. Regulatory effects at the transcript and protein level were analyzed by multi-enrichment analysis for assessment of affected pathways within DM and juvenile DM.
Results: Expression of 1,124 gene loci were significantly altered at the transcript or protein levels across DM or juvenile DM, with 70 genes shared. A subset of interferon-stimulated genes was elevated, including CXCL10, ISG15, OAS1, CLEC4A, and STAT1. Innate immune markers specific to neutrophil granules and neutrophil extracellular traps were up-regulated in both DM and juvenile DM, including BPI, CTSG, ELANE, LTF, MPO, and MMP8. Pathway analysis revealed up-regulation of PI3K/AKT, ERK, and p38 MAPK signaling, whose central components were broadly up-regulated in DM, while peripheral upstream and downstream components were differentially regulated in both DM and juvenile DM. Up-regulated components shared by DM and juvenile DM included cytokine:receptor pairs LGALS9:HAVCR2, LTF/NAMPT/S100A8/HSPA1A:TLR4, CSF2:CSF2RA, EPO:EPOR, FGF2/FGF8:FGFR, several Bcl-2 components, and numerous glycolytic enzymes. Pathways unique to DM included sirtuin signaling, aryl hydrocarbon receptor signaling, protein ubiquitination, and granzyme B signaling.
Conclusion: The combination of proteomics and transcript expression by multi-enrichment analysis broadened the identification of up- and down-regulated pathways among active DM and juvenile DM patients. These pathways, particularly those which feed into PI3K/AKT and MAPK signaling and neutrophil degranulation, may be potential therapeutic targets.

Inoue K, Bostan H, Browne MR, Bevis OF, Bortner CD, Moore SA, Stence AA, Martin NP, Chen SH, Burkholder AB, Li JL, Shaw ND. DUX4 double whammy: The transcription factor that causes a rare muscular dystrophy also kills the precursors of the human nose. *Sci Adv*. 2023 Feb 17;9(7):eabq7744. doi: 10.1126/sciadv.abq7744. Epub 2023 Feb 17. PMID: 36800423; PMCID: PMC9937577.

SMCHD1 mutations cause congenital arhinia (absent nose) and a muscular dystrophy called FSHD2. In FSHD2, loss of SMCHD1 repressive activity causes expression of double homeobox 4 (DUX4) in muscle tissue, where it is toxic. Studies of arhinia patients suggest a primary defect in nasal placode cells (human nose progenitors). Here, we show that upon SMCHD1 ablation, DUX4 becomes derepressed in H9 human embryonic stem cells (hESCs) as they differentiate toward a placode cell fate, triggering cell death. Arhinia and FSHD2 patient-derived induced pluripotent stem cells (iPSCs) express DUX4 when converted to placode cells and demonstrate variable degrees of cell death, suggesting an environmental disease modifier. HSV-1 may be one such modifier as herpesvirus infection amplifies DUX4 expression in SMCHD1 KO hESC and patient iPSC. These studies suggest that arhinia, like FSHD2, is due to compromised SMCHD1 repressive activity in a cell-specific context and provide evidence for an environmental modifier.

Bommarito PA, Stevens DR, Welch BM, Weller D, Meeker JD, Cantonwine DE, McElrath TF, Ferguson KK. Temporal trends and predictors of phthalate, phthalate replacement, and phenol

biomarkers in the LIFECODES Fetal Growth Study. *Environ Int*. 2023 Apr;174:107898. doi: 10.1016/j.envint.2023.107898. Epub 2023 Mar 24. PMID: 37001215; PMCID: PMC10133207.

Background: Exposure to many phthalates and phenols is declining as replacements are introduced. There is little information on temporal trends or predictors of exposure to these newer compounds, such as phthalate replacements, especially among pregnant populations.
Objective: Examine temporal trends and predictors of exposure to phthalates, phthalate replacements, and phenols using single- and multi-pollutant approaches.
Methods: We analyzed data from 900 singleton pregnancies in the LIFECODES Fetal Growth Study, a nested case-cohort with recruitment from 2007 to 2018. We measured and averaged concentrations of 12 phthalate metabolites, four phthalate replacement metabolites, and 12 phenols in urine at three timepoints during pregnancy. We visualized and analyzed temporal trends and predictors of biomarker concentrations. To examine chemical mixtures, we derived clusters of individuals with shared exposure profiles using a finite mixture model and examined temporal trends and predictors of cluster assignment.
Results: Exposure to phthalates and most phenols declined across the study period, while exposure to phthalate replacements (i.e., di(isononyl) cyclohexane-1,2-dicarboxylic acid, diisononyl ester [DINCH] and di-2-ethylhexyl terephthalate [DEHTP]) and bisphenol S (BPS) increased. For example, the sum of DEHTP biomarkers increased multiple orders of magnitude, with an average concentration of 0.92 ng/mL from 2007 to 2008 and 61.9 ng/mL in 2017-2018. Biomarkers of most chemical exposures varied across sociodemographic characteristics, with the highest concentrations observed in non-Hispanic Black or Hispanic participants relative to non-Hispanic White participants. We identified five clusters with shared exposure profiles and observed temporal trends in cluster membership. For example, at the end of the study period, a cluster characterized by high exposure to phthalate replacements was the most prevalent.
Significance: In a large and well-characterized pregnancy cohort, we observed exposure to phthalate replacements and BPS increased over time while exposure to phthalates and other phenols decreased. Our results highlight the changing nature of exposure to consumer product chemical mixtures.

Qiu C, Zhang Z, Wine RN, Campbell ZT, Zhang J, Hall TMT. Intra- and inter-molecular regulation by intrinsically-disordered regions governs PUF protein RNA binding. *Nat Commun*. 2023 Nov 13;14(1):7323. doi: 10.1038/s41467-023-43098-1. PMID: 37953271; PMCID: PMC10641069.

PUF proteins are characterized by globular RNA-binding domains. They also interact with partner proteins that modulate their RNA-binding activities. Caenorhabditis elegans PUF protein fem-3 binding factor-2 (FBF-2) partners with intrinsically disordered Lateral Signaling Target-1 (LST-1) to regulate target mRNAs in germline stem cells. Here, we report that an intrinsically disordered region (IDR) at the C-terminus of FBF-2 autoinhibits its RNA-binding affinity by increasing the off rate for RNA binding. Moreover, the FBF-2 C-terminal region interacts with its globular RNA-binding domain at the same site where LST-1 binds. This intramolecular interaction restrains an electronegative cluster of amino acid residues near the 5' end of the bound RNA to inhibit RNA binding. LST-1 binding in place of the FBF-2 C-terminus therefore releases autoinhibition and increases RNA-binding affinity. This regulatory

mechanism, driven by IDRs, provides a biochemical and biophysical explanation for the interdependence of FBF-2 and LST-1 in germline stem cell self-renewal.

Degtyareva NP, Placentra VC, Gabel SA, Klimczak LJ, Gordenin DA, Wagner BA, Buettner GR, Mueller GA, Smirnova TI, Doetsch PW. Changes in metabolic landscapes shape divergent but distinct mutational signatures and cytotoxic consequences of redox stress. *Nucleic Acids Res*. 2023 Jun 9;51(10):5056-5072. doi: 10.1093/nar/gkad305. PMID: 37078607; PMCID: PMC10250236.

Mutational signatures discerned in cancer genomes, in aging tissues and in cells exposed to toxic agents, reflect complex processes underlying transformation of cells from normal to dysfunctional. Due to its ubiquitous and chronic nature, redox stress contributions to cellular makeover remain equivocal. The deciphering of a new mutational signature of an environmentally-relevant oxidizing agent, potassium bromate, in yeast single strand DNA uncovered a surprising heterogeneity in the mutational signatures of oxidizing agents. NMR-based analysis of molecular outcomes of redox stress revealed profound dissimilarities in metabolic landscapes following exposure to hydrogen peroxide versus potassium bromate. The predominance of G to T substitutions in the mutational spectra distinguished potassium bromate from hydrogen peroxide and paraquat and mirrored the observed metabolic changes. We attributed these changes to the generation of uncommon oxidizing species in a reaction with thiol-containing antioxidants; a nearly total depletion of intracellular glutathione and a paradoxical augmentation of potassium bromate mutagenicity and toxicity by antioxidants. Our study provides the framework for understanding multidimensional processes triggered by agents collectively known as oxidants. Detection of increased mutational loads associated with potassium bromate-related mutational motifs in human tumors may be clinically relevant as a biomarker of this distinct type of redox stress.

Rai P, Sharpe M, Ganta CK, Baker PJ, Mayer-Barber KD, Fee BE, Taylor GA, Fessler MB. IRGM1 supports host defense against intracellular bacteria through suppression of type I interferon in mice. *J Clin Invest*. 2023 Nov 1;133(21):e171982. doi: 10.1172/JCI171982. PMID: 37698925; PMCID: PMC10617763.

Our findings challenge the long-prevailing paradigm that IRGM1 serves as an IFNγ-induced cell autonomous host defense effector (1), and suggest instead that IRGM1 supports host defense by preventing excess autocrine and/or paracrine IFN-I from compromising myeloid cell fate and function. Future studies will be required to distinguish autocrine vs. paracrine mechanisms.

Haam J, Gunin S, Wilson L, Fry S, Bernstein B, Thomson E, Noblet H, Cushman J, Yakel JL. Entorhinal cortical delta oscillations drive memory consolidation. *Cell Rep*. 2023 Oct 31;42(10):113267. doi: 10.1016/j.celrep.2023.113267. Epub 2023 Oct 14. PMID: 37838945.

Long-term memories are formed by creating stable memory representations via memory consolidation, which mainly occurs during sleep following the encoding of labile memories in the hippocampus during waking. The entorhinal cortex (EC) has intricate connections with the hippocampus, but its role in memory consolidation is largely unknown. Using cell-type- and

input-specific in vivo neural activity recordings, here we show that the temporoammonic pathway neurons in the EC, which directly innervate the output area of the hippocampus, exhibit potent oscillatory activities during anesthesia and sleep. Using in vivo individual and populational neuronal activity recordings, we demonstrate that a subpopulation of the temporoammonic pathway neurons, which we termed sleep cells, generate delta oscillations via hyperpolarization-activated cyclic-nucleotide-gated channels during sleep. The blockade of these oscillations significantly impaired the consolidation of hippocampus-dependent memory. Together, our findings uncover a key driver of delta oscillations and memory consolidation that are found in the EC.

Li R, Wang T, Marquardt RM, Lydon JP, Wu SP, DeMayo FJ. TRIM28 modulates nuclear receptor signaling to regulate uterine function. *Nat Commun*. 2023 Aug 1;14(1):4605. doi: 10.1038/s41467-023-40395-7. PMID: 37528140; PMCID: PMC10393996.

Estrogen and progesterone, acting through their cognate receptors the estrogen receptor α (ERα) and the progesterone receptor (PR) respectively, regulate uterine biology. Using rapid immunoprecipitation and mass spectrometry (RIME) and co-immunoprecipitation, we identified TRIM28 (Tripartite motif containing 28) as a protein which complexes with ERα and PR in the regulation of uterine function. Impairment of TRIM28 expression results in the inability of the uterus to support early pregnancy through altered PR and ERα action in the uterine epithelium and stroma by suppressing PR and ERα chromatin binding. Furthermore, TRIM28 ablation in PR-expressing uterine cells results in the enrichment of a subset of TRIM28 positive and PR negative pericytes and epithelial cells with progenitor potential. In summary, our study reveals the important roles of TRIM28 in regulating endometrial cell composition and function in women, and also implies its critical functions in other hormone regulated systems.

FY2023 AWARDS AND HONORS

Scientific Awards

- Dr. Benedict Anchang (Biostatistics and Computational Biology Branch) received an award from the Chan Zuckerberg Initiative (CKI) to further support an international collaboration to develop a Nigerian Materno-Fetal Atlas to Improve Birth Outcomes.
- Dr. Donna Baird (Epidemiology Branch) received the 2023 John Snow Award from the American Public Health Association
- Dr. Dondrae Coble (Chief, Comparative Medicine Branch) and Dr. Jesse Cushman (Neurobiology Laboratory) received the NIH Director's Challenge Innovation Award for "Machine vision-enabled behavioral tracking for cross-species extrapolation".
- Dr. Francesco DeMayo (Chief, Reproductive and Developmental Biology Laboratory) was elected as a Distinguished Fellow for the Society for the Study of Reproduction
- Dr. Paul Doetsch (Deputy Scientific Director and Genome Integrity and Structural Biology Laboratory) was elected as a Fellow of the Royal Society of Chemistry.
- Dr. Chandra Jackson (Epidemiology Branch) received the Diversity, Equity & Inclusion Leadership Award from the Associated Professional Sleep Societies.
- Dr. Stephanie London (Epidemiology Branch) received the 2023 John Peters Award from the Environmental and Occupational Population Health Assembly of the American Thoracic Society.
- Dr. Anant Parekh (Chief, Signal Transduction Laboratory) received the Annual Review Prize from The Physiological Society in recognition of his transformative research that has wide interest and impact.
- Dr. Dale Sandler (Chief, Epidemiology Branch) received an Intramural Climate Change and Health Research Awards, for studying heat waves and DNA methylation in a mouse model and in a population cohort and for studying biomarkers of stress, aging, and cellular senescence before and after a major climate disaster.
- Dr. Carmen Williams (Reproductive and Developmental Biology Laboratory) was selected to receive the 2023 Trainee Mentoring Award from the Society for the Study of Reproduction (SSR) and the NIH Director's Ruth L. Kirschstein Mentoring Award.
- Dr. Darryl Zeldin (Scientific Director and Immunity, Inflammation and Disease Laboratory) received a 2023 NIH Director's Awards for outstanding work to develop the NIH Climate Change and Health Initiative.

Named Professorships/Lectures

- Dr. Francesco DeMayo (Chief, Reproductive and Developmental Biology Laboratory) was invited to give the Donald C. Johnson Lecture in Reproduction at Kansas University Medical Center.
- Dr. Michael Fessler (Chief, Immunity, Inflammation and Disease Laboratory) presented the Keynote lecture at the Third Conference on Small Airways and PExA at the University of Gothenburg, Sweden.
- Dr. Stavros Garantziotis (Immunity, Inflammation and Disease Laboratory) presented the Elliott F. Ellis Memorial lecture at the 2023 American Academy of Allergy, Asthma and Immunology meeting in San Antonio, TX.

Dr. Chandra Jackson (Epidemiology Branch) was invited Keynote Speaker at the World Sleep Society meeting in Rio de Janeiro, Brazil. She also gave the Richard P. Allen Endowed Lecture in Sleep & Circadian Rhythms at The Johns Hopkins University. She also gave the Keynote address at the 25th Anniversary and Annual Retreat organized by the Division of Sleep Medicine, Harvard Medical School. Dr. Jackson also gave the Nornes Lecture in Neuroscience at Concordia College and the Connors Lecture at the Division of Sleep Medicine, Harvard Medical School and Brigham and Women's Hospital.

Dr. Dale Sandler (Chief, Epidemiology Branch) gave the G. Burroughs Mider lecture at NIH was invited to give the Anna Baetjer Lecture in Environmental Health Sciences at the Johns Hopkins University Bloomberg School of Public Health in March 2024.

Dr. Lisa Rider (Clinical Research Branch) presented the Keynote address at the Cure JM Foundation Symposium at Duke University.

Dr. Darryl Zeldin (Scientific Director and Immunity, Inflammation and Disease Laboratory) presented the Keynote address at 2023 International Symposium on Polyunsaturated Fatty Acid and Metabolism in Wuhan, China.

Advisory/Editorial Boards

Dr. Dondrae Coble (Chief, Comparative Medicine Branch) was elected to the Board of Directors for the American, the College of Laboratory Animal Medicine (ACLAM), the North Carolina Academy of Laboratory Animal Medicine (NCALAM) and the North Carolina Association of Biomedical Research (NCABR). He also served on the NCBR Executive Council.

Dr. Donald Cook (Immunity, Inflammation and Disease Laboratory) served the editorial boards of the *American Journal of Respiratory Cell and Molecular Biology* and *Frontiers in Chemoattractants.*

Dr. William Copeland (Chief, Genome Integrity and Structural Biology Laboratory) served on the Mitochondrial Disease Gene Curation Expert Panel for the Children's Hospital of Philadelphia. He also served as Chair of the Genetics subgroup for the NINDS Mitochondrial Common Disease Elements Group.

Dr. Paul Doetsch (Deputy Scientific Director and Genome Integrity and Structural Biology Laboratory) served on the Department of Defense Programmatic Panel (Grants Council) for Cancer Research Program. He also served as an Academic Editor for *BioMed Research International, Biochemistry Research International* and on the editorial boards *Nucleic Acids Research* and *DNA Repair*.

Dr. Serena Dudek (Neurobiology Laboratory) served on the Editorial Board of the *Journal of Neuroscience* and *Hippocampus.* She also served on the Molecular and Cellular Cognition Society Council

Dr. Kelly Ferguson (Epidemiology Branch) served as Associate Editor of *Environmental Research*.

Dr. Michael Fessler (Chief, Immunity, Inflammation and Disease Laboratory) served as a Deputy Editor for the *American Journal of Respiratory Cell and Molecular Biology.* He also served on National Asthma Education and Prevention Program Federal Advisory Committee, as well as on the Scientific Grant Review Committee of the American Thoracic Society.

Dr. Stavros Garantziotis (Immunity, Inflammation and Disease Laboratory) served on the Editorial Board of *Matrix Biology*, *American Journal of Respiratory Cell and Molecular Biology* and *Proteoglycan Research* and served as Deputy Editor for Basic Science for *Lung.* He was elected Treasurer of the International Society for Hyaluronan Sciences and serves on the Board of officers for the Assembly for Allergy and Immunology of the American Thoracic Society.

Dr. Dmitry Gordenin (Genome Integrity and Structural Biology Laboratory) served as Associate Editor for *PLoS Genetics* and on the Editorial Board of *Mutation Research, Fundamental and Molecular Mechanisms of Mutagenesis*.

Dr. Chandra Jackson (Epidemiology Branch) was elected to the Board of Directors of the Sleep Research Society. She also served on the Editorial Board of *Sleep Health: Journal of the National Sleep Foundation* and Guest Editor for Special Issue on Social and Environmental Determinants of Health Disparities for the *International Journal of Environmental Research and Public Health.*

Dr. Patricia Jensen (Neurobiology Laboratory) served as a member of the External Advisory Committee for the Metabolic Basis of Disease Center for the Pennington Biomedical Research Center. She is also served on the Editorial Board of *Brain Research.*

Dr. Anton Jetten (Immunity, Inflammation and Disease Laboratory) was appointed to the Editorial Board of *Frontiers in Endocrinology*. He also served on the Editorial Boards for *Nuclear Receptor Research*, *Stem Cell Investigation* and *Cells*

Dr. Anne Marie Jukic (Epidemiology Branch) served as the Methodological Editor for *Fertility and Sterility* and Reproductive Epidemiology Section Editor for *Current Epidemiology Reports*.

Dr. Jason Li (Biostatistics and Computational Biology Branch) served as Associate Editor in Single Cell Bioinformatics for *Frontiers in Bioinformatics.*

Dr. Xiaoling Li (Signal Transduction Laboratory) was appointed to the Editorial Board of *Cells.*

Dr. Alison Motsinger-Reif (Chief, Biostatistics and Computational Biology Branch) served as a Statistical Associate Editor for *Exposome* and on the Statistical Board of Reviewing Editors (sBORE) for *Science*.

Dr. Geoffrey Mueller (Genome Integrity and Structural Biology Laboratory) served as a review editor for Frontiers in Allergy. In 2023 he was elected Secretary of the World Health Organization / International Union of Immunological Societies Allergen Nomenclature Subcommittee.

Dr. Hideki Nakano (Immunity, Inflammation and Disease Laboratory) served as an Associate editor of *Frontiers in Immunology.*

Dr. Anant Parekh (Chief, Signal Transduction Laboratory) served as Executive Editor of *Function* and served on the Editorial Board of *Cells*.

Dr. Lalith Perera (Genome Integrity and Structural Biology Laboratory) served on the Editorial Board of *International Journal of Molecular Sciences* and as an Associate Editor of *Frontiers in Chemistry*.

Dr. Lisa Rider (Clinical Research Branch) served as Associate Editor for *Arthritis & Rheumatology*, and *Frontiers in Immunology*, *Autoimmune and Autoinflammatory Disorders: Autoimmune Disorders*. She also served on the Editorial Boards of *Clinical Experimental Rheumatology* and the *Journal of Neuromuscular Diseases*. Dr. Rider also served as Chair of the Cure JM Foundation Medical Advisory Committee and on the Stanley

Manne Children's Research Institute/ Ann & Robert H. Lurie Children's Hospital of Chicago Cure Juvenile Myositis Center of Excellence Biorepository and Registry Review Committee. She served on the Advisory Council for the Pediatric Rheumatology Collaborative Study Group.

Dr. Dale Sandler (Chief, Epidemiology Branch) served on the Scientific Advisory Board of the U.K. Biobank and was elected to the Steering Committee for the NCI Cancer Cohort Consortium

Dr. Natalie Shaw (Clinical Research Branch) served on the Editorial Board for *Pediatric Endocrinology*, a section within *Frontiers in Endocrinology* and *Frontiers in Pediatrics*, and as a member of the Endocrine Society Research Affairs Core Committee.

Dr. Keith Shockley (Biostatistics and Computational Biology Branch) served on the editorial boards of *Toxicologic Pathology*, *Frontiers in Toxicogenomics*, *Frontiers in Computational Toxicology and Informatics*. He also appointed as Associate Editor for *Toxigenomics*.

Dr. Robin Stanley (Signal Transduction Laboratory) serves as Associate Editor for *Frontiers in RNA Research.*

Dr. Carmen Williams (Reproductive and Developmental Biology Laboratory) was an Associate Editor of *Biology of Reproduction*, Academic Editor for *PLOS Biology*, Reviewing Editor for *eLife*, and Chair of the Advisory Council for the Frontiers in Reproduction course, Marine Biological Laboratories, Woods Hole, MA.

Dr. Humphrey Yao (Reproductive and Developmental Biology Laboratory) served as the Director for the Society for the Study of Reproduction (SSR) and on the Editorial Board for *Sexual Development* and as a guest editor for the *Biology of Reproduction.* Dr. Yao also served as a regular member of the Cellular, Molecular and Integrative Reproduction Study Section for the NIH.

Dr. Darryl Zeldin (Scientific Director and Immunity, Inflammation and Disease Laboratory) served as an Associate Editor for *Pharmacology and Therapeutics* and on the Editorial, Reviewer Board or Guest Editor of *Journal of Allergy and Clinical Immunology, Journal of Biological Chemistry*, the *American Journal of Physiology: Lung Cellular and Molecular Biology*, *Prostaglandins and Other Lipid Mediators*, *Open Environmental Research Journal, Molecular and Cellular Pharmacology, Pharmacology and Therapeutics, Cancer and Metastasis Reviews, Advances in Pharmacology* and the *Journal of Lipid Research.*

Dr. Shanshan Zhao (Biostatistics and Computational Biology Branch) served as an Associate Editor of *Biometrics*.

Training and Mentoring

NIEHS Trainee Alumni

From January 1, 2023 through December 31, 2023, 5 pre-doctoral trainees left NIEHS to continue their doctoral studies in their respective universities. 28 post-baccalaureate trainees left NIEHS. The majority of them went to either medical school or graduate school. And 29 postdoctoral trainees left NIEHS. Below is a summary of the analysis of where the postdoctoral trainees have gone upon completing their training, what they are doing and the level of the positions they took.

What are they doing?

Additional postdoctoral training	**3**
Internship	**0**
Additional advanced degree	**0**
Primarily teaching	**2**
Primarily basic research	**6**
Primarily clinical research	**0**
Primarily clinical practice	**0**
Primarily applied research	**9**
Primarily patient care	**0**
Regulatory affairs	**1**
Science administration/project management	**1**
Intellectual property/ licensing and patenting	**0**
Consulting	**0**
Public policy	**0**
Science writing or communications	**0**
Grants management	**0**
Business development or Operations	**0**
Computation/informatics	**4**
Sales/marketing	**0**
Technical/customer support	**1**
Unknown or Undecided	**2**
Other	**0**
Unemployed	**0**
TOTAL	**29**

Where did they go?

Academic institution	**11**
Government agency	**6**
For-profit company	**9**
Non-profit organization	**1**
Private medical practice	**0**
Independent/self-employed	**0**
Unknown or Undecided	**2**
Unemployed	**0**
TOTAL	**29**

What is their position?

Tenure track faculty	**2**
Non-tenure track faculty	**2**
Professional staff	**19**
Support staff	**0**
Management	**1**
Trainee	**3**
Unknown or Undecided	**2**
Unemployed	**0**
TOTAL	**29**