FALL 2024

YOUR HEALTH & THE ENVIRONMENT

NEWS FROM THE UNIVERSITY OF ROCHESTER ENVIRONMENTAL HEALTH SCIENCES CENTER

In This Issue

Celebrating Children's Environmental Health Day

October 10th, 2024 was Children's Environmental Health Day!

The Environmental Health Sciences Center (EHSC), along with several centers within the University of Rochester, partnered with the Children's Environmental Health Network again this year to celebrate Children's Environmental Health Day. The purpose of Children's Environmental Health Day is to increase the visibility of children's environmental health issues to create a healthier, safer, more equitable world for all children, where fewer children suffer from preventable health issues.

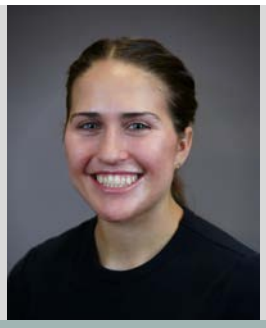
The EHSC supports research on how environmental exposures impact health and disease across the lifespan.

Read on to learn about just some of the EHSC research related to children's environmental health!

Highlights of Ongoing PFAS Research at Rochester

PFAS, or per- and polyfluoroalkyl substances, are a group of thousands of chemicals commonly used in consumer products including food packaging and non-stick and water-resistant materials. They are sometimes called “forever chemicals” because they have strong bonds that do not break down naturally. PFAS have been found in animals, people, and in the environment, and exposure to PFAS has been linked to harmful health effects, including developmental delays and effects on reproductive health and immune response. (To learn more, check out the article “Vulnerable Beginnings: Unraveling the Effects of Fetal PFAS Exposure on Infants” in the Winter 2024 Newsletter.)

Read on to learn how a few EHSC researchers are studying PFAS:



Knicki Bergman, MS, is a third-year Toxicology PhD Candidate advised by EHSC member Martha Susiarjo, PhD. She studies the mechanism by which gestational exposures to environmentally relevant doses of perfluorooctanoic acid (PFOA) induces gestational diabetes in mice.

The Health and Environmental Economics Lab (HEEL) team, led by Elaine Hill, PhD, is compiling PFAS measurements in public drinking water systems and studying infant health and housing outcomes associated with detection of PFAS.

Members of Dr. Paige Lawrence’s lab are using cutting-edge approaches to establish how developmental exposure to a mixture of PFAS affects the immune system. In the context of fighting human respiratory virus infection, they are defining how PFAS influences immune function at cellular levels, parsing sex differences and defining the underlying mechanism.

Left to right: Darline Castro Melendez, MS, Kristina Fenner, PhD, Marissa Skulsky, Hannah Teets, Paige Lawrence, PhD, Christina Post, PhD, Colleen O’Dell, MS

Nature, Nurture, and Neuroscience

An interview with EHSC member Marissa Sobolewski, PhD, adapted from URMC News.

The Sobolewski Lab explores how the environment, including exposure to chemicals and other variables like stress, influences brain development and behavior. Studying how the environment influences molecular targets like hormones, epigenetic profiles, and neurotransmitter balance helps us better understand the environment's role in conditions like ADHD and autism, ultimately improving risk assessment and protecting public health.

What has your research taught you so far?

Marissa Sobolewski, PhD

"The research I conduct in the lab today focuses on understanding how environmental pollutants and stressors interact. When I first entered toxicology, I focused on how metals like lead impact children's behavior. Through animal studies, we've found that combining exposure to pollutants like lead, methyl mercury, and arsenic with prenatal stress increases toxicity and results in worse behavioral outcomes. These effects often vary by sex. Despite NIH mandates from 15 years ago to include sex as a biological variable, most research in neuroscience, toxicology, and pharmacology still uses only male rodents. The exclusion of females from basic research has also limited our understanding of pregnancy as a unique critical window for how chemical exposures impact maternal health.

Our work expands on this idea that combining exposures can worsen behavioral outcomes by investigating the effects of mixtures of endocrine-disrupting chemicals and modeling exposures to air pollution, which itself is a complex mixture of gases and particles. What my research has taught me so far is that we must embrace the complexity and that scientific discovery lies in our ability to better model the environment at all biological scales. We think that cumulative environmental exposures, or "death by a thousand cuts," may increase risk for neurobehavioral disorders."

New Model Could Help Provide Expectant Mothers a Clearer Path to Safe Fish Consumption

Adapted from URMC News

Fish consumption during pregnancy is a complex scientific topic. On one hand, fish are rich in nutrients essential to brain development, including polyunsaturated fatty acids, selenium, iodine, and vitamin D. On the other, fish contain methyl mercury, a known neurotoxicant. This has led the US Food and Drug Administration to recommend that expectant mothers limit consumption, which inadvertently causes many women to forgo fish consumption during pregnancy altogether.

Fish consumption is an important route of methyl mercury exposure. However, the nutritional benefits from fish may modify or reduce the toxicity posed by mercury. A new study appearing in the American Journal of Epidemiology by EHSC member Sally Thurston, PhD, and collaborators Susan Korrick, MD, MPH, (Harvard T.H. Chan School of Public Health and Brigham and Women's Hospital) and David Ruppert, PhD, (Cornell University) creates a new framework that could untangle these questions, reduce confusion, and produce clearer guidance on fish consumption for pregnant mothers.

Using data from a fish-eating population in Massachusetts, the researchers measured mercury exposure during the third trimester of pregnancy through hair samples collected from the study mothers after birth. Mothers in the study also completed a food questionnaire and reported the type and frequency of fish and shellfish consumed during pregnancy. The authors estimated the average mercury levels by type of fish, and when combined with the information about the mother's diet, they were able to create a more precise and detailed method to estimate the joint associations of pregnancy fish intake and fish mercury levels on neurodevelopment.

Sally Thurston, PhD

Using this model, the researchers found that the relation between pregnancy fish consumption and subsequent neurodevelopment varied depending on the estimated average mercury levels in the fish. Specifically, consuming low mercury-containing fish was beneficial, while consuming fish with higher levels of mercury was detrimental.

"Given methodologic limitations to previous analyses, future work expanding our alternative modelling approach to account for both the average mercury and nutritional content of fish could facilitate better estimation of the risk-benefit tradeoffs of fish consumption, a key component of many healthy diets," said the authors.

Examining the Impact of Air Pollution, Climate Change, and Social Determinants of Health on Asthma and Environmental Justice

Exposures from outdoor and indoor air pollution are known to exacerbate asthma, and recent studies suggest that air pollution can even cause new asthma. In a review published earlier this year in Current Opinion in Pulmonary Medicine, Pulmonary and Critical Care Fellow Felicia Canaday, MD, and EHSC members Dan Croft, MD, MPH, and Steve Georas, MD, review the connections between asthma and air pollution, climate change, and environmental justice. Asthma is an environmental justice problem, as there are inequities in asthma care and in environmental exposures that can cause or exacerbate asthma. Many of these structural barriers to high-quality asthma care, including poverty, redlining, and systemic racism, also are risk factors for increased air pollution exposure and vulnerability to climate change impacts. More frequent and more severe extreme heat and wildfire smoke events are expected to negatively impact air quality, and these events pose particular risks for individuals with asthma. The individuals in these disproportionately affected groups are doubly affected by worsened exposure and worsened access to care for the resultant asthma exacerbations or incident asthma. More research is needed to understand the specific climate and air pollution mitigation efforts where disproportionately affected communities would derive the most benefit.

A note from author Felicia Canaday

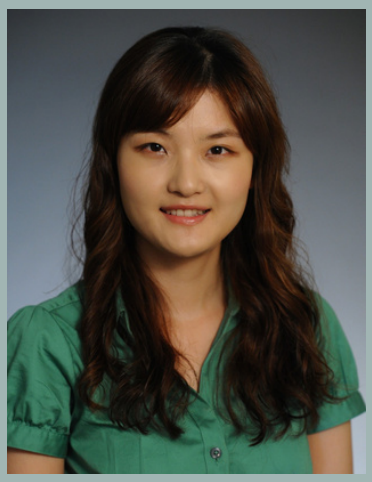
Felicia Canaday, MD

“When I was approached with the opportunity to review the effects air pollution has on asthma, I knew I couldn’t pass on the opportunity. This subject hit home for me for many reasons—one of which related to my family. My family currently resides in New York City, a place known for its congestion, overpopulation, and air pollution. I had always wondered if living in a large city such as NYC would have any long-term effects on one’s health. After learning that air pollution not only leads to worsening respiratory symptoms but can also cause the development of asthma, I was shocked. That meant that over 8 million people were faced with the possibility of developing respiratory disease in their lifetime. This was astounding! I couldn’t help but think of my current patients who, although they didn’t live in a large urban area like NYC, had similar exposures to those who did. This changed my perspective on how I approached treating patients and led to further education on external factors affecting their health that may be out of their control. This topic deserved more awareness. This experience sparked a passion within myself to continue the research as I move forward in my career. There are millions of individuals who are currently facing this same issue, including those who are most vulnerable. It will take many years before we finally see change, but this is only the beginning!”

New research provides insights into placental response to arsenic exposure

The placenta is crucial for fetal development, acting as an interface between mother and fetus. While environmental stressors, including exposure to heavy metals such as arsenic, are linked to pregnancy complications and adverse health outcomes, the placenta's role in responding to these exposures is little understood. New research from EHSC member Hae-Ryung Park, PhD, and collaborators analyzes the response of the mouse placenta to prenatal arsenic exposure.

Globally, an estimated 94 to 220 million people may face hazardous arsenic levels in groundwater. Arsenic exposure during pregnancy is linked to pregnancy complications, adverse birth outcomes and impaired neurodevelopment in children, with effects differing between male and female babies.



Hae-Ryung Park, PhD

The study identified a gene, Prap1, that may play a role in regulating placental response to arsenic exposure. Prap1 showed different activity in female versus male placentas in mice, which may partially explain the sex-dependent health outcomes associated with arsenic exposure during pregnancy.

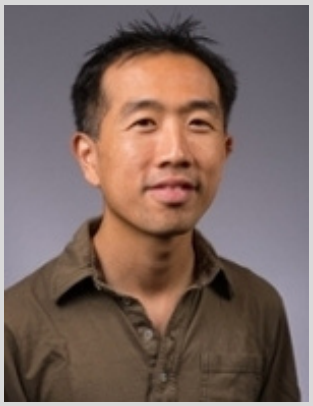
These findings offer valuable insights into the mechanisms driving environment-related pregnancy complications. Understanding how the placenta responds to environmental stress is essential for developing preventive and therapeutic strategies for adverse outcomes in mothers and children.

Prescriptions for Prevention

EHSC Community Engagement Core director Katrina Smith Korfmacher, PhD, was part of a team that of developed materials aimed at integrating environmental health into routine pediatric clinical care. The group worked together to create, refine, and disseminate a clinical tool called Prescriptions (Rx) for Prevention to help clinicians when they screen their patients for environmental health concerns, counsel on those topics, and refer to environmental health resources. According to an article recently published in the Journal of Public Health Management and Practice, "Rx for Prevention —tailored with local resources—are now in use at more than a dozen sites in multiple regions of the U.S. supporting the promotion of healthy homes, communities, and the broader environment for children." Over 45 Rx for Prevention are available.

Faculty News and Awards

Congratulations to the EHSC members recently appointed to named professorships:



Dragony Fu, PhD, was appointed as the Mercer Brugler Distinguished Teaching Professor in the Department of Biology.

Jill Halterman, MD, MPH, was appointed as the William H. Eilinger Chair of Pediatrics. She also received the Academic Pediatric Association Miller Sarkin Mentoring Award for Research at the 2024 Pediatric Academic Societies annual meeting.

Ehsan Hoque, PhD, an associate professor in the Department of Computer Science, is part of a new bilateral policy project to develop the next generation of climate and health leaders. A collaboration between the UK Academy of Medical Sciences and the US National Academy of Medicine, the project offers research leaders of the future the opportunity to gain policy experience and to connect with international peers. The project was designed for researchers and other professionals working in the health research sector, who are interested in engaging with policymakers and translating their research into benefits for society. Hoque is one of 18 future research leaders affiliated with the US National Academy of Medicine and the UK Academy of Medical Sciences who have been selected to participate in the project, which started in March 2024.

Learn more: **Awards and honors recognize faculty accomplishments (rochester.edu)**

Continued from page 10

Faculty News (continued)

New Multidisciplinary Training in Lung Biology and Pulmonary Medicine Program

EHSC members Steve Georas, MD (Pulmonary & Critical Care Medicine), and Michael O'Reilly, PhD (Pediatrics), received a $2.5 million multidisciplinary training grant from the National Heart, Lung, and Blood Institute. This T32 Training Grant aims to educate and support basic scientists and physician-scientists conducting high impact and innovative research that will improve the health of people suffering from lung diseases. The grant will enable them to recruit and train postdoctoral fellows and predoctoral trainees from diverse backgrounds and provide multifaceted and personalized training opportunities. Trainees can come from any University of Rochester PhD program, including the Toxicology Training Program.

Steve Georas, MD

Michael O'Reilly, PhD

Developing ethical report-back guidelines for household exposure research

Katrina Smith Korfmacher, PhD

EHSC Community Engagement Core director Katrina Smith Korfmacher, PhD, and Jonathan Herington, PhD (Assistant Professor of Health Humanities and Bioethics and of Philosophy), received NIH funding for a new study related to the ethics of reporting back individual results from home-based environmental health research. The SHELTER study (Sharing Housing Exposure Lessons: Transparent and Ethical Reporting) is part of the NIH Strategies for Responsibly Reporting Back Environmental Health and Non-Genomic Research Results grant program. Additional SHELTER collaborators include Silent Spring Institute, National Center for Healthy Housing, and Harvard University. The study team will talk with housing researchers, stakeholders, and former research study participants throughout the U.S. about their experiences, perspectives, and insights. Ultimately, they plan to develop a toolkit to help researchers, research subject review boards and others make better decisions about how to responsibly inform study participants about their results.

Welcome Incoming Toxicology Trainees!

Justin Capezzuto
Education Background: BS in Pharmacology and Toxicology from Massachusetts College of Pharmacy and Health Sciences

Carissa Dressel
Education Background: BS in Biology with a minor in professional writing from Ball State University; MS in Biology with a concentration in neuroscience and physiology from DePaul University

Katie Eggleston
Education Background: BA in Biology and BS in Psychology from King University

Rintaro Kato
Education Background: BS in Forensic Science with triple concentration in Molecular Biology, Toxicology, and Criminalistics from CUNY John Jay College of Criminal Justice

Rachel Lombardo
Education Background: BS in Biochemistry and BS in Environmental Science from the University of Virginia.

Sebastião Martin
Education Background: BA with Honors in Chemistry, minor in Creative Writing from Austin College.

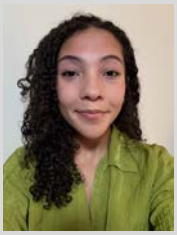
Jessica Shaw
Education Background: BS in Pharmacology and Toxicology from Saint Joseph's University

Tianna Torrice
Education Background: BS in Forensic Biology with a minor in Cyber Intelligence and Security from Embry-Riddle Aeronautical University




Top Row: Justin Capezzuto, Carissa Dressel, Katie Eggleston, and Rintaro Kato






Bottom Row: Rachel Lombardo, Sebastião Martin, Jessica Shaw, and Tianna Torrice

For Questions or Comments, Please Contact:

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