



YOUR HEALTH & THE ENVIRONMENT

News from the University of Rochester Environmental Health Sciences Center

Spring 2019

Susiarjo Leading the Way in Research on Environmental Exposure and Pregnancy Loss

Martha Susiarjo, PhD, Assistant Professor of Environmental Medicine, and her team have been working on understanding how exposure to endocrine disrupting chemicals could impact pregnancy loss.¹



Martha Susiarjo, PhD

Susiarjo's most recent publication identifies a novel mechanism regulating levels of IDO1, an important enzyme for tryptophan depletion in the placenta. Previously, her lab found that pregnant mice exposed to BPA have reduced tryptophan depletion. In order for the tryptophan depletion to occur normally, IDO1 has to be present in high enough concentrations to convert tryptophan into kynurenine. This reaction is necessary to create an immunobalanced environment so that the mother's immune system will not react to the fetus, potentially causing pregnancy loss. Prior research has linked reduced IDO1 to miscarriage in mice and humans. Because higher maternal BPA levels in pregnancy have also been linked to pregnancy loss, the Susiarjo lab became interested in studying BPA's impact on the IDO1 enzyme to better understand whether this is a potential mechanism of pregnancy loss. A first step was to investigate the genetic regulation of IDO1 production.
(Continued on page 2)

In This Issue

Page 1-2

Susiarjo Leading the Way in Research on Environmental Exposure and Pregnancy Loss

Page 3

Science Take-Out Community Environmental Health Kits Change Community Education

Page 5—10

The EHSC Welcomes New Center Members

- Daniel Croft, MD, MPH
- Dragony Fu, PhD
- Gus Litonjua, MD, MPH
- Matthew McCall, PhD
- Tom O'Connor, PhD

Page 11

Rochester Represented at National Healthy Homes Conference in Washington D.C.

Page 12

EHSC Members Featured in International Women in Science Day Video

Page 13

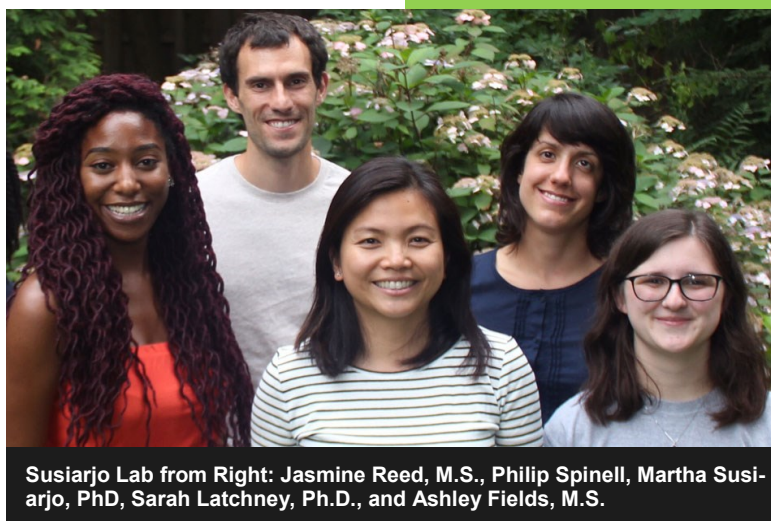
EHSC Seminar Series: Kathleen Gray, PhD

Page 14

Toxicology Trainee Highlight By Ashley Peppriell

Continued from page 1 “*Susiarjo Leading the Way in Research on Environmental Exposure and Pregnancy Loss*”

In the recent publication, the Susiarjo lab discovered that the *Ido1* gene is a novel imprinted gene that is epigenetically regulated through paternal chromosome-specific DNA methylation. There are approximately 150 known imprinted genes in both mice and humans that are important for fetal and placental development. “DNA methylation is the best-characterized epigenetic mechanism regulating imprinting,” Susiarjo explained. “Altered DNA methylation can affect imprinted gene expression, which could potentially disrupt normal fetal and placental development.”² Normally, only the maternal copy of the *Ido1* gene is expressed and the paternal copy is methylated and silenced. Increased methylation on the maternal copy was predicted to reduce *Ido1* gene expression. In this study, increased methylation of the *Ido1* gene was observed in a spontaneous abortion mouse model. As well, similar observations were noted in placental samples from first trimester pregnancy loss in humans. These findings suggest that epigenetic perturbation of this gene could be a novel mechanism underlying pregnancy loss.



Susiarjo Lab from Right: Jasmine Reed, M.S., Philip Spinell, Martha Susiarjo, PhD, Sarah Latchney, Ph.D., and Ashley Fields, M.S.

Susiarjo’s next step for this work is to go back to the mouse model to see if BPA exposure directly causes dysregulation of the *Ido1* gene.

¹Susiarjo M, Xin F, Stefaniak M, Mesaros C, Simmons RA, Bartolomei MS. 2017. Bile acids and tryptophan metabolism are novel pathways involved in metabolic abnormalities in BPA-exposed pregnant mice and male offspring. *Endocrinology* 158(8):2533–2542.

²Amolegbe, Sarah. 2018. Imprinted genes and the environment discussed by Susiarjo. *Environment Factor*. April 2018
<https://factor.niehs.nih.gov/2018/4/science-highlights/imprinted-genes/index.htm>

Science Take-Out Community Environmental Health Kits For Community Education

The Community Engagement Core (CEC) teamed up with Rochester-area small business, Science Take-Out, LLC on a nearly \$1 million, two-year STTR Phase II grant from the National Institute of Environmental Health Sciences (NIEHS) to develop a line of environmental health science kits for use in community-based settings. This project enabled the team to do extensive field testing of Science Take-Out kits that had been previously developed for high school science classes and to modify them into eight new “community kits” suitable for a broad range of non-student audiences.



A woman prepares to pilot Science Take-Out's community environmental health education kits at the CitSci2019 Conference in Raleigh-Durham, North Carolina.

Science Take-Out's community environmental health (CEH) education kits provide interactive activities to engage the general public in learning how exposure to things in their environment may affect their health. These kits are designed to provide background information on EH issues and promote discussion during informal education programs. The kits use simple, hands-on activities to engage diverse community audiences in learning concepts, encourage dialogue, and support community members' actions to improve their environmental health. Science Take-Out kits are fully assembled “labs in bags” that require no additional lab equipment. The convenient design makes the kits useful in a variety of venues such as community centers, libraries, health fairs, and other informal education settings.

The community environmental health kits were pilot tested by our CEC in Rochester as well as by community outreach partners from University of North Carolina - Chapel Hill, University of Texas Medical Branch - Galveston, and WE ACT for Environmental Justice in New York City. Each of these groups conducted pilot testing with local community members. They provided detailed feedback on draft kit designs and materials to ensure that the kits are appropriate for diverse community audiences. (*Continued on page 4*)

Continuation from page 3 “*Science-Take Out Community Environmental Health Kits For Community Education*”

Between the four institutions, these eight kits were piloted in diverse communities and geographic areas including with residents in a senior independent living facility, public health nurses, a church youth group, and environmental justice groups. Partners from each institution also conducted workshops at local conferences in Texas, New York, and North Carolina as well as national conferences in Washington, D.C. and California to help disseminate the kits to broader audiences.

These new community EH kits can be purchased on the Science Take-Out website, <https://www.sciencetakeout.com/ceh-kits>. Kits will also be offered to community-based educators at no cost until June 1st for piloting to collect additional evaluation data from kit users.

Katrina Korfmacher, PhD, Director of the CEC, Dina Markowitz, PhD, Professor of Environmental Medicine, and CEC Program Manager, Cait Fallon, MA were also recently awarded an EHSC pilot project grant for evaluating the effectiveness of community environmental health science kits in promoting environmental health literacy.

For more information, see:

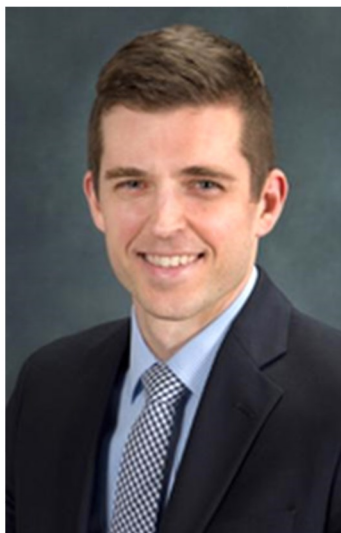
- <https://www.urmc.rochester.edu/environmental-health-sciences/community-engagement-core/projects-partnerships/community-environmental-health-science.aspx>
- <https://www.sciencetakeout.com/ceh-kits>
- For high school science kits on environmental health as well as many other topics, see www.sciencetakeout.com

Community EH Kit Topics

- **Breast Cancer Risk Factors**
- **Safe City Water?**
- **Safe Well Water?**
- **Skin Cancer and Sun Safety**
- **Healthy Homes**
- **Testing Blood for Lead**
- **Preventing Lead Poisoning**
- **Pesticide Safety**

The EHSC Welcomes New Center Members

Daniel Croft, MD, MPH



Daniel Croft, MD, MPH joined the University of Rochester Medical Center in 2014 and is currently Assistant Professor of Medicine, Pulmonary Diseases, and Critical Care. Croft's main goals as a clinician are to improve the health of individual patients and populations through research on air pollution. His work has focused on general pulmonary disease including COPD and asthma in his outpatient clinic. He has a special interest in occupational health including diseases caused from inhaled toxins. Croft credits the EHSC with accelerating his development as an independent researcher including mentorship by Mark Utell, MD, and David Rich, ScD, MPH.

"The EHSC has provided great networking opportunities with experts from other institutions who have helped inform my research," Croft said. "The EHSC has also connected me to local resources including the American Lung Association to help develop my clinical education series on electronic cigarettes." Croft gave a presentation on the health effects of vaping to the EHSC Community Advisory Board in December 2018. He is currently partnering with the Community Engagement Core at the EHSC to support education and report-back of results of a community-based pilot of home air filtration for COPD patients. (*Continued on page 6*)

Continuation from page 5 *"The EHSC Welcomes New Center Members, Dan Croft, MD, MPH"*

Croft did both his undergraduate and medical school training at Indiana University. While in medical school he completed a Master's in Public Health. He completed a residency in internal medicine at Dartmouth Hitchcock Medical Center in New Hampshire where he investigated improved primary care delivery by employing health coaches in collaboration with The Dartmouth Institute. During his fellowship in pulmonary and critical care medicine at the University of Rochester, Croft began epidemiologic research on the cardiac and pulmonary health effects of ambient air pollution. For his work on the association between air pollution and respiratory infection, Croft was the 2018 recipient of the David Bates Award for Promising Investigation in the Field of Environmental and Occupational Health from the American Thoracic Society. He is expanding this line of research by collaborating with Ann Falsey, MD and Tom Mariani, PhD on their clinical trial studying potential genetic predictors to discriminate between viral and bacterial respiratory infections. This study on respiratory infection will serve as the population for his K23 proposal on the association between air pollution and the immune response to respiratory infection. Finally, serving as clinical oversight within the Western New York (WNY) Center for Research on Flavored Tobacco Products (CRoFT) he will gain experience in using the Center's inhalation exposure chamber resources.



Croft, middle, accepts the ATS David Bates Award with mentors Utell, left, and Mark Frampton, M.D., right.

ation for his K23 proposal on the association between air pollution and the immune response to respiratory infection. Finally, serving as clinical oversight within the Western New York (WNY) Center for Research on Flavored Tobacco Products (CRoFT) he will gain experience in using the Center's inhalation exposure chamber resources.

Dragony Fu, PhD

Dragony Fu, PhD is an Assistant Professor in the Department of Biology at the University of Rochester.

The Fu laboratory investigates the cellular roles of nucleic acid modification enzymes in biological processes ranging from neurodevelopment to the cellular stress response. In particular, the Fu lab focuses on discovering the targets and functions of methyltransferases and dioxygenases. To study the diverse processes modulated by these enzymes, Fu uses an integrated biochemical, molecular and genetic approach in mammalian tissue culture systems as well as mouse knockout models. Through this approach, Fu has discovered novel targets and functions for enzymes involved in DNA repair, RNA modification and regulated cell death. The pathways and mechanisms identified through his studies provide critical insight into multiple aspects of human health and disease, including anti-cancer chemotherapy, degenerative disorders, and aging. Currently, the Fu Lab is collaborating with the Cory-Slechta and Mayer-Pröschel Labs to decipher the function of RNA modification in neurocognitive disorders. Fu looks forward to working with other members of the EHSC to determine the impact of environmental agents on global RNA modifications.

Fu received his undergraduate degree at the University of Chicago. He completed his PhD at the University of California, Berkeley and then moved to Boston to join MIT for his Postdoctoral Fellowship. Fu was a member of the MIT Center for Environmental Health Sciences where he worked with colleagues to discover DNA repair mechanisms for damage caused by environmental alkylating agents.



Gus Litonjua, MD, MPH

Augusto Litonjua, MD, MPH joined the University of Rochester in 2017 as Chief of Pediatric Pulmonology and Professor of Pediatrics and of Medicine. He completed his clinical Pulmonary and Critical Care fellowship at West Virginia University and a Chronic Disease Epidemiology research fellowship at the Channing Laboratory at Brigham and Women's Hospital and Harvard Medical School. After his research fellowship, Dr. Litonjua obtained a KO8 grant from the NIH and was appointed Instructor in Medicine at the Channing Laboratory.



Litonjua's research focuses on the developmental origins of asthma and lung disease, specifically nutritional and environmental exposures during pregnancy. Based on research with several birth cohorts, he has reported on a diverse group of exposures (e.g. maternal nutrient intake, allergen levels in the home, air pollution, and infant microbiome) that affect the risk for childhood asthma, wheezing, and allergies. To date, he has over 290 publications, several book chapters, and has edited a book titled "Vitamin D and the Lung."

Litonjua co-led a multi-center clinical trial of vitamin D supplementation in pregnancy to prevent asthma in offspring (Vitamin D Antenatal Asthma Reduction Trial, VDAART). He is Principal Investigator of this cohort that is currently participating in the NIH-wide ECHO (Environmental influences in Child Health Outcomes) Program. At the University of Rochester, Litonjua has begun pilot studies to study the microbiome in house dust of children with asthma and the maternal intestinal microbiome during pregnancy.

Matthew McCall, PhD

Matthew McCall, PhD is an Associate Professor of Biostatistics & Computational Biology. He is currently developing statistical methods to estimate gene regulatory networks from gene perturbation experiments, to address within-subject heterogeneity in genomic biomarkers, to preprocess and analyze genomic data, and to examine the effect of cellular composition on tissue-level gene expression.

McCall's work with Paige Lawrence, PhD identified two datasets from the Lawrence lab's work using a mouse model to study 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) exposure. TCDD is a high-risk environmental pollutant, and exposure to TCDD has the potential to profoundly impact the immune system. From both datasets, McCall and Lawrence's team selected TCDD-exposed and control samples that were infected with influenza A virus (IAV). TCDD-exposed mice had been shown to differ in their adaptive immune response to IAV infection. McCall's team investigated whether the application of statistical deconvolution methods could estimate the proportion of adaptive immune cells responding to the infection without experimentally sorting the cells.

McCall received his undergraduate degree in Statistics from the University of Michigan. He went on to John Hopkins University where he obtained his Master of Health Science in Bioinformatics and PhD in Biostatistics. He joined the University of Rochester as a Postdoctoral Fellow in 2010.



Tom O'Connor, PhD

Tom O'Connor, PhD studies the mechanisms by which early stress exposures, including prenatal maternal stress, shape children's behavioral and physical health; developmental studies of psychoneuroimmunology; and the role of caregiving and caregiving interventions on children's behavioral and physical health. His work has been supported by research councils in the United Kingdom, Canada, and the United States. He joined the EHSC through collaborations developed chiefly around a 7-year study that he is leading that is part of the NIH Environmental influences on Child Health Outcomes (ECHO) program. The multi-site project (Rochester & Pittsburgh) aims to identify how prenatal exposures

such as inflammation predict neurodevelopment and metabolic health in children through age 4 years. The project, which includes many collaborators at UR and elsewhere in the US and Europe, has considerable scope for environmental health research.

His current NIH projects are collaborations with colleagues in Pediatrics, Obstetrics/Gynecology, Neuroscience, Pathology, and the Eastman Institute for Oral Health. He is keen to integrate research on stress, immunology, and behavioral development with models, measures, and methods from environmental health.

O'Connor received his PhD in Clinical Psychology from the University of Virginia in 1995. From 1995-2003, he was on the faculty of the Institute of Psychiatry in London in the Departments of Psychology, Child Psychiatry, and the Social, Genetic, and Developmental Psychiatry Research Center. He has been on the faculty at the University of Rochester since 2003; he is now a Professor in the Department of Psychiatry and also directs the Wynne Center for Family Research.



Rochester Represented at National Healthy Homes Conference in Washington D.C.



The Rochester delegation to the Lead and Healthy Homes Conference (L to R) Katrina Korfmacher, Len Merritt (City of Rochester), and Jennifer Becker (Finger Lakes Children's Environmental Health Center)

CEC director Katrina Korfmacher spoke at a national Lead and Healthy Housing conference February 27-28 in Washington, DC. Korfmacher discussed the connections between local and national lead policy as a part of a panel on federal actions to advance a lead poisoning prevention agenda. As well, she led a workshop on the use of Science Take-Out kits for community environmental health education. Korfmacher attended the meeting along with representatives of the City of Rochester and the Finger Lakes Children's Environmental Health Center to learn about new national healthy homes initiatives and share lessons learned from Rochester's local lead policy innovations.

EHSC Members Featured in International Women in Science Day Video

Environmental Health Sciences Center members Martha Susiarjo, PhD, Assistant Professor of Environmental Medicine and Danielle Benoit, PhD, Associate Professor of Biomedical Engineering shared their inspirations for becoming scientists in the UR Medicine video campaign for the International Day of Women and Girls in Science (IDWGS) Monday, February 11th, 2019. This day was declared by the United Nations General Assembly in an effort “to achieve full and equal access to and participation in science for women and girls, and further achieve gender equality and the empowerment of women and girls.”¹



The University of Rochester video featured women scientists from Environmental Medicine, Biomedical Engineering, Neuroscience, Biochemistry & Biophysics, and Neonatology.

Susiarjo, who works on how endocrine disrupting chemicals impact pregnancy outcomes, expressed the excitement of working in her field, “When you look at your data and you think, wow, we are the only group in the world who knows this right now.” On the video, she shares that her first defining moment in science was in middle school when she got to look at mitosis through a microscope.



Benoit’s work focuses on controlling biomaterial functionality and architecture to treat diseases, control cell behavior, and answer fundamental biological questions. As she says on the video, “I became a scientist because it’s really exciting. I have a great desire to find out why things happen... and it’s a never ending story.”

To watch this video go to <https://www.facebook.com/UniversityofRochesterMedicalCenter/videos/239032180373651/>

¹<https://www.un.org/en/events/women-and-girls-in-science-day/>

EHSC Seminar Series: Kathleen Gray, PhD

Kathleen Gray, PhD, Associate Director for Outreach and Public Service at the UNC Institute for the Environment was invited to speak in the EHSC Seminar Series in March. Gray, who directs the Community Engagement Core (CEC) at the UNC-Chapel Hill Center for Environmental Health and Susceptibility, presented “To Eat or Not to Eat? How Environmental Health Knowledge and Beliefs Influence Consumption of Contaminated Fish.” She has done extensive community-engaged work around contaminated fish consumption by subsistence anglers in rural North Carolina to inform effective messaging strategies by informal educators. During her visit, Dr. Gray interacted with local community partners, gave a lecture to environmental science undergraduates, and shared her expertise in environmental health literacy with Rochester’s CEC team.



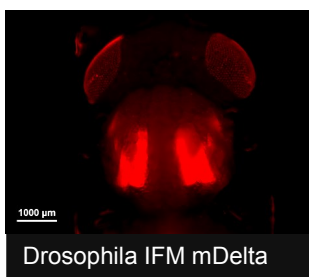
CEC Director Katrina Korfmacher said, “Dr. Gray’s visit was a great opportunity for our CEC to build our understanding of environmental health literacy as it relates to our current work as well as to share her substantive experience with fish consumption advisories with our partners from Rochester, Albany and Buffalo.”

Gray has partnered with the University of Rochester CEC the past two years on two projects. Along with the University of Texas Medical Branch-Galveston and Columbia University, her team worked with the University of Rochester on the “Sensor Stories” project to develop educational materials for communities using low-cost air particulate sensors. This project was funded by a 2017 Administrative Supplement grant from NIEHS. Gray’s team also participated in a recent STTR-funded project to develop and pilot Science Take-Out Community Environmental Health Kits.

Toxicology Trainee Highlight

By Ashley Peppriell

As a second-year graduate student in the Toxicology Graduate Program, I work towards understanding how methylmercury (MeHg) influences muscle development. MeHg is most commonly found in the tissues of seafood or fish like tuna, albeit at low levels. Humans are primarily exposed by consuming such fish. Of particular concern, pregnant mothers who eat contaminated fish risk toxicity to their developing fetus because the toxicant transfers across the placenta. This “developmental exposure” is traditionally thought to interfere with brain development. However, scientists who study methylmercury have identified additional impacts of the chemical, including on muscle development.



My work in the Rand lab helps elucidate mechanisms through which MeHg may act on developing muscle. To understand how MeHg influences muscle development, we utilize the model system *Drosophila melanogaster*. *Drosophila* muscle fibers are remarkably similar to those of humans, but offer superior genetic, optical, and physiological characteristics. We capitalize on these characteristics to perform live imaging of a developing organism exposed to MeHg. In this way, we can detect morphological alterations.

Additionally, we run functional output assays on adult fruit flies to evaluate behavioral manifestations of developmental exposures to MeHg. One of these is called the flight assay, which I have optimized for our lab. I have used this assay to demonstrate flight defects in adult flies who were exposed to MeHg as larvae, suggesting adult manifestation of earlier life exposure.



Conducting flight assays on drosophila flies.

As a member of the Department of Environmental Medicine’s toxicology training program, I co-chair the Toxicology Social committee, which strives to help students in our program maintain a healthy work-life balance. For more information on the Toxicology training program and student activities, see <https://www.facebook.com/URMCToxicology/> And: <https://www.urmc.rochester.edu/education/graduate/phd/toxicology.aspx>

For questions or comments, please contact:

Cait Fallone, MA

Program Manager

Environmental Health Science Center

Community Outreach &

Engagement Core

(585) 275-3354

Cait_fallone@urmc.rochester.edu

View this newsletter and past newsletters at [www.urmc.rochester.edu/
environmental-health-sciences/coec/news-publications.aspx](http://www.urmc.rochester.edu/environmental-health-sciences/coec/news-publications.aspx)