# IIT UPDATE

INSTITUTE FOR INTEGRATIVE TOXICOLOGY

Spring 2020

## in this issue....



MICHIGAN STATE UNIVERSITY

# IIT Faculty & Students Honored Virtually by Society of Toxicology

Although this year's 59th Annual Society of Toxicology meeting was canceled due to the novel coronavirus, the SOT was happy to virtually recognize this year's award recipients. The IIT is proud to share two of our affiliated faculty received two of the most prestigious awards of the meeting.

IIT Director, **Dr. Norbert Kaminski**, was selected to receive the 2020 Society of Toxicology Merit Award for his sustained and highly influential contributions to the discipline of toxicology. The Merit Award is presented to a member of the Society of Toxicology in recognition of distinguished contributions to toxicology throughout an entire career in areas such as research, teaching, regulatory activities, consulting, and service to the Society.

Dr. Kaminski's research involves molecular mechanisms of immunotoxicology, particularly those by which cannabinoids alter immune competence; his laboratory discovered cannabinoid receptor expression within cells of the immune system. His work also involves investigating B cell development and differentiation and its impairment by halogenated hydrocarbons, and he has contributed greatly to the understanding of activation of lymphoid cells resulting in the upregulation of the aryl hydrocarbon receptor. Within the past decade, Dr. Kaminski has focused on developing functional, biochemical, and molecular assays employing primary human leukocytes to identify immune-modulating agents and the mechanisms by which they mediate their activity.

The Kaminski laboratory has been continuously funded for more than three decades through grants from the National Institutes of Health, US Environmental Protection Agency, and industry. Notably, in his role as IIT Director, Dr. Kaminski has coordinated research efforts across institutions to secure two successful competing renewals for the Superfund Research Program.

Dr. Kaminski has served as an advisor to numerous predoctoral, master's, and postdoctoral scholars, many of whom have been highly awarded—a testament to Dr. Kaminski's commitment and excellence in toxicology instruction. Dr. Kaminski also furthers toxicological understanding through regular speaking engagements as well as chairing symposia and workshops during scientific meetings.

In addition to his rich publication history—which includes approximately 150 hypothesis-driven peer-reviewed papers

...continued on page 2

# IIT Society of Toxicology Awards cont.

...continued from page 1

and 25 reviews or book chapters—Dr. Kaminski co-authored the chapter on "Toxic Responses of the Immune System" in the seventh, eighth, and ninth editions of Casarett and Doull's Toxicology: The Basic Science of Poisons, the leading text in toxicology graduate studies. He also has served on numerous journal Editorial Boards throughout his career, including his current role as a member of the Editorial Board of Toxicology.

Dr. Kaminski has been active within SOT since he joined the membership in 1983. He served as Treasurer from 2005 to 2007 and was the 2014–2015 SOT President. He is a past Chair of the Endowment Fund Board and Finance Committee and a current member of the Michigan Regional Chapter, Food Safety Specialty Section, and Immunotoxicology Specialty Section.

For his paradigm-shifting research on the role of the coagulation cascade in homeostasis of the liver and other organs, IIT-affiliated faculty member, **Dr. James Luyendyk**, has received the 2020 Society of Toxicology Achievement Award. The Achievement Award is presented to a member of the Society of Toxicology who, within 15 years since obtaining his/her highest earned degree (in the year of the Annual Meeting of the Society of Toxicology), has made significant contributions to toxicology.

Dr. Luyendyk is a leader in the fields of toxicology, hepatology, and hematology, evidenced not only by the more than 100 peer-reviewed publications and multiple book chapters that compose his publication repertoire, but also by his numerous regional, national, and international speaking engagements. His research, involving both drug and environmental exposures, explores the mechanisms by which blood-clotting factors contribute to liver disease, which has challenged assumptions in multiple fields, including toxicology, and has inverted perceptions on the role coagulation factors play in the liver's response to toxicants.

A member since 2002, Dr. Luyendyk has been an active participant in SOT since the first Annual Meeting he attended. In addition to receiving the 2016 Women in Toxicology Mentoring Award, Dr. Luyendyk also was the Founding Chair of the Postdoctoral Assembly and has served as a leader and member of numerous SOT Regional Chapters, Specialty Sections, and Committees. Notably, Dr. Luyendyk was the inaugural Chair of the Graduate Education Subcommittee. Dr. Luyendyk is the 2019–2020 Chair of the Committee on Diversity Initiatives and the 2019–2020 Senior Councilor for the Mechanisms Specialty Section. He also has been a member of the Toxicological Sciences Editorial Board since 2011, in addition to and in conjunction with service on Editorial Boards of other high-impact journals.

Importantly, Dr. Luyendyk's involvement in toxicology extends also to his trainees. He has served as a dedicated mentor not only to graduate and postdoctoral trainees, but also to undergraduate and high school students. His trainees are past recipients of the Mechanisms SS Gabriel L. Plaa Education and Carl C. Smith Graduate Student Awards, Pfizer SOT Undergraduate Student Travel Award, and Undergraduate Diversity Program Student Travel Award, among others. This underscores his influence on furthering the future of toxicology.

Several IIT-affiliated students also received recognition from the SOT this year:

- **Robert Freeborn**, EITS trainee with Dr. Cheryl Rockwell, received 3 prestigious awards: the Frank C. Lu Graduate Student Award from the Food Safety Specialty Section, the Robert J. Rubin Student Travel Award, and the Carl C. Smith Mechanisms Student Award. Freeborn was awarded for his abstract, "*Development of a T cell-specific Nrf2-null mouse model to determine the role of Nrf2 in impaired T cell response to influenza by tBHQ.*"
- **Abigail Bryson**, training with Dr. Jamie Bernard, received the Dharm V. Singh Carinogenesis Endowment Graduate Student Award for her abstract, "*Visceral adipose tissue increases the vulnerability of epithelial cells to carcinogenic effects of benzo[a]pyrene by inducing the aryl hydrocarbon receptor.*"
- **Rance Nault**, postdoctoral researcher with Dr. Timothy Zacharewski, received the John Doull Student Award.
- **Andrés D. Rivera Ruiz**, an undergraduate from the Universidad Ana G. Méndez Gurabo and who trained with Dr. John LaPres at MSU last summer as part of the MSU NIEHS R25 training program, received the Pfizer SOT Undergraduate Student Travel Award for his abstract, "*Understanding the Relationship between the Aryl Hydrocarbon Receptor (AhR) and the Translocator Protein (TSPO) in Regulating Mitochondrial Function in Mouse Lung Epithelial Cells.*"

Congratulations to all the IIT-affiliated SOT award winners this year!

# MSU NIEHS R25 Training Grant Renewed for 5 Years

The NIEHS R25 Training Grant, "First Time Summer Research Experience in Environmental Health Sciences," lead by IIT-affiliated faculty members, **Dr. William Atchison** and **Dr. James Luyendyk**, was recently renewed for an additional 5 years.

The summer research program in environmental health and toxicology provides opportunities for underrepresented minority (URM) students to receive first time mentored introductory experiences in laboratory research. The 12 week beginning research experience is coupled with professional development activities aimed at improving both verbal and written scientific communication, introduction to research career opportunities in environmental health, and training on ethical conduct of research. The ultimate goal of the program is to encourage URM students to enroll in Ph.D. programs in environmental health or allied biomedical sciences and the training they receive during the program prepares the student for a more extensive subsequent research experience.

# Wu Receives William J. Beal Outstanding Faculty Award

IIT-affiliated faculty member, **Dr. Felicia Wu**, was selected as one of ten MSU faculty to receive the William J. Beal Outstanding Faculty Award in 2020. William J. Beal Outstanding Faculty Awards are made each year to members of the faculty for outstanding total service to the University. Each college making nominations for the award has its own detailed criteria and methods for nomination. The nominations are based on teaching; advising; research; publications; art exhibitions; concert performances; committee work; public service including extension, continuing education and work with government agencies; or a combination of these activities. Final selection of William J. Beal Outstanding Faculty Award winners is made by an All-University Awards Committee appointed by the President.

Felicia Wu is the John Hannah Distinguished Professor of Food Science and Human Nutrition. Her research focuses on the national and global burden of food borne disease; how regulations affect global trade networks and influence chemical exposures; the effect of in-utero chemical exposures, nutrition and socioeconomic factors on infant immunity; and the cost-effectiveness of strategies to improve food safety along supply chains in the United States and worldwide.

In her research, Wu has estimated the number of global cancer cases attributable to aflatoxin and arsenic in food and assessed the cost-effectiveness and feasibility of strategies to reduce aflatoxin in the United States and in resource-poor nations. For her research on the impact of aflatoxin regulations on global liver cancer risk, Wu was awarded a National Institutes of Health EUREKA Award.

Wu and her research team have shown that transgenic Bt corn reduces aflatoxin through examining corn growers' insurance claims for aflatoxin problems. She is also collaborating with an MSU team to assess how cassava cyanide exposure affects children's cognitive development in Central Africa, where cassava is a staple in many populations' diets. Wu has published 73 peer-reviewed articles and received approximately $4 million in grant funds.

Wu's service in national and international professional organizations is exemplary. She serves as an expert adviser to the Joint FAO/ WHO Expert Committee on Food Additives of the United Nations. She is an area editor for two journals: "Risk Analysis and World Mycotoxin Journal," and serves on the editorial board of Archives of Environmental and Occupational Health. She recently served on the U.S. National Academy of Sciences panel on the future of animal sciences research for global food security. She also served as an invited reviewer on the Intergovernmental Panel on Climate Change Sixth Assessment Report on the topics of land use and food security.

Wu has earned outstanding reviews from students for her teaching, the quality of her lectures, her enthusiasm and her willingness to provide help. Wu has advised multiple doctoral and master's students and supervised postdoctoral research fellows and research assistant professors. The graduates from her program have all gone on to successful careers in academia, industry, government and nonprofit organizations. Wu was selected to give the annual Robert F. Leader Lecture this year for the MSU Online Food Safety course for students across the United States.

For her excellent research, teaching and service to her profession and MSU, Felicia Wu is most deserving of the Michigan State University William J. Beal Outstanding Faculty Award.

# Poole Hardy Selected for 2020 Journal of Thrombosis & Haemostasis Editor's Award

IIT training grant postdoctoral fellow, **Dr. Lauren Poole Hardy**, was selected as one of six early career investigators to receive the Journal of Thrombosis and Haemostasis (JTH) 2020 Editors' Awards. The jury, comprised of the Editors-in-Chief and Associate Editors of JTH, chose six recently published articles that particularly stood out in their contributions to the field of thrombosis and hemostasis. Poole Hardy was selected for her publication, "Chronic liver injury drives non-traditional intrahepatic fibrin(ogen) crosslinking via tissue transglutaminase." Poole Hardy will receive a travel grant to attend the International Society on Thrombosis and Haemostasis (ISTH) 2020 Congress.

Poole Hardy is a postdoctoral fellow in the laboratory of Dr. James Luyendyk. Her research interests are focused on the role of the blood clotting cascade in acute and chronic liver injury. Specifically, her goals are to identify how the blood clotting factor fibrin(ogen) drives repair of the injured liver.

# National COVID-19 Convalescent Plasma Website for Providers & Patients Launched

IIT-affiliated faculty member, Nigel Paneth, along with colleagues from Johns Hopkins University and the Mayo Clinic, is leading the development of the National Convalescent Plasma Project. The project includes 170 physician-scientists from 50 universities and hospitals across the nation studying the use of convalescent plasma in COVID-19 treatment and prevention.

Treatment of COVID-19 is urgent. As part of the next step to advance the use of convalescent plasma for the treatment of COVID-19 infection, the National Convalescent Plasma Project has launched a website for health care providers, patients who have recovered from COVID-19 infection and want to donate plasma and those considering the treatment.

On March 25, the Food and Drug Administration expedited the compassionate use of convalescent plasma – plasma from those who have recovered – for care of seriously ill patients infected with coronavirus that causes COVID-19 disease. The use of convalescent serum involves taking the antibodies of those who have recovered and giving them to someone else to fight the virus. Currently, the FDA has approved the treatment for compassionate use, which means it can only be used in very severe cases of COVID-19 disease, but it is anticipated that broader use will be approved soon.

Paneth spearheaded the group's website, which is hosted by MSU and was created with the help of MSU IT Services and Amazon Web Services. Paneth said the website is a critical tool to distribute much-needed information to health care providers and to register plasma donors.

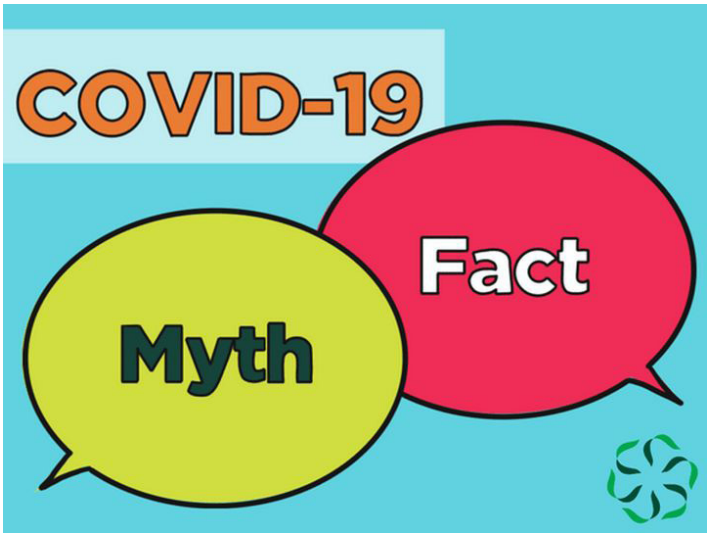
"We need to inform health care providers about the use of convalescent plasma and also reach recovered patients with an urgent plea to donate plasma," Paneth said. "Additionally, doctors will use the site to input data on how their patients respond to the plasma treatment. The hope is that we can move this potentially life-saving therapy to controlled clinical trials and then to wider use if effectiveness is demonstrated as quickly as possible."

"As of April 7, more than 4,300 plasma donors have registered, but we need more," Paneth said. "We are developing a coordination plan with Red Cross and other agencies to collect and distribute plasma. We also are working directly with the FDA to obtain clearance to use convalescent plasma in trials, and in certain situations, outside of a trial framework.

"The use of antibody-rich convalescent plasma to treat or prevent serious infections has been part of medical practice for more than 100 years," Paneth said. "It was a common treatment for bacterial infections before the discovery of antibiotics. More recently, other infectious diseases such as H1N1 influenza, SARS, and MERS have been treated with convalescent plasma with varying results.

"Small studies in China during the recent outbreak of COVID-19 suggest, but do not prove, that convalescent plasma improved outcomes. Until randomized trials are completed in the future, we will not know for sure that it works, in what circumstances and for whom, but we're hopeful."

# CRIS COVID-19 Resource Roundup

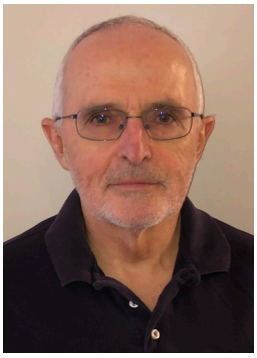



The Center for Research on Ingredient Safety has developed an array of informational blog posts and videos on COVID-19 to offer fact-based information during this unprecedented time. Click on any of the titles at right to learn more!

» COVID-19: Myth or Fact? There is a lot of confusing information around COVID-19 & the novel coronavirus circulating on the internet & social media forums. In this post, we separate the myths from the facts.
» COVID-19: Food & Ingredient Safety In this post, we explore the current state of food and ingredient safety related to the novel coronavirus and our food supplies.
» COVID-19: Cleaning vs. Disinfecting In this post, we put together information to help you safely clean and disinfect your home.
» COVID-19: Bleach as a Disinfectant In this post, we explain how you can use liquid household bleach to disinfect hard surfaces.
» COVID-19: Ingredients, Supplements & Actions that can Aid in Prevention In this post, we cover the soap, hand sanitizer, cleaning ingredients, supplements, and actions you can take to help prevent the spread of COVID-19.
» Risk Perceptions - Coronavirus: A Case Study In this post, we explore risk perceptions, and how our opinions and changing facts influence our perceptions and actions.

# Two New Adjunct Faculty Join IIT

The IIT is pleased to welcome two new adjunct faculty members to our ranks this spring - **Dr. Rory Conolly** and **Dr. Peer Karmaus**.



Dr. Rory Conolly has been a long time collaborator with the IIT, having served on the Computational Core of the MSU Superfund project for many years. Conolly was born in London, England and raised in Canada and the United States. He received a bachelor's degree in biology from Harvard College in 1972, a doctorate in physiology/toxicology from the Harvard School of Public Health in 1978 and spent a post-doctoral year at the Central Toxicology Laboratory of Imperial Chemical Industries in Cheshire, England. He was a member of the Toxicology Faculty at The University of Michigan School of Public Health from 1979 through 1986 and worked with the U.S. Air Force Toxic Hazards Research Division, Wright-Patterson Air Force Base, Ohio from 1986 until 1989. In 1989, Dr. Conolly joined the Chemical Industry Institute of Toxicology (CIIT) and worked there until 2005, when he joined the U.S. EPA. Dr. Conolly retired from the EPA in 2020 and then joined Ramboll Environ as a part-time Senior Management Consultant.

Conolly's research interests include: (1) biological mechanisms of the dose-response and time-course behaviors that determine how exposures to toxicants result in adverse health effects; (2) the use of biologically based computational modeling to study these mechanisms; and (3) the application of these models to quantitative dose-response assessment. Dr. Conolly has extensive experience in physiologically based pharmacokinetic (PBPK) modeling and in computational modeling of multistate carcinogenesis. An important ancillary interest is the identification of experimental designs that efficiently support development of computational models of toxicological mechanisms. He has about 140 peer-reviewed publications.

Dr. Peer Karmaus received his B.S. in Biochemistry from the Lyman Briggs School of Science at Michigan State University in 2005. In 2011, he received his Ph.D. in Cell and Molecular Biology and Integrative Toxicology from MSU as well. Karmaus was mentored by Dr. Norbert Kaminski during his time as an EITS graduate student. Today, Karmaus is a staff scientist at the National Institue of Environmental Health Sciences.

Karmaus' research focuses on how metabolism in innate and adaptive immune cells dictates cell fate and function. Of particular interest is the idea that different intracellular signaling pathways instruct anabolic, catabolic, and biosynthetic processes to affect cell fate decisions and how in turn these metabolites (including xenobiotics) affect cell signaling and cell fate. One of the major metabolic pathways involved in cellular metabolic changes is the biosynthesis and metabolism of cholesterol. Metabolism by immune cells (immunometabolism) and control thereof by changes in cholesterol metabolism affect the outcome of anti-pathogen, anti-tumor, and anti-self (autoimmune and tolerogenic) immune reactions and thus plays a key role in understanding the immune system.

Karmaus' current research involves signaling pathways, metabolic changes, and cellular features that define cell fate. Within this area, the focus is on three overarching ideas: 1. How a cell's environment affects its ability to support cell fate decisions; 2. How signaling pathways connect with a cell's ability to sense metabolite/energy levels and how this mechanism may be perturbed by the availability of metabolites; 3. How heterogeneity within seemingly homogenous cell populations contributes to cell fate and function.

# Medina Meza Selected for MADC Mentee Program

IIT-affiliated faculty member, **Ilce Medina Meza** was selected as a junior investigator mentee by the Michigan Alzheimer's Disease Center (MADC). This is a highly selective two year program lead by University of Michigan, Wayne State University and Michigan State University. As a mentee, Medina Meza will be able to connect with physicians and researchers in the neurological diseases area to further her career development.

Medina Meza's research interests are on food and health engineering, focusing on a deep understanding in the molecular mechanisms governing oxidative stress of lipids, steroids and cholesterol homeostasis. She has devoted significant time studying lipid oxidation due to autoxidation and reactive oxygen species (ROS), and evaluating their impact on health. Her current research is the lipidomic based-discovery of neurodegenerative diseases biomarkers for early detection by application of high throughput mass spectrometry methods and kinetic modeling.

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