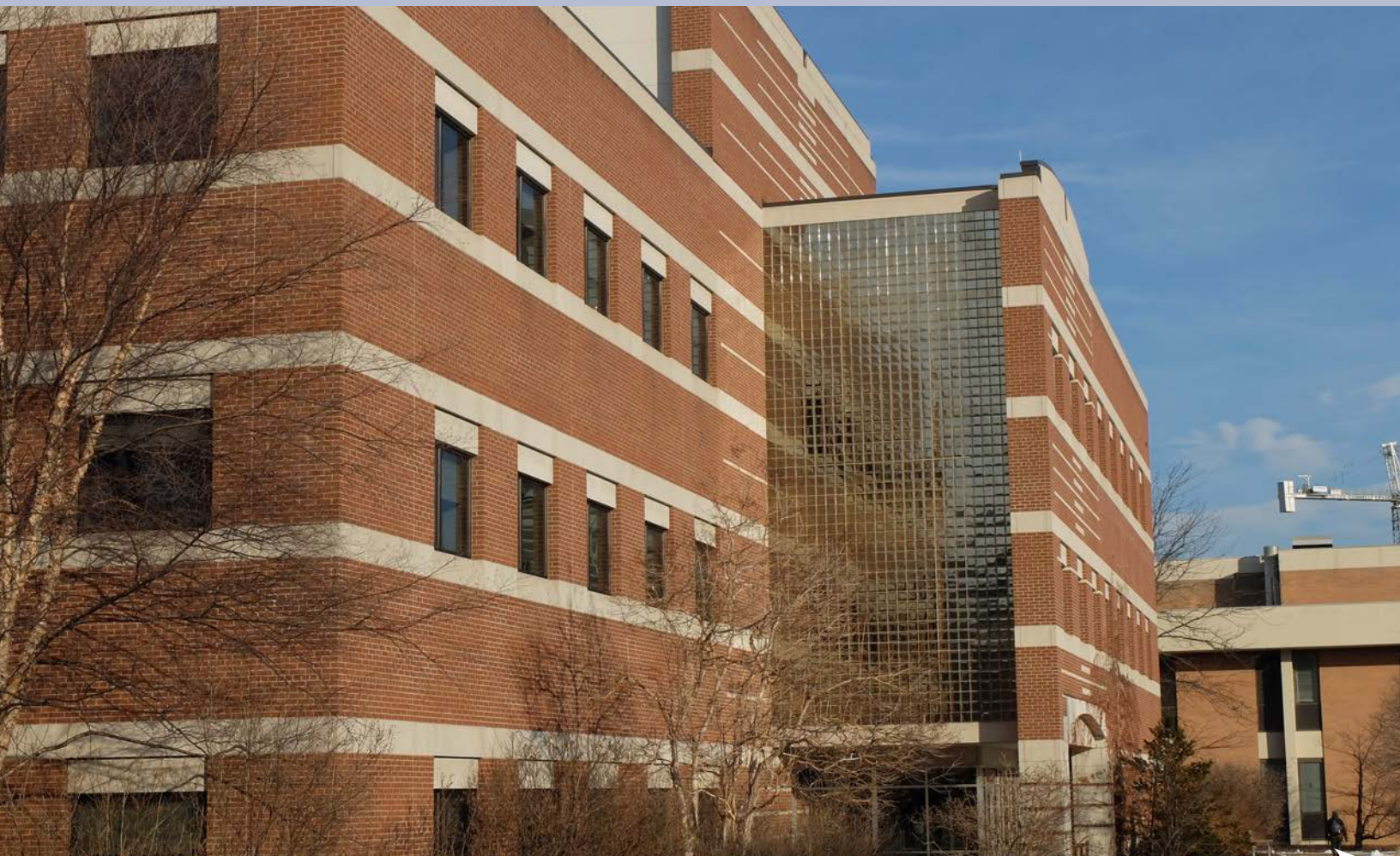


IIT@MSU

INSTITUTE FOR INTEGRATIVE TOXICOLOGY



**2014-2015 Annual Report**

MICHIGAN STATE  
UNIVERSITY



# Annual Report 2014-2015

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Robert A. Roth, Ph.D., Graduate Program Director

Amy Swagart, IIT Fiscal Officer

Kasey Baldwin, IIT Administrative Assistant

Adelle Simmons, EITS Graduate Secretary

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## A TRADITION OF EXCELLENCE

The Michigan State University Institute for Integrative Toxicology (IIT) is a multidisciplinary academic unit that supports and coordinates research and graduate education activities for faculty interested in various aspects of **toxicology**. The Institute is a **successor** to the Institute for Environmental Toxicology and the Center for Environmental Toxicology, the latter founded in 1978. While the name of the unit has changed over the years to denote changes in the **leadership** and academic position, the mission has been the same. For over 30 years, toxicology at Michigan State has provided **excellence** in training graduate students, facilitating research, and providing service to the State of Michigan when needed. The successes generated in these endeavors have resulted in **recognition** of Michigan State as a leader in academic toxicology.

The Center for Environmental Toxicology was initiated primarily to **assist** the State of Michigan with environmental contamination issues such as those arising from the PBB (polybrominated biphenyls) incident in the early 1970s. That unfortunate event was initiated by the accidental

contamination of feed for dairy cattle with PBBs. These dioxin-like chemicals and dioxin itself remain a major topic of research at Michigan State University.

Two years after the founding of the Center for Environmental Toxicology, a dual-degree Ph.D. program in environmental toxicology was offered in conjunction with several cooperating departments. The characteristics of the program were **unique** at that time as students were required to complete the Ph.D. requirements of a department of their choice in addition to the didactic requirements and toxicology research specified by the Center. The **quality** of this multi-departmental effort was recognized by the National Institutes of Health in 1989 with the award of a Training Grant from the National Institute for Environmental Health Sciences. This grant has been competitively renewed ever since, providing over 28 years of continuous funding. Graduates of MSU's toxicology program number over 200 and can be found in academia, industry, and governmental positions. ♻️

# MESSAGE FROM THE DIRECTOR



I am delighted to convey that 2015 proved to be a period of growth and change for the CIT. With the formation of the Center for Research on Ingredient Safety (CRIS) in 2014, which joined two established MSU toxicology centers within the CIT, the US EPA Great Lakes Air

Center for Integrative Environmental Research (GLACIER) and the P42 NIH Superfund Research Program (SRP) Center, there was strong support campus wide to elevate the CIT to Institute status. I must admit that it was also a bit of a challenge explaining to those unfamiliar with toxicology at MSU why our centers were administered by a center. Therefore, renaming the CIT to the Institute for Integrative Toxicology (IIT) has clarified the relationship between these toxicology entities. More importantly, having these three strong toxicology centers under the umbrella of the IIT has many advantages for the MSU toxicology community. For example, the sheer critical mass of faculty, trainees and staff that comprise our various toxicology activities brings significant visibility nationally and internationally. Perhaps most importantly, because many of us participate in more than one of these centers, there is tremendous synergy, collaboration, excitement and camaraderie among the IIT faculty, trainees and staff. Likewise, the cohesiveness of these centers under the IIT umbrella provides resources for research, training and service that otherwise would not be possible.

As I reported in my 2014 message, with the establishment of CRIS, MSU launched a new model for engaging stakeholders as well as supporting research and training. CRIS represents a collaborative initiative between academia, industry, government and nongovernment organizations. Financial support for CRIS comes from both MSU and the private sector. CRIS has gotten off to an excellent start with twenty-one private partners joining within the first 18 months since its establishment primarily from the food, personal care products and the chemical industries. In the

summer of 2015 Dr. Michael Holsapple joined the MSU faculty as the founding Director and Endowed Chair for CRIS. We are delighted to have Mike join the MSU Community. Mike's past experience is diverse having started his career in academia, transitioned into industry, followed by having served as Executive Director of ILSI Health and Environmental Sciences Institute, which serves as a think tank focused on toxicology related issues for the chemical and pharmaceutical industry. Mike has now come full circle returning to academia and we look forward to having him apply his unique collection of skills and perspectives to lead our new center.

We also saw in 2015 the continuation of a longstanding tradition at MSU with the election of Dr. Patricia Ganey into the Society of Toxicology Presidential Track. This history of leadership by MSU within the SOT is a tremendous source of pride for all of us. Patti will serve as the 57th President of the Society of Toxicology with her presidential term being in 2017-2018. Patti will be the ninth MSU faculty member or past trainee to serve as SOT President. To my knowledge this is a unique distinction among toxicology programs.

Finally, I do want to also convey that our greatest triumph has been our doctoral training program in Environmental and Integrative Toxicological Sciences. The EITS program presently has 32 graduate trainees with 4 having matriculated during the past year. With the establishment of CRIS, the EITS program, under the direction of Dr. Robert Roth, will be expanding from its present two graduate tracks, the Biomedical Sciences Track and the Environmental Track, by adding the Food and Ingredient Safety Track. We anticipate recruiting students into this new EITS track beginning with the Fall 2016 entering class. The Food and Ingredient Safety doctoral track will primarily serve students interested in career paths in regulatory sciences and risk assessment either in industry or government.

We look forward to continued success in the coming year.

A handwritten signature in blue ink that reads "Norbert E. Kaminski".

Norbert E. Kaminski, Ph.D., IIT Director



# Student and Faculty HIGHLIGHTS

*This year's highlights showcase the accomplishments of not only the institute, but also of the faculty and trainees involved in continuing to expand the quality and leadership of Michigan State University in academic toxicology.*

## CIT BECOMES THE INSTITUTE FOR INTEGRATIVE TOXICOLOGY (IIT)

Founded in 1978, the name of the CIT has changed over the years to reflect changes in the leadership and academic position, but the mission has always stayed true: provide outstanding graduate training, facilitated research, and service to the State of Michigan and the country when needed. The successes generated in these endeavors have resulted in recognition of MSU as a leader in academic toxicology.

As of the past year, the center now houses three separate centers: the NIH Superfund P42 Center Grant, the US EPA Clean Air Research Center Grant - GLACIER, and the newly added Center for Research on Ingredient Safety (CRIS), all of which are collaborative research and training efforts. The request of the CIT to become the Insti-

tute for Integrative Toxicology helps to provide a more coherent organizational structure that clearly portrays how the various entities relate to each other administratively. The three centers that are currently administered by the IIT (Superfund, GLACIER and CRIS) now fall under the broader umbrella of the Institute. The new Institute title also enhances external visibility and stature of a successful toxicology enterprise that MSU can communicate nationally and internationally with the potential of not only enhancing the existing centers but also in creating new centers in toxicology.

With the changes in the past year, the IIT needs and staff have expanded and the IIT offices have now moved into room 165 of the Food

Safety and Toxicology Building. Adelle Simmons has joined the IIT staff as the new EITS Graduate Program Secretary and will also provide administrative support for CRIS. Also joining the staff, Dr. Michael P. Holsapple has been recruited as the new director for CRIS.

With the important role that toxicology plays in the safety and well being of the general public in virtually all aspects of life, the IIT is uniquely positioned to expand in a variety of areas. The IIT leadership and faculty look forward to continued success in the years ahead under a united banner as the Institute for Integrative Toxicology. ♡

## NEW DIRECTOR NAMED FOR THE CENTER FOR RESEARCH ON INGREDIENT SAFETY (CRIS)



Michael P. Holsapple has been named the founding director of the Center for Research on Ingredient Safety (CRIS) at Michigan

State University. CRIS is an independent, academic, science-based center within the Institute for Integrative Toxicology. The mission of CRIS, working in collaboration with the Department of Food Science and Human Nutrition, is to serve as a reliable and unbiased source for information on the safe use of chemical ingredients in consumer packaged goods.

With more than 30 years as a toxicologist and leader in academia, industry as well as in non-profit charitable organizations, Dr. Holsapple is uniquely-suited to lead Michigan State University's new

center. He will be building on MSU's internationally renowned knowledge base in food safety and toxicology.

Holsapple, who has been an affiliate professor at MSU since 1994, most recently served as the executive director for Global Immunotoxicology at Covance Laboratories, Inc. He was also a senior research leader in systems toxicology at the Battelle Memorial Institute in Columbus, Ohio.

Holsapple has served as the executive director of the Health and Environmental Sciences Institute (HESI), which is the global branch of the International Life Sciences Institute (ILSI) in Washington, D.C. During his time with HESI, Holsapple facilitated the organization's emergence as a recognized global leader in advancing the state-of-the-science of safety and risk assessment.

He has also worked in the Toxicology, Environmental Research and Consulting Laboratories for the Dow Chemical Company in Midland, MI, and has served as associate professor

for the Medical College of Virginia/Virginia Commonwealth University in Richmond, Virginia, and has published more than one hundred and fifty manuscripts and chapters. He received his master's and doctoral degrees in pharmacology and toxicology from Purdue University.

Holsapple has served on the board of directors for both the American College of Toxicology (ACT) and the Society of Toxicology (SOT). He was also president of the SOT from 2010 to 2011, presiding over the Society's 50th anniversary.

In recognition of his contributions to toxicology, he received the SOT Achievement Award in 1992, the Vos Award-Career Achievement in Immunotoxicology in 2009 from the SOT Immunotoxicology Specialty Section, and the Ambassador of Toxicology Award in 2014 from the Mid-Atlantic Regional Chapter of the SOT.

He was elected as a Fellow in the Academy of Toxicological Sciences (ATS) in 2006 and is currently serving as president. ♡

## EITS STUDENT COLÓN-RODRÍGUEZ WINS TOP AWARDS FROM SOCIETY FOR NEUROSCIENCE

**Alexandra Colón-Rodríguez**, EITS student training with Dr. Bill Atchison, has received two prestigious awards from the Society for Neuroscience. The first is a national award as a Neuroscience Scholar. The Neuroscience Scholars Program (NSP) is a multi-year program designed to enhance career development and professional networking opportunities for underrepresented and diverse graduate students and post-doctoral fellows in the field of neuroscience.

The second award she received was the 2014 Next Generation Award at the predoctoral/postdoctoral level. She received this nomination for her outreach efforts alongside two other Michigan State University graduate students, Eileen S. Rodríguez Tapia and Chelsea Tiernan. The three students developed a “Bridge to Neuroscience Workshop” (BNW) in Puerto Rico that is designed for high school students and

their teachers. This program specifically targets Hispanic students, an underrepresented population in neuroscience. Their intensive one day workshop includes hands-on experimentation

**Dr. Bill Atchison**, IIT-affiliated faculty member, to prepare undergraduate Hispanic students within universities for admission into neuroscience graduate programs. The high school workshop is now an integral part of this initiative.

Each of the nominees played a distinct and vital role in developing the workshop. Alexandra Colón-Rodríguez developed a third of the exercises and oversaw the completion of the workbook distributed to the participants, including the translation of materials into Spanish. She was also responsible for securing all materials used in the workshop.

In addition to their individual contributions, all three played equal roles in the workshop's presentation and assessment.

Colón-Rodríguez and her partners were recognized at the Society for Neuroscience's annual meeting in November 2014. 🍀



along with supplemental instruction and accompanying handouts that introduce neuroscience to younger participants and ultimately can serve as a recruitment tool for the university-level “Bridge Program in Neuroscience” in Puerto Rico. The original “Bridge to Neuroscience” program was developed in 2008 by

## EITS PROGRAM 2014-2015

The Environmental and Integrative Toxicological Sciences (EITS) graduate program continues to be one of the premier toxicology training programs in the U.S. This MSU program administered by the CIT is a “dual major” format that emphasizes excellent basic science training from one of our 16 partnering graduate programs coupled with didac-

tic and research training in toxicology by MSU CIT-affiliated faculty. Currently, 32 doctoral students are enrolled in the EITS program, distributed among several of our partnering PhD programs. Twenty-eight of these students are in the Biomedical Track and 4 in the Environmental Track. Many of our current students have received awards at the

2015 Annual Meeting of the Society of Toxicology (SOT) or from other organizations. Our students continue to demonstrate good citizenship with service on Society committees at the regional and national levels as well as within MSU. Students who graduated in the past year are typically in postdoctoral positions at various academic institu-

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tions in the U.S. and other countries.

The 2014-2015 academic year marked the 26<sup>th</sup> consecutive year that the program has enjoyed training grant support from the National Institute for Environmental Health Sciences (NIEHS). This grant provides stipend support for 6

predoctoral and 3 postdoctoral fellows. Generous supplemental funding from Dean Klomparens of the Graduate School provides additional support for stipends and fellowships that enable students to travel to scientific meetings to present the results of their research. With a

strong, research-intensive CIT faculty, leadership by Dr. Roth and support from the MSU administration, the EITS training program continues to thrive.

## RECENT EITS GRADUATES



### Chelsea Hutch

Neuroscience

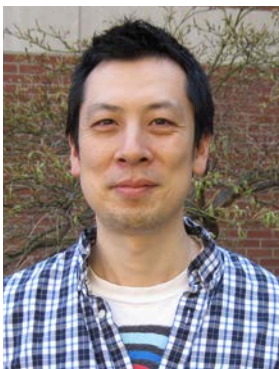
Mentor, Colleen Hegg

Hutch successfully defended her dissertation, "Cannabinoid Action in the Mouse Olfactory Epithelium," in July of 2014 and earned her Ph.D. degree in Neuroscience and Environmental Toxicology.

Hutch is currently at the University of Michigan as a Postdoctoral Fellow in the Department of Surgery in the labs of Drs. Randy Seely and Darleen Sandoval. Her projects focus on the adaptations of the gut-brain axis with bariatric surgery and how this leads to weight-loss and

improvements in glucose and lipid homeostasis after these surgeries, with the goal of generating better therapeutic options for obesity and type 2 diabetes. After her fellowship she hopes to obtain a position in industry focused on the environmental impacts on metabolic disease, while continuing to be involved in science policy and research.

Hutch expressed, "The EITS program provided me with essential opportunities for me to succeed in graduate school, and I deeply appreciate those who encouraged and supported me to be one of the first dual Neuroscience and EITS graduate students."



### Kazuhisa Miyakawa

Pathobiology and Diagnostic Investigation

Mentor, Robert Roth

Miyakawa successfully defended his dissertation, "Contribution of thrombin and platelets to acetaminophen hepatotoxicity in mice," in July of 2014 and earned his Ph.D. degree in Pathobiology and Environmental Toxicology.

Miyakawa now works for Toxikon, a pre-clinical contract research firm in Boston. Toxikon contracts and partners with the biotech, pharmaceutical and medical device industries to deliver

product development services from concept to final product. Miyakawa is responsible for overseeing all the clinical pathology work, assay radiation, writes reports from blood results, and consults with sponsors.



### Josephine Wee

Food Science and Human Nutrition

Mentor, John Linz

Wee successfully defended her dissertation, "Regulation and sub-cellular localization of aflatoxin biosynthesis in *Aspergillus parasiticus*," in April of 2015 and earned her Ph.D. degree in Food Science and Human Nutrition and Environmental Toxicology.

In September, Wee will begin a new position as a postdoctoral associate in the laboratory of Dr. Zhenglong Gu at Cornell University in Ithaca, New York. Dr. Gu is the Head of the Nutrition and Evolution group within the Division of Nutritional Sciences at Cornell.

Wee will be working on two main projects there - investigating the effect of carcinogens on mitochondrial DNA mutation and copy number and investigating the evolution of aerobic fer-

mentation in yeast. The central theme of these two projects is to understand the regulation of energy metabolism and evolution of metabolic gene pathways.

In the next five years, Wee hopes to actively publish her findings, attend conferences to present her work, apply for independent research support, and establish national and global scientific collaboration. From there, she hopes to transition from a postdoctoral researcher to an Assistant Professor in an R01-type research institution in the USA to begin her own laboratory.

Wee said, "My motivation to pursue an academic career in science stems from the idea to 'pay it forward', to mentor and guide the next generation of scientists with the same dedication and passion of my current mentors."

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## IIT WELCOMES SIX NEW AFFILIATED FACULTY

This past year the MSU-IIT added five new affiliated faculty members Dr. Jamie Bernard, Dr. Matthew Bernard, Dr. Brian Petroff, Dr. Almudena Veiga-Lopez, and Dr. Matthew Zwiernik, as well as an adjunct faculty member, Dr. A. Wallace Hayes. These faculty join the IIT as research collaborators as well as contributors to the Environmental and Integrative Toxicological Sciences Graduate Training Program.

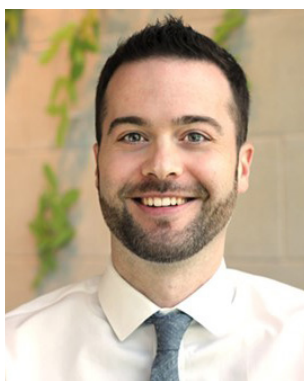


**Jamie J. Bernard**  
*Assistant Professor, Department of Pharmacology and Toxicology*

Dr. Bernard received her B.S. in Neuroscience in 2004 and her Ph.D. in Toxicology in 2009 from the University of Rochester.

The Bernard laboratory studies toxicological effects in everyday life that act as triggers in the formation of cancer. They have discovered that intra-abdominal (visceral) fat can promote skin carcinogenesis in an animal model of high-fat diet-

induced obesity. They aim to identify specific mechanisms of obesity-promoted cancer with a focus on visceral fat inflammation. Additionally, they have interests in studying the effects of components of moisturizing creams and chemicals in sunscreens on skin tumor formation.



**Matthew P. Bernard**  
*Assistant Professor, Department of Pharmacology and Toxicology*

Dr. Bernard received his B.S. in Biochemistry from the State University of New York at Geneseo in 2004 and his Ph.D. in Microbiology and Immunology from the University of Rochester in 2009.

Dr. Bernard is a member of the In Vivo Facility, a contract

research organization within Michigan State University, where he supports custom model development for toxicological endpoints for both industry and academic clients. Dr. Bernard has extensive knowledge in designing and conducting applied research studies in immunopharmacology and immunotoxicology in a GLP environment. He has specialized in immunoassay development, validation, and implementation for in vitro and in vivo pharmacology and toxicology studies, and has over a decade of flow cytometry experience. As a Senior Research Investigator at Bristol-Myers Squibb, he worked in Drug Safety Evaluation performing investigative toxicology research for small molecules and Biologics.



**Brian K. Petroff**  
*Associate Professor, Diagnostic Center for Population and Animal Health, Department of Pathobiology and Diagnostic Investigation*

Dr. Petroff received his B.S. in Animal Science in 1992, his Ph.D. in Physiology, and his D.V.M. in 1998, all from Ohio State University.

Endocrine disruption and infertility share a number of suspected disease pathways and risk factors. The Petroff

laboratory focuses upon the characterization and antagonism of promising targets in animal models. Major research efforts include assay development within the Endocrinology service at DCPAH, and characterization and alleviation of the premature loss of female fertility with age and chemotherapy or toxicant exposure. A novel focus of their work concerns the impact of selective estrogen receptor modulators on normal and precancerous breast and ovarian tissue and the follicular reserve.

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**Ashley Maiuri**  
*Pharmacist, Mentor, Robert Roth*

Maiuri successfully defended her dissertation, "Drug-Cytokine Cytotoxic Interaction: Relationship to Idiosyncratic Drug-Induced Liver Injury," in June of 2015 and earned her Ph.D. degree in Pharmacology and Toxicology and Environmental Toxicology.

Maiuri will begin as a postdoctoral associate in the lab of Dr. Heather O'Hagan at Indiana University this fall. She will be studying the role

of inflammation in initiating epigenetic changes associated with colon cancer.

In the next five years, Maiuri hopes to establish a career that involves some combination of research in toxicology and teaching. ☘

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**Almudena Veiga-Lopez**  
Assistant Professor, Department of  
Animal Sciences

Dr. Veiga-Lopez received her B.S. in Biology from Cervantes Institute in 1995, her D.V.M. in Animal Medicine from Complutense University in 2000, and her Ph.D. in Reproductive Physiology from the National Institute of Agricultural Research in 2005.

The Veiga-Lopez laboratory focuses on understanding the fetal origins of adult reproductive

and metabolic disorders. The lab is interested how environmental exposures (endocrine disruptors) during prenatal life can induce adaptive mechanisms in the developing organism leading up to pathophysiological consequences during postnatal life. They use *in vivo* approaches to characterize the pathophysiological outcomes and *in vitro* approaches (cellular and molecular) to understand the mechanisms and pathways by which the pathological outcomes occur.



**Matthew J. Zwiernik**  
Assistant Professor, Department of Animal Science, Director, Wildlife Toxicology Laboratory

Dr. Zwiernik received his B.S. in Biochemistry in 1989, and his Ph.D. in Environmental Toxicology, both from Michigan State University.

Dr. Zwiernik's research focuses on assessing the impacts of environmental chemical exposure to wildlife ranging from oil spills to superfund sites. His work

combines direct measures of wildlife exposure and popula-

tion health with controlled laboratory studies identifying mechanisms of action and toxicity. Dr. Zwiernik is particularly interested in improving the certainty of the quantification of the ecological risk associated with wildlife exposure to complex contaminant mixtures by improving approaches for the identification of contaminants, contaminant interactions, identification of receptors of concern, applicable measurement parameters, site-specific chemodynamics, derivation of toxicity reference values, risk characterization, and the use of risk assessment in sustainable development. His team specializes in working with wildlife species including great horned owl, osprey, bald eagle, great blue heron, kingfisher, wood duck, tree swallow, house wren, bluebirds, American robin, coyote, American mink and shrews as receptors of concern.



**A. Wallace Hayes**  
Senior Science Advisor, Spherix Consulting

Dr. Hayes received his A.B. in Chemistry in 1961 from Emory University, and his M.S. in Physiology in 1964, and his Ph.D. in Biochemistry in 1967, both from Auburn University.

Dr. Hayes' research recently has primarily focused on food safety with a particular interest on food additives and contaminant. A major emphasis has been

the investigation of the potential untoward effects of mycotoxins in the food supply on the reproductive system. Dr. Hayes is also interested in the application of newer methods for safety evaluation involving alternative methods and the use of system toxicology in understand adverse outcome pathways. ♡

## MURPHY RECEIVES EPA GRANT TO STUDY CONTAMINANTS' EFFECTS ON FISH



**Dr. Cheryl Murphy**, associate professor in the Department of Fisheries and Wildlife and IIT-affiliated faculty member, is leading an EPA-funded study to determine the effects of certain contaminants on fish. MSU, along with scientists from the University of Wisconsin-Milwaukee and the University of Mississippi, received an \$800,000 grant to conduct the research.

Specifically, the team will study contaminants' effects on the developing brains of larval fish, in particular looking at behaviors that are important to survival, such as finding food and avoiding predators, and which genes are important in regulating these behaviors.

"It's crucial that these behaviors develop quickly, as these little larval fish have a lot going against them in their first month or so of life," said Dr. Murphy. "Many chemicals can disrupt brain and behavior development."

Members of the research team have found that methylmercury disrupts foraging behavior and corresponding gene pathways in larval yellow perch. One of the team's missions is to address whether similar mechanisms affect other fish species and to determine if measurements at the gene level can predict behavior and subsequent population impacts.

MSU is one of six universities to receive an EPA Science to Achieve Results, or STAR, grant. It is part of the agency's Chemical Safety for Sustainability research program, designed to develop new methods to improve chemical evaluation and support environmental sustainability. ♡

## GANNEY ELECTED VICE PRESIDENT-ELECT OF SOT



**Dr. Patricia Ganney**, IIT-affiliated faculty member in the Department of Pharmacology and Toxicology, was recently elected vice president-elect for the Society of Toxicology.

Her election to this office at the SOT will lead to her serving as vice president and then as president of the society.

The Society of Toxicology (SOT) is a professional and scholarly organization of scientists from academic institutions, government, and industry representing

the great variety of scientists who practice toxicology in the US and abroad. SOT is committed to creating a safer and healthier world by advancing the science of toxicology. The organization analyzes the adverse effects of chemical, physical and or biological agents on people, animals, and the environment and currently has a membership of approximately 7,500 scientists.

Dr. Ganney received her B.S. in Biological Sciences in 1979 from the University of Maryland, and her Ph.D. in Pharmacology and Toxicology from Michigan State University in 1986.

Dr. Ganney's research interests lie in the interaction of inflammation and chemically-induced liver injury. For many chemicals of diverse structure and mechanism of action, ongoing inflamma-

tion makes the liver more sensitive to toxic effects. Among the chemicals for which this is true are some drugs and environmental contaminants. Dr. Ganney's research focus is on understanding the mechanisms by which inflammation causes this change in sensitivity. She studies inflammatory cells, including neutrophils and liver macrophages, as well as soluble mediators, like cytokines. Of particular interest are the changes in gene expression and signal transduction pathways that lead to toxicity.

The current outgoing president of SOT is IIT Director Norbert Kaminski. Ganney will be the 9<sup>th</sup> Michigan State University-affiliated President of the SOT. ●

## MSU-SRP BEGINS COMMUNITY PARTICIPATORY RESEARCH PROJECT IN MIDLAND, MI

The Research Translation Core (RTC) of the MSU Superfund Program has continued to work with Midland High School to develop an environmental science curriculum that has a strong focus on the primary contaminant problem of their local community, namely the dioxin contamination of the soils of local properties, and sediments of the Tittabawassee river basin and flood plains. This past spring the RTC gave presentations to the AP Chemistry and AP Biology classes as well as AP Sociology: Theory of Knowledge class. Presentations included information on basic toxicological principles, the peer review science process, and an introduction to fish advisories, which included access to the State of Michigan's database on levels of contaminants in fish. The presentations also were an introduction to the Gene-Z handheld gene analyzer, a field portable analyzer that links with a mobile phone app to

identify microorganisms that biodegrade chlorinated organic chemicals and organisms with antibiotic resistance. The dioxygenase chips for the Gene-Z



analyzer, to measure organisms of interest to the center, are being developed by utilizing the Gene-Z platform and genomic libraries through collaborative efforts of Project 4 (Syed Hashsham and Robert Stedtfeld of MSU), Project 5 (Gerben Zylstra of Rutgers University),

and Research Support Core B (James Tiedje, Jim Cole and Benli Chai).

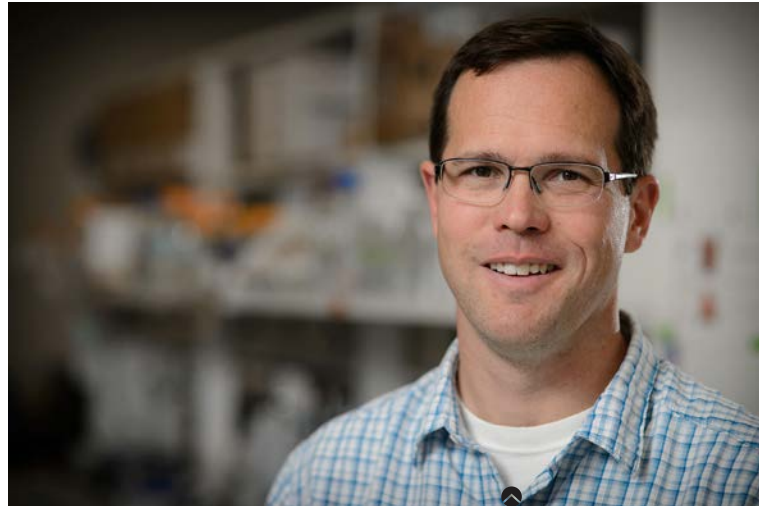
Three chips, along with the Gene-Z analyzers, will be validated by the students at Midland High School to initiate the Community Participatory Research Project, an integrative citizen science project with the community of Midland. This past summer, an undergraduate student at MSU optimized the analyzers by loading genes and experimental protocol that will help find genes of interest from the soil and sediments tested, specifically those related to dioxin degradation, and those resistant to antibiotic. This fall, Midland High School, with instruction from the MSU-SRP, will start to use the Gene-Z analyzers. Their challenge will be to detect small amounts of biodegradation genes in river sediments. They will be trained on how to use the analyzer, record data, manage data, and rules on property rights for testing in their community. ●

# ANDRECHEK CREATES DATABASE TO HELP THE STUDY OF HUMAN BREAST CANCER

**Eran Andrechek**, physiology professor and IIT-affiliated faculty member, has discovered that many of the various mouse models used in breast cancer research can replicate several characteristics of the human disease, especially at the gene level.

Previously, genomic variability limited the efficacy of breast cancer therapy. To simplify the study of the molecular complexity of breast cancer, researchers used mouse mammary tumor models. Less clear is how effective are these models though in actually mimicking the disease.

Andrechek, along with his doctoral student Daniel Hollern, analyzed 1,172 mouse mammary tumor samples from 26 different preclinical models and were able to compile a database to show which strains of mice were best suited to



**Left:** Eran Andrechek, was recently featured in the respected journal, *Breast Cancer Research* for the development of a database analyzing mouse mammary tumor samples.

study a particular type of human breast cancer. The study and database link can now be found in the journal *Breast Cancer Research*, <http://breast-cancer-research.com/content/16/3/R59>.

“We found that the vast majority of human breast cancers can be represented by one of the strains we studied,” Andrechek said. “But these models have to be chosen very carefully.”

The research highlights the ways these models should be used to study the disease and Andrechek’s new database could prove to be a valuable resource to researchers around the world.

As of now, predictions about which signaling pathways were important in various tumors are currently being tested genetically by Andrechek and his team. This has also led to tests of what therapies might be affected in subtypes of breast cancer. In addition, other advances in methods for database analysis have allowed them to address new questions in the database for how regions of chromosomal gain/loss represent human breast cancer.

“There are definitely clear parallels between mice and men in relation to breast cancer and this study provides legitimacy to using these models so ultimately a cure can be found,” Andrechek said.

The National Cancer Institute of the National Institutes of Health and Susan G. Komen Foundation funded the study.



**Above and right:** A mouse tumor related to breast cancer is viewed under a microscope by MSU doctoral student, Daniel Hollern.



Photos by G.L. Kohuth, MSU University Relations.

# IIT AFFILIATES SHINE AT 54<sup>TH</sup> SOT MEETING

Students and faculty of the MSU Institute for Integrative Toxicology were highly honored at 2015's 54th annual Society of Toxicology (SOT) meeting in San Diego, California with numerous abstracts presented and many special honors awarded.

The SOT annual meeting is the largest toxicology meeting and exhibition in the world, attracting more than 7,000 scientists from industry, academia, and government from various countries around the globe. This year's meeting was held March 22 – 26, 2015 at the San Diego Convention Center.

The following students in the MSU-IIT's Environmental and Integrative Toxicological Sciences (EITS) training program received awards or honors:

» **Alexandra Colón Rodríguez**, training with Dr. Bill Atchison, received the Women in Toxicology SIG Graduate Student Achievement Award from the SOT for her abstract, "In vivo methylmercury exposure alters glutamate receptor mRNA levels in rat forebrain."

» **Kelly Fader**, training with Dr. Timothy Zacharewski, received the Molecular and Systems Biology Specialty Section's 1<sup>st</sup> place Graduate Student Research Award for her abstract, "The role of the intestine in TCDD-mediated steatohepatitis in C57BL/6 mice."

» **Nikita Joshi**, training with Dr. James Luyendyk, was a recipient of the Dr. Laxman Desai Graduate Student Best Abstract Award from the Association of Scientists of Indian Origin SIG for her abstract titled, "Fibrin(ogen) Engagement of  $\alpha\beta 2$ -Integrin Limits Chronic Liver Fibrosis Induced by a Bile Duct Toxicant in Mice." She also received 2<sup>nd</sup> place for the Carl C. Smith Graduate Student Award from the Mechanisms Specialty Section of the SOT.

» **Alexandra Turley**, training with Dr. Cheryl Rockwell, won the Frank C. Lu Food Safety Student Award from the Food Safety Specialty Section and the 2<sup>nd</sup> place Immunotoxicology Specialty Sec-

tion Student Presentation award for her abstract, "The Food Additive tBHQ Inhibits Activation of Primary Human CD4 T Cells."

Postdoctoral student, **Dr. Anna Kopec**, from the lab of Dr. James Luyendyk, was the winner of the Gabriel Plaa Education Award and the 2<sup>nd</sup> place Postdoctoral Travel Award from the Mechanisms Specialty Section. She also received the 3<sup>rd</sup> place Postdoctoral Travel Award from the Molecular and Systems Biology Specialty Section for her abstract, "Role of fibrin(ogen) in hepatocyte proliferation after acetaminophen overdose."

**Anna Wojcicki**, undergraduate in the lab of Dr. James Luyendyk, received the Pfizer SOT Undergraduate Travel Award and the Committee on Diversity Undergraduate Travel Award for her abstract, "Acetaminophen Increases Hepatocyte Tissue Factor Procoagulant Activity In Vitro."

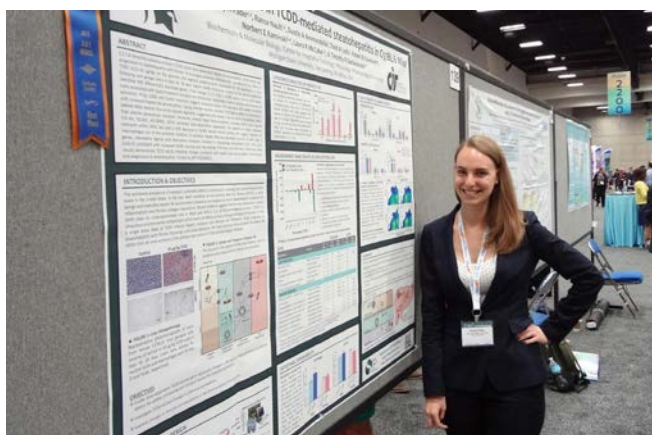
**Jamie Bernard**, CIT-affiliated faculty member, received the Carcinogenesis Specialty Section Fellowship. 🌟



**Top Left:** IIT-affiliated faculty member, Dr. James Luyendyk with two SOT award winners from his lab, Dr. Anna Kopec and EITS graduate student Nikita Joshi.

**Top Right:** IIT-affiliated faculty member, Dr. Jamie Bernard receiving her award from MSU alumnus Elaine Faustman from the Carcinogenesis Specialty Section.

**Bottom Left:** EITS Graduate student Kelly Fader next to her award-winning presentation.



# WU FEATURED IN THE JOURNAL NATURE: TIME TO FACE THE FUNGAL THREAT

A perspective by IIT-affiliated faculty member, **Felicia Wu**, John A. Hannah Distinguished Professor in the Department of Food Science and Human Nutrition and the Department of Agricultural, Food and Resource Economics, was recently featured in the journal *Nature*. "Perspective: Time to face the fungal threat" outlined some of Wu's most recent work on aflatoxins, a deadly carcinogenic toxin that is produced by certain molds that can grow on corn, pistachios and peanuts. Aflatoxin is responsible for up to 28 percent of liver cancer cases worldwide, with the majority of cases occurring in sub-Saharan Africa, Southeast Asia and China. In addition to liver cancer, aflatoxin has been associated with acute poisoning, immune system dysfunction and stunted growth in children. The article summarizes several years of work by Wu and her team to identify cost-effective and feasible aflatoxin prevention methods in developing countries.

Wu believes aflatoxin-induced liver cancer can be prevented, but it will take a coordinated effort of immunization, agricultural practices and dietary diversity. Widespread vaccination against hepatitis B virus would rob the toxin of its partner in carcinogenicity. The farmers growing these crops also are part of the solution – stressed plants are more vulnerable to mold, so a healthy field of crops is the best prevention against



**Left:** Felicia Wu was recently featured in the journal *Nature* for her piece, "Perspective: Time to face the fungal threat."

contamination. Storage is also important. The fungi that produce aflatoxin thrive in damp conditions and can be easily transported by insects and rodents that are common in storage conditions worldwide. Lastly Wu notes, "Simply introducing a more diverse diet can reduce the risk of aflatoxin-induced liver cancer in populations that traditionally have relied on maize and peanuts, but it also serves another purpose – essential compounds in leafy greens and cruciferous vegetables can actually help negate dietary toxins."

Looking forward, Wu has two main thrusts for the next steps of her research in aflatoxin. The first is to determine the role of aflatoxin in child stunting through two different child cohorts in Tanzania and Nepal, funded by the Bill

and Melissa Gates Foundation. The study will control for nutritional factors, diarrheal disease, and maternal factors. The second thrust is to determine whether aflatoxin and malaria severity are correlated in children in Uganda and Malawi. The possible mechanism is immunology-related. This work is sponsored by MSU's Center for Health Impacts of Agriculture (CHIA), an initiative that ties the study of global food supply, agriculture and nutrition to the study of human health. Wu is co-director of the center which was started this past year. Her research is also funded by the National Institutes of Health, the Bill and Melinda Gates Foundation, USAID, and the USDA. 🌱

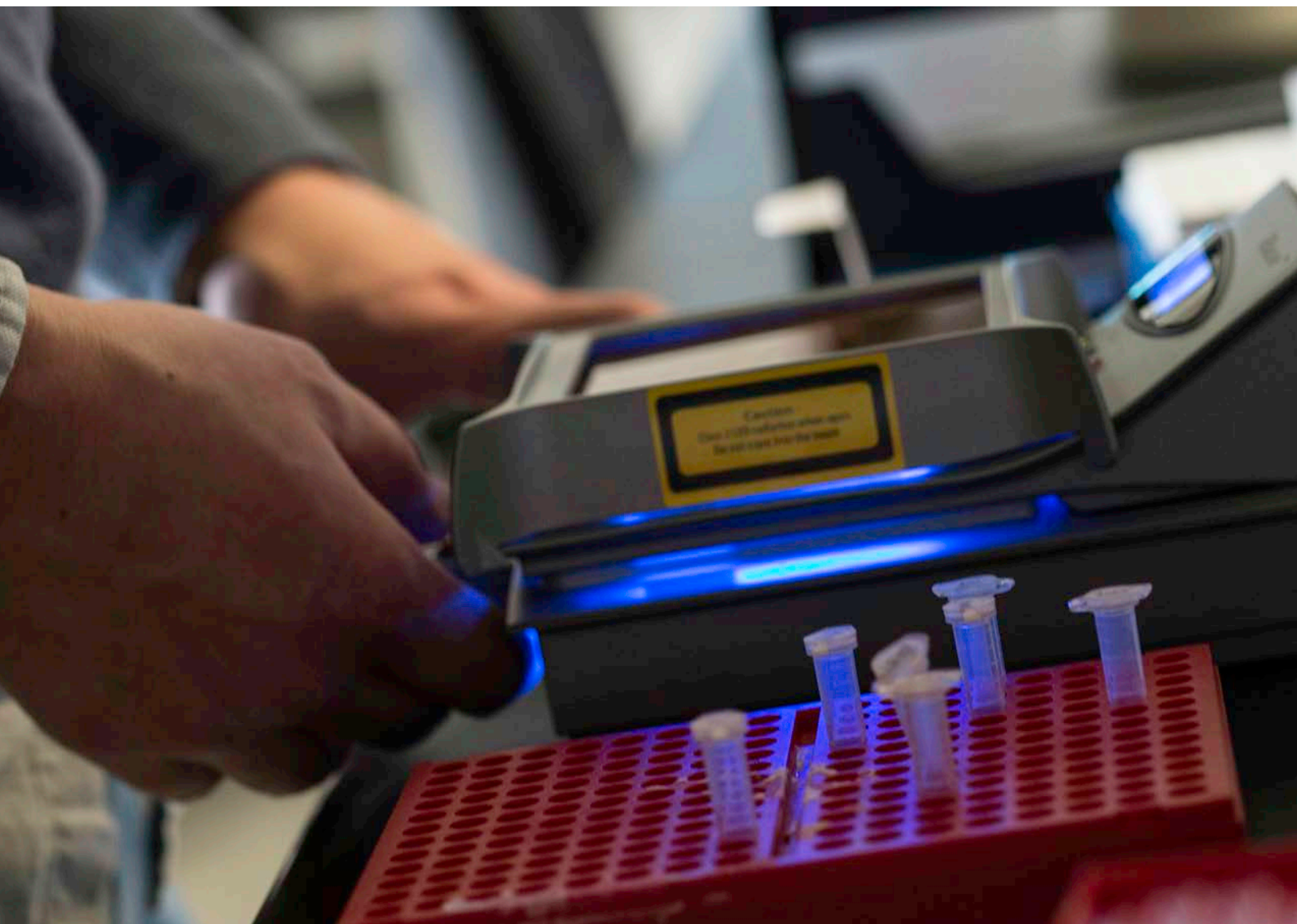
## ACHIEVEMENTS BY IIT STUDENTS



**Phillip T. Brooks**, EITS student in the lab of Dr. Linda Mansfield, was awarded Best Oral Presentation by a Ph.D. student at the 2014 Phi Zeta Research Day held by the College of Veterinary Medicine. The title of Brooks' presentation was "Characterization of *Campylobacter Jejuni* infection in C57BL/6 IL-10<sup>-/-</sup> Mice with Conventional or Antibiotic Treated Microbiota."



**Peter Dornbos**, working with Superfund investigators, Dr. John LaPres and Dr. Norbert Kaminski, received the Best Poster Presentation Award in the Biomedical category at the 2014 NIEHS Superfund Annual Meeting. His presentation was titled, "The Effects of Genetic Variability on the Shape of a Dose-Response Curve: 2,3,7,8 Tetrachlorodibenzo-p-dioxin (TCDD) Induced Suppression of CD40L-Activated Human Primary B Cells."



## Faculty PUBLICATIONS

*During the 2014-2015 academic year, IIT affiliated faculty published more than 200 peer-reviewed articles. As a result, the IIT, and MSU research, has been highly visible in prominent peer-reviewed literature.*





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## Faculty FUNDING

*The IIT and its affiliated faculty maintained a longstanding tradition of external research funding with over \$18 million accepted by the MSU Board of Trustees during the past fiscal year. The majority of the amounts listed here represent just one year in a multi-year award cycle, ensuring that a high level of funding for toxicology will continue in the near future.*

### Andrea Amalfitano

- » \$231,662; ER-localized aminopeptidases in ankylosing spondylitis; NIH/PHS
- » \$92,848; Novel vaccine targeting clostridium difficile using the adjuvant cyclic di-GMP; NIH/PHS
- » \$57,651; Novel Immunomodulating Therapeutics; Michigan Initiative for Innovation and Entrepreneurship

### Eran Andrechek

- » \$298,204; Dissecting Tumor Heterogeneity by Analyzing Signaling Pathway Requirements; NIH/PHS
- » \$33,600; Illuminating the E2F Transcription Factors Control of Breast Cancer Metastasis; NIH/PHS
- » \$38,465; Using a Systems Biology Approach to Block Breast Cancer Metastasis; Association for International Cancer Research
- » \$40,000; Identification of driver mutations that regulate metastasis; Metavivor Research & Support, Inc.

### William Atchison

- » \$278,904; Research Experience in Structural and Functional Neural Biology for Undergraduates; National Science Foundation
- » \$41,473; First Time Summer Research Experience in Environmental Health Sciences; NIH/PHS
- » \$9,000; American Society for Pharmacology and Experimental Therapeutics (ASPET) Summer Undergraduate Research Fellowships (SURF); American Society for Pharmacology & Experimental Therapeutics
- » \$28,826; Purinergic neurotransmission in the gut; NIH/PHS
- » \$319,212; Bridge to the PhD in Neuroscience; NIH/PHS

### Stephen Boyd

- » \$98,525; Bioavailability of tetracyclines in water and soil to bacteria for expressing antibiotic resistance response; National Science Foundation
- » \$560,197; Environmental Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS

### John Buchweitz

- » \$17,574; Cyanide Testing; US Dept of Air Force

### Steven Bursian

- » \$7,000; Research - Gift - Assessment of diflubenzuron as a Feed-Through Iar; USA Fur Commission
- » \$55,111; The Toxicity and Other Adverse Impacts of Exposure to Selected Crude Oils to Gulf of Mexico Birds; Stratus Consulting

### Bryan Copple

- » \$116,206; Novel mechanisms stimulating liver repair after acetaminophen overdose; NIH/PHS

### Susan Ewart

- » \$2,000; 2015 Merial Veterinary Scholars Summer Research Program; Merial Limited
- » \$18,455; Short-term biomedical research training program for veterinary students; NIH/PHS
- » \$7,938; Veterinary Research Student Training Program: Building Capacity; NIH/PHS
- » \$122,945; Transgenerational epigenetic inheritance of allergy in a multigenerational cohort; University of Memphis

### Jay Goodman

- » \$280,098; Environmental Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS

### John Goudreau

- » \$16,432; BDNF Polymorphism and PD Progression in DATATOP; Michael J. Fox Foundation
- » \$37,375; A Phase 3 Double-Blind, Placebo Controlled, Parallel Group Study of Isradipine as a Disease Modifying Agent in Subjects with Early Parkinson Disease; Northwestern University
- » \$9,901; A Phase 2, Randomized, Double-blind, placebo-controlled, multiple dose, parallel group study to evaluate the pharmacodynamics, efficacy and safety of RM-131 administered to patients with Parkinson's Disease and chronic constipation dissatisfied with current therapy; University of Rochester

### Jack Harkema

- » \$814,046; Great Lakes Air Center for Integrative Environmental Research (GLACIER); Environmental Protection Agency
- » \$155,881; Nasal Responses of Rodents to Episodic Inhalation Exposures to Ethylene (Study1); American Chemistry Council
- » \$25,000; Morphometric Examination of Neoplastic and Nonneoplastic Lesions in Nasal Airways of Rats Exposed to Furfuryl Alcohol; toXcel LLC
- » \$120,204; Vinyl Acetate: Evaluation of n2-ethyl dG DNA adducts and epithelial cell proliferation in nasal airways of Crl:CD(SD) rats repeatedly exposed to vinyl acetate vapors; Vinyl Acetate Council

### Syed Hashsham

- » \$504,177; Environmental Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS
- » \$34,772; Development of Field Methodology to Rapidly Detect Dehalococcoides and Deha-





lobacter Spp. Genes On-Site; US Dept of Army

### Robert Hollingworth

- » \$489,376; NC Region IR4 Minor Crop Pest Management; USDA – National Institute of Food and Agriculture

### A. Daniel Jones III

- » \$99,993; Characterization of Related Impurities in Antibiotics; US Pharmacopeial

### Norbert Kaminski

- » \$869,504; A Characterization of Species-Dependent Sensitivity of B Cell Function to Modulation by 2,3,7,8-Tetrachlorodibenzo-p-dioxin; Dow Chemical Co.
- » \$165,085; Impaired B cell Activation/Differentiation via Sustained BCL6 Expression by TCDD; NIH/PHS
- » \$784,275; Environmental, Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS
- » \$112,776; Immunotoxicology of Chronic Exposure to Estrogenic Bisphenol-A; NIH/PHS

### John Kaneene

- » \$169,734; Capacity building in Integrated Management of Transboundary Animal Diseases and Zoonoses (CIMTRADZ); Mississippi State University

### John LaPres

- » \$560,197; Environmental, Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS
- » \$64,162; MSU BEST: Integrated Biomedical Training for Multiple Career Options; NIH/PHS

### Gina Leininger

- » \$245,077; Lateral Hypothalamic Leptin Receptor-Neurotensin Neurons in Energy Balance;

NIH/PHS

- » \$323,829; Role of Lateral Hypothalamic Neurotensin Signaling in Energy Balance and Obesity; University of Michigan

### Hui Li

- » \$448,157; Environmental, Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS
- » \$8,241; Removal of pharmaceuticals and nutrients from agricultural drainage water using nano-engineered porous ceramic media; Metamateria Technologies LLC
- » \$98,525; Bioavailability of tetracyclines in water and soil to bacteria for expressing antibiotic resistance response; National Science Foundation

### James Luyendyk

- » \$243,376; Mechanisms of fibrosis exacerbation by trichloroethylene in hepatic autoimmunity; NIH/PHS
- » \$65,148; Identification of caspase-driven procoagulant responses in hepatic apoptosis; Conatus Pharmaceuticals Inc.
- » \$17,774; First Time Summer Research Experience in Environmental Health Sciences; NIH/PHS
- » \$235,934; Novel mechanisms stimulating liver repair after acetaminophen overdose; NIH/PHS

### Linda Mansfield

- » \$634,574; ERIN CRC: Host-microbiota-pathogen interactions govern enteric health and disease; NATL INST OF ALLERGY & INFEC DIS –NIH
- » \$18,454; Short-term biomedical research training program for veterinary students; NIH/PHS
- » \$2,000; 2015 Merial Veterinary Scholars Summer Research Program; Merial Limited

### Michelle Mazei-Robison

- » \$115,124; A Novel Emotional Stress Model of Co-morbid Opiate Use and Mood Disorders; NIH/PHS

### Laura McCabe

- » \$406,371; Mechanistic basis of probiotic prevention of osteoporosis; NIH/PHS
- » \$55,725; GPCR Kinase-5 in Inflammatory Bowel Disease; NIH/PHS
- » \$233,104; The role of the gut and bone microenvironment in T1D bone loss; NIH/PHS

### Thomas Mullaney

- » \$8,800; 2014 Classical Swine Fever Surveillance; US Dept of Agriculture
- » \$63,800; 2014 Member Laboratory Cooperative Agreement 14-9419-0332; US Dept of Agriculture
- » \$6,249; Services for Allergan - DCPAH, app 134514; Allergan
- » \$97,400; Bioterrorism Preparedness - Diagnostic Ctr for Population and Animal Health; MI Dept of Community Health
- » \$16,500; Michigan State University DCPAH VetLRN 2012; Food and Drug Administration – PHS

### Cheryl Murphy

- » \$70,300; Cell-Free Neurochemical Screening Assays to Predict Adverse Effects in Mammals, Fish, and Birds; Regents of the University of Michigan

### L. Karl Olson

- » \$29,525; Life Course Energy Balance and Breast Cancer Risk in Black/White Women under 50; National Cancer Institute – NIH/PHS
- » \$274,998; Inflammatory lipid biomarkers for early detection of beta cell autoimmunity; Juvenile Diabetes Research Foundation

### Nigel Paneth

- » \$41,160; Neonatal Biomarkers in Extremity Preterm Babies Predict Childhood Brain Disorders; Boston Medical Center
- » \$34,000; Data Coordinating Center for Autism & Other Developmental Disabilities: SEED I&II; Centers for Disease Control and Prevention
- » \$191,909; Training Program in Perinatal Epidemiology; NIH/PHS
- » \$43,350; Distinguished Research Award for Cerebral Palsy Research; Research Foundation of Cerebral Palsy Alliance
- » \$3,000; The Michigan Bloodspot Environmental Epidemiology Project; Regents of the University of Michigan
- » \$25,000; Integrated Proteomics and Genomics Analysis of Newborn Blood Spots; University of Michigan
- » \$5,222; Are Live Births Endogenous and Does it Matter?; NIH/PHS

### James Pestka

- » \$125,812; Application of Hormonal Biomarkers for DON-3-Glucoside Risk Assessment; US Dept of Agriculture, Agricultural Research Service

### Kenneth Rosenman

- » \$893,629; Expanded Program in Occupational Injury and Illness Surveillance; Centers for Disease Control and Prevention
- » \$46,000; AOEC Exposure Code System Updates; Association Occupational & Environment Clinics
- » \$90,000; Michigan AgrAbility; US Dept of Agriculture
- » \$45,000; Healthy Herd Management: Worker Health and Safety; Michigan Dept of Licensing & Regulatory Affairs
- » \$6,000; Fatality Assessment

and control Evaluation (FACE); Michigan Farm Bureau

### Robert Roth

- » \$376,865; Multidisciplinary Training in Environmental Toxicology; National Institute of Environmental Health Sciences -NIH/PHS

### James Sikarskie

- » \$2,000; Investigation of Contributing Factors of Morbidity and Mortality in Brown Pelicans and Double-Crested Cormorants in Southwest Florida; Morris Animal Foundation

### Greg Swain

- » \$28,826; Purinergic neurotransmission in the gut; NIH/PHS
- » \$69,449; Purchase of a Raman and Photoluminescence Imaging System for the Characterization of Advanced Electrochemical and Electronic Materials; Air Force Office of Scientific Research
- » \$135,000; REU Site: Cross-Disciplinary Training in Sustainable Chemistry and Chemical Processes; National Science Foundation
- » \$162,000; Electrochemistry of Nanostructured Carbon Electrodes in Room-Temperature Ionic Liquids; US Army Research Office
- » \$166,165; Galvanic Corrosion of Aluminum Alloys and Carbon Composites - Correlation between Corrosion Status and Mechanical Fatigue; US Office of Naval Research
- » \$6,000; Supplement to W11NF-12-R-0011 for a High School and Undergraduate Student Apprentice; US Army Research Office
- » \$82,128; Neurohumoral control of arteries and veins in obesity-associated hypertension; National Heart Lung Blood Institute

### Brian Teppen

- » \$560,196; Environmental, Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS
- » \$65,682; Bioavailability of tetracyclines in water and soil to bacteria for expressing antibiotic resistance response; National Science Foundation

### James Tiedje

- » \$145,701; Collaborative research ABI Development: Beyond ribosomal rRNA genes: Community tools for analysis of whole-genomes and metagenomes; National Science Foundation
- » \$65,682; Bioavailability of tetracyclines in water and soil to bacteria for expressing antibiotic resistance response; National Science Foundation
- » \$58,649; The Ribosomal Database Project: Sequences and Tools for Microbial Analysis; US Dept of Energy
- » \$24,631; ERIN CRC: Host-microbiota-pathogen interactions govern enteric health and disease; National Institute of Allergy and Infectious Disease -NIH
- » \$616,213; Environmental, Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS
- » \$246,361; From structure to functions: Metagenomics-enabled predictive understanding of soil microbial feedbacks to climate change; University of Oklahoma

### Bruce Uhal

- » \$3,485; Role of Angiotensin Converting Enzyme 2 (ACE 2) in Human Alveolar Epithelial Cell and Neonatal Mice Lung Explants Injury by Hyperoxia; Sparrow Hospital
- » \$5,000; Hypoxia Upregulates Antiotensin Converting Enzyme-2 (Ace-2) in Fetal Neona-



tal and Adult Lung Cells; American Academy of Pediatrics

- » \$21,600; Angiotensin Blockers in Cystic Fibrosis; Cystic Fibrosis Foundation

### Brad Upham

- » \$448,157; Environmental, Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS

### Thomas Voice

- » \$38,067; PIRE: Water and Commerce: Technologies to Enable environmental sustainability in global markets; Duke University

### James Wagner

- » \$651,237; Great Lakes Air Center for Integrative Environmental Research (GLACIER); Environmental Protection Agency

### Felicia Wu

- » \$11,176; The Effect of Aflatoxin Regulation on Global Liver Cancer Risks; NIH/PHS

### Timothy Zacharewski

- » \$560,196; Environmental, Microbial and Mammalian Biomolecular Responses to AhR Ligands; NIH/PHS
- » \$49,938; Quantitative Histological Analysis Tool Development; NIH/PHS

### Wei Zhang

- » \$16,484; Removal of pharmaceuticals and nutrients from agricultural drainage water using nano-engineered porous ceramic media; Metamateria Technologies LLC
- » \$20,000; Managing Pythium attachment and detachment on fresh vegetables; Cornell University

### Matthew Zwiernik

- » \$297,886; Washington Ground Squirrel Monitoring at Naval Weapons Systems Training Facility Boardman, Morrow County, Oregon; Army US Corps of Engineers
- » \$107,190; Quantifying the Spatial

and Temporal Changes in San Clemente Island Vegetation Between 1985 and Present, Using Historical Imagery and Dynamic Plant Modeling; Army US Corps of Engineers

- » \$47,500; Gift; Dow Chemical Co.



## Professional Service of **FACULTY**

*The affiliated faculty of the IIT participate in many external activities that promote the development of research and science in their chosen field. These activities include editorial boards, review groups or study sections, scientific advisory boards and committees, and officers in scientific societies.*



## Eran Andrechek

- » Member, Department of Defense Study Section

## Leslie Bourquin

- » Chair, NSF International Global Food Safety Advisory Council
- » Technical Committee Member, World Bank Global Food Safety Partnership
- » Consumer Goods Forum, Global Food Safety Initiative, GFSI Technical Committee Member
- » Advisory Council Member, International Food Protection Training Institute (IFPTI)
- » Editorial Board, Foods Journal

## Dan Bronstein

- » Member, Council, Section K (Social, political and economic science) American Association for the Advancement of Science
- » Member, Environmental Quality Committee, American Bar Association

## John Buchweitz

- » Member, Technical Advisory Group for Michigan Department of Environmental Quality, Generic Cleanup Criteria - Part 201 Environmental Remediation
- » Member-at-large, AOAC Central Section Executive Committee
- » Representative, MISOT K-12 Education Committee

## Steven Bursian

- » Editorial Board, Journal of Toxicology
- » Member, Health Advisory Board of NSF International

## Stephan Carey

- » President-Elect, Veterinary Comparative Respiratory Society
- » Member, Early Faculty and Fellows Subcommittee, Environmental and Occupational Health Assembly, The American Thoracic Society
- » Ad Hoc Reviewer: The Veterinary Journal, Journal of Veterinary Internal Medicine, Toxicology and Applied Pharmacology

## Bryan Copple

- » NIH Study Section, ZRG1 DKUS-N (10) B Small Business: Digestive Sciences

## Susan Ewart

- » National Institutes of Health; Allergy, Immunology, and

Transplantation Research Committee (AITC) reviewer, standing committee member

## Patricia Ganey

- » Editorial Board, Journal of Pharmacology and Experimental Therapeutics
- » Editorial Board, Journal of Toxicology and Environmental Health
- » Editorial Board, Toxicology
- » Member, Society of Toxicology Board of Publications
- » Vice President-Elect, Society of Toxicology

## Jay Goodman

- » Editorial Board, Toxicology
- » Member, Board of Scientific Councilors, National Institute of Environmental Health Sciences
- » Board of Trustees Member: International Life Sciences Institute (ILSI); LSI Health and Environmental Sciences Institute (HESI); The Toxicology Forum

## John Goudreau

- » Chair, COMLEX Level 2 Committee National Board of Osteopathic Medical Examiners
- » Chair, Clinical Decision Making Task Force, National Board of Osteopathic Medical Examiners
- » Chair, Cognitive Testing Advisory Committee, National Board of Osteopathic Medical Examiners
- » Composite Committee, National Board of Osteopathic Medical Examiners
- » Blue Ribbon Advisory Panel: Advancing National Board Certification Examinations, National Board of Osteopathic Medical Examiners
- » COMVEX Committee, National Board of Osteopathic Medical Examiners
- » NSD-B Study Section, National Institutes for Neurological Disorders and Stroke
- » NIH Udall Center for Parkinson Disease Research Excellence Special Review Group
- » NINDS Panel on Optimizing the Predictive Value of Preclinical Research
- » Professional Advisory Board, Michigan Parkinson Foundation
- » Credentialing Committee, Parkinson Study Group
- » Recruitment Committee, NINDS, NET-PD FZ-ZONE Study

## Brian Gulbransen

- » Trainee Development Committee, American Physiological Society GI & Liver Physiology Section

- » Membership committee, American Society of Neurochemistry (ASN)
- » Member, American Neurogastroenterology and Motility Society (ANMS), American Gastroenterological Society (AGA), Michigan Physiological Society (MPS) and American Physiological Society (APS)
- » Editor, Purinergic Signalling
- » Editor, Frontiers Autonomic Neuroscience
- » Editor, Frontiers in Cellular Neuroscience
- » Guest Associate Editor, Frontiers in Cellular Neuroscience Research Topic
- » Guest Editor, BioMed Research International

### Jack Harkema

- » Editorial Board, Journal of Experimental and Toxicologic Pathology
- » Director, EPA Great Lakes Air Center for Integrated Environmental Research
- » Member, Directors of EPA Clean Air Research Centers
- » Member, Science Advisory Committee, Harvard University Clean Air Research Center, Boston, MA
- » Chairperson, Science Advisory Committee, California National Primate Research Center, Davis, CA
- » Member, EPA Clean Air Science Advisory Committee
- » Member, Board of Scientific Advisors, National Toxicology Program, NIEHS/NIH
- » Councilor, Executive Committee of the Society of Toxicologic Pathologists
- » Editorial Board, Journal of Toxicologic Pathology

### Syed Hashsham

- » Reviewer, National Institute of Environmental Health Sciences Special Emphasis Panel, NIEHS
- » Reviewer, NIH's SBIR/STTR Panel
- » Member, Editorial Board, Bioterrorism and Biodefense Journal

### A Wallace Hayes

- » Editor-in-Chief: Food and Chemical Toxicology; Ocular and Cutaneous Toxicology
- » Editor for the Americas, Human and Experimental Toxicology
- » Member, Globalization Committee, American Board of Toxicology
- » Member, US Food and Drug Administration, Food Advisory Committee
- » Invited Speaker, Workshop on GRAS Determinations, International Society of Regulatory Toxicology and

Pharmacology, Washington, DC.

- » Subject Matter Expert, Member Panel on Update and Validate Risk Ranking Model to Inform High Risk Food List, Institute of Food Technologists (US FDA Project)
- » Chair, Systems Toxicology: Future of Risk Assessment. 7th International Congress of Asian Society of Toxicology, Jeju Island, South Korea

### Colleen Cosgrove Hegg

- » Reviewer, NIH NIDCD Fellowship Application review
- » Co-Chair, Judging, College of Veterinary Medicine Phi Zeta Research Day
- » Advocate in Science, Susan G. Komen for the Cure National Panel for Grant Review
- » Officer, SOT Stem Cell Specialty Section

### Robert Hollingworth

- » Editorial Board, Insecticide Resistance Newsletter
- » Officer, Agrochemicals Division, American Chemical Society
- » Member, National Research Council Panel to Review California Department of Pesticide Regulation's Risk Assessment Procedures

### A. Daniel Jones

- » NIH Panel, Bioengineering Sciences and Technologies, ZRGI BST-F (80) A
- » External Advisory Committee, UC Davis NIEHS Superfund Basic Research Program
- » Review Editor, Frontiers in Plant Metabolism and Chemodiversity
- » Founding Advisory Board Member, North American Affiliate Chapter of the Metabolomics Society

### Norbert Kaminski

- » President, Society of Toxicology
- » NIEHS National Advisory Environmental Health Sciences Council
- » Editorial Board, Toxicology
- » External Advisory Committee, Oregon State University Superfund Center Grant
- » Chair, External Review Committee, Interdisciplinary Program in Toxicology, Texas A&M University

### John Kaneene

- » Member, Tanzania Partnership Program Committee
- » Member, Institute of International Health Committee
- » Reviewer, Engineer Research and Development Center



## John LaPres

- » Director, BioMolecular Sciences Recruiting Program
- » Associate Editor, Toxicology Reports
- » National Toxicology Program: Special Emphasis Panel to review Draft Report on Carinogens Monograph on Cobalt and Certain Cobalt Compounds

## Gina Leininger

- » Reviewer, Pharmacology, Biochemistry and Behavior, PLOS Genetics, Obesity, Diabetes, International Journal of Obesity, Endocrine, Endocrinology, Molecular Metabolism, Nature
- » The Endocrine Society Annual Meeting Steering Committee
- » Abstract Reviewer, The Obesity Society
- » Early Career Reviewer, NIH - Neuroendocrinology, Neuroimmunology, Rhythms and Sleep (NNRS) Study Section
- » Ad Hoc Reviewer, Integrative Physiology of Obesity and Diabetes (IPOD), NSF
- » Ad Hoc Reviewer, Michigan Diabetes Research Center

## Hui Li

- » Associate Editor, Journal of Environmental Quality, Awarded Outstanding Associate Editor 2013-2014
- » Proposal Review Panels, USDA and NSF

## Ning Li

- » Editorial Board, Journal of Environmental Immunology and Toxicology

## James Luyendyk

- » Editorial Board: Arteriosclerosis, Thrombosis and Vascular Biology; Toxicological Sciences; Journal of Biochemical and Molecular Toxicology
- » Task Force on Scientific Events and Special Programs, American Society for Investigative Pathology
- » Education Committee, Society of Toxicology
- » Councilor, Michigan Regional Chapter of the Society of Toxicology
- » Chairperson, Graduate Education Subcommittee, Society of Toxicology

## Laura McCabe

- » Scientific and Medical Advisory Panel Member, Melorheostosis Association
- » Research Advisory Committee, Orthopedic Clinical

Research Center, Ingham Regional Medical Center

- » Michigan Chapter Medical Advisory Committee, Crohn's and Colitis Foundation of America
- » Michigan Diabetes Research and Training Center/Translational Research Pilot and Feasibility Grants Program Advisory Council
- » Research and Funding Advocacy Committee, American Society of Bone and Mineral Research (ASBMR)
- » Associate Editor: Journal of Cellular Biochemistry, Molecular Biology Reports, World Journal of Diabetes
- » Review Board: Journal of Pediatric Biochemistry

## Cheryl Murphy

- » Editorial Board, Ecotoxicology
- » Scientific Advisory Panel, Federal Insecticide, Fungicide, and Rodenticide Act, EPA

## L. Karl Olson

- » Merit Review Panel for Endocrinology-A, Department of Veterans Affairs
- » Ad Hoc Reviewer, Special Emphasis Panel, NIH/NIDDK

## Nigel Paneth

- » National Scientific Advisory Committee, March of Dimes Foundation
- » External Advisory Committee, University of Pennsylvania MPH Program
- » Scientific and Editorial Board, Supercourse in Epidemiology, University of Pittsburgh
- » Scientific Advisory Group, Norwegian Mother and child Cohort (MoBa) and Danish National Birth Cohort (DNCB) combined cerebral palsy study (MOBAND)
- » Member, NIH panel to review the study section structure of the "Health of the Population" Integrated Review Group of NIH CSR

## Ed Robinson

- » Member, Editorial advisory board, Equine Veterinary Journal
- » Member, Scientific advisory Board, Animal Health Trust, Newmarket, UK

## Cheryl Rockwell

- » Member, Education Committee, Immunotoxicology Specialty Section, SOT
- » Junior Councilor, Immunotoxicology Specialty Section, SOT
- » Councilor, Michigan Regional Chapter, SOT
- » Editorial Board, Pharmacological Research

### Kenneth Rosenman

- » Co-Leader, Occupational Health Work Group, Conference of State and Territorial Epidemiologists
- » Member, Board of Directors of the Michigan Occupational and Environmental Medical Association
- » Member, Michigan State Medical Society Liason Committee with Public Health

### Robert Roth

- » Editorial Board, Toxicology and Applied Pharmacology
- » Editorial Board, Journal of Toxicology and Environmental Health
- » Associate Editor, Journal of Pharmacology and Experimental Therapeutics
- » Member/Consultant, Technical Committee on the Application of Genomics to Mechanism-based Risk Assessment, ILSI, Health and Environmental Sciences Institute (HESI)
- » Member, NIH Study Section: Xenobiotic and Nutrient Disposition and Action

### J. Craig Rowlands

- » Chair, American Chemistry Council, Public Health and Science Policy Sub-team, Science Integrity and Risk Assessment Working Group
- » Member, of American Chemistry Council, Public Health and Science Policy Sub-team, Computational Toxicology Working Group
- » Member, American Chemistry Council, Center for the Advancement of Risk Assessment Science and Policy
- » Member, Board of Trustees, International Life Sciences Institute, Health and Environmental Sciences Institute
- » Steering Committee Member, International Life Sciences Institute, Health and Environmental Sciences Institute, Risk2I Project
- » Co-chair, International Life Sciences Institute, Health and Environmental Sciences Institute, Risk2I Project, DoseResponse sub-team
- » Chair, Society of Toxicology, Continuing Education Committee
- » Vice President Elect, Society of Toxicology, Molecular Biology Specialty Section
- » Editorial Board, Journal of Biochemical and Molecular Toxicology
- » Editorial Board, ISRN Toxicology

### James Sikarskie

- » Member of the AVMA's Committee on Environmental Issues representing at AAWV and AAZW
- » Member, Michigan Veterinary Medical Association's Public Health Committee and the State of Michigan's Rabies Working Group
- » Manuscript Reviewer, Journal of wildlife Diseases and Journal of Zoo and Wildlife Medicine
- » Planning Committee Member, Annual Michigan Veterinary Conference
- » Member, Animal Welfare Committee, Binder Park Zoo, Battle Creek, MI

### Brian Teppen

- » NIEHS Review Panel ES-13-010: Biogeochemical Interactions Affecting Bioavailability for in situ Remediation of Hazardous Substances (R01)

### James Tiedje

- » National Resource Council Committee on Preparedness for Artic Ocean Oil Spills
- » Center for Environmental and Agricultural Microbiology, Chr Advisory Committee
- » Environmental Molecular Sciences Lab, Pacific Northwest National Laboratory, Science Advisory Committee
- » Joint Genome Institute, Science Advisory Committee
- » Berkeley National Laboratory, Bioscience External Science Advisory Committee
- » Treasurer and Executive Committee, American Society for Microbiology
- » Section Chair, National Academy of Sciences
- » Hannah Chair Search in Water Science/Engineering
- » MMG Search for Microbial Ecology Related to Infectious Disease
- » PSM Soil Biology Search Committee
- » Chair, PSM Department Advisory Committee

### Bruce Uhal

- » Executive Guest Editor, Current Pharmaceutical Design
- » Member, Frontiers in Pediatrics

### Brad Upham

- » Co- Chair-Fundraising, In Vitro Animal Cell Science Section, Society of In Vitro Biology (SIVB)
- » Associate Editor: BioMed Research International
- » Associate Editor: Journal of Toxicology
- » Reviewer for NIEHS Study Section: "P50-Centers for Children's Environmental Health & Disease Prevention Centers (RFA-ES-14-002)





- » Reviewer for Wayne State University's "Center for Urban responses to Environmental Stressors (CURES)" Pilot Project Program
- » Co-Convener with Dr. Mathieu Vinken for a symposium titled "The Role of Connexin-Based Channels in Toxicity" at the 2015 Annual Meeting of the Society of Toxicology
- » Co-Convener with Dr. Sukhpreet Sandhu for a plenary session titled "Epigenetic Control of Phenotypic Gene Expression" at the 2015 Annual Meeting of the Society of In Vitro Biology

### Almudena Veiga-Lopez

- » Ad hoc Grant Reviewer, Pilot Grant Program, Michigan Institute for Clinical & Health Research, University of Michigan
- » Ad hoc Grant Reviewer, Pilot Projects Program, Center for Environmental Genetics, University of Cincinnati
- » Ad hoc Abstract Reviewer, 97th Endocrine Society Annual Meeting
- » Ad hoc Grant Reviewer, Medical Research Council (MRC) Grant Reviewer, UK

### James Wagner

- » Editorial Board: Inhalation Toxicology; Particle and Fibre Toxicology
- » Past-President, Michigan Chapter, Society of Toxicology
- » Vice President-Elect, Cardiovascular Toxicology Specialty Section, National Society of Toxicology
- » Member, Continuing Education Committee, Society of Toxicology
- » Member, Committee for Threshold Limit Values for Chemical Substances (TLV-CS); American Conference of Governmental Industrial Hygienists (ACGIH)
- » Consultant, Japanese Automotive Research Institute (JARI) and Japanese Automobile Manufacturers Association (JAMA)
- » NIH Reviewer, NIH: NIEHS Children's Environmental Health and Disease Prevention Research Centers Review Committee ZESI LKB-D (CC)

### Felicia Wu

- » Area Editor for Health Risk Assessment, Risk Analysis
- » Section Editor for Economics and Policy, World Mycotoxin Journal
- » Consulting Editor for Risk Communication, Archives of Environmental and Occupational Health
- » Member, Computational Task Force, World Health Organization (WHO) Foodborne Disease Burden Epidemiology Reference Group

- » Expert Panelist, Joint FAO/WHO Expert Committee on Food Additives (JECFA)
- » Chair, Communications Committee, Society for Risk Analysis

### Chengfeng Yang

- » Review panelist, NIEHS/NIH Revision Awards for Creating Virtual Consortium for Translational/Transdisciplinary Environmental Research
- » Review panelist, NIEHS/NIH Superfund Research Program (SRP) Special Emphasis Panel/Scientific Review Group
- » Scientific reviewer, United Kingdom Medical Research Council (MRC) cancer research proposal
- » Scientific reviewer, The Union for International Cancer Control (UICC) International Cancer Technology Transfer Fellowships (ICRETT) Program
- » Scientific reviewer, The Cancer ITMO of the French National Alliance for Life and Health Sciences (AVIESAN), in collaboration with the French National Cancer Institute
- » Academic editor: PLOS ONE; Scientific Reports (Nature Publishing Group)
- » Journal manuscript reviewer: The Journal of Biological Chemistry, Current Cancer Drug Target, Molecular Cancer, PLOS ONE, Molecular Carcinogenesis, Toxicology, In Vitro Toxicology, Applied Pharmacology

### Timothy Zacharewski

- » Program Reviewer, Health Canada, Chemicals Management Plan (CMP) Research Program
- » Program Reviewer, National Institute of Environmental Health Sciences, National Toxicology Program, NTP Technical Reports for Tetrabromobisphenol-A, Cobalt Metal Dust, Vinylidene Chloride, and Glycidamide

### Wei Zhang

- » Ad Hoc Reviewer, USDA Small Business Innovation Research (SBIR) Program
- » Ad Hoc Reviewer, National Science Foundation (NSF) Hydrological Sciences Program
- » North Carolina Biotechnology Center Institutional Development Grant Program
- » Member of Western Regional Research Project W-2082 Evaluating the Physical and Biological Availability of Pesticides and Pharmaceuticals in Agricultural Contexts
- » Member of North Central Regional Research Project NCII87: The Chemical and Physical Nature of Particulate Matter Affecting Air, Water and Soil Quality

### Matthew Zwiernik

**Affiliated Faculty**

**Andrea Amalfitano**, Professor, Microbiology & Molecular Genetics, and Pediatrics

**Eran R. Andrechek**, Assistant Professor, Department of Physiology

**Jamie J. Bernard**, Assistant Professor, Pharmacology & Toxicology

**Matthew P. Bernard**, Assistant Professor, Pharmacology & Toxicology

**Sudin Bhattacharya**, Assistant Professor, Institute for Integrative Toxicology

**William D. Atchison**, Professor, Pharmacology & Toxicology

**Leslie D. Bourquin**, Professor, Food Science & Human Nutrition

**Stephen A. Boyd**, University Distinguished Professor, Plant, Soil and Microbial Sciences

**Daniel A. Bronstein**, Professor, Community, Agriculture, Recreation & Resource Studies, and Psychiatry

**John P. Buchweitz**, Assistant Professor and Toxicology Section Chief, Diagnostic Center for Population & Animal Health, Department of Pathobiology & Diagnostic Investigation

**Steven J. Bursian**, Professor, Animal Science

**Stephan A. Carey**, Assistant Professor, Small Animal Clinical Sciences

**Karen Chou**, Associate Professor, Animal Science

**Bryan L. Copple**, Associate Professor, Pharmacology & Toxicology

**Susan L. Ewart**, Professor, Large Animal Clinical Sciences

**Patricia E. Ganey**, Professor, Pharmacology & Toxicology

**Jay I. Goodman**, Professor, Pharmacology & Toxicology

**John L. Goudreau**, Associate Professor, Pharmacology & Toxicology, and Neurology

**Brian D. Gulbransen**, Assistant Professor, Neuroscience Program, Department of Physiology

**Jack R. Harkema**, University Distinguished Professor, Pathobiology & Diagnostic Investigation

**Syed A. Hashsham**, Edwin Willits Associate Professor, Civil & Environmental Engineering; Adjunct Associate Professor, Crop & Soil Sciences, and the Microbial Ecology Center

**A. Wallace Hayes**, IIT Adjunct Faculty, Senior Science Advisor, Spherix Consulting

**Colleen C. Hegg**, Associate Professor, Pharmacology & Toxicology

**Robert M. Hollingworth**, Professor Emeritus, Entomology

**Michael P. Holsapple**, Director, Center for Research on Ingredient Safety; Professor and Endowed Chair, Food Science and Human Nutrition

**A. Daniel Jones**, Professor, Biochemistry & Molecular Biology, and Chemistry

**Norbert E. Kaminski**, Director, Institute for Integrative Toxicology; Professor, Pharmacology & Toxicology

**John B. Kaneene**, University Distinguished Professor and Director, Large Animal Clinical Sciences

**John J. LaPres**, Associate Professor, Biochemistry & Molecular Biology

**Gina M. Leininger**, Assistant Professor, Department of Physiology, Neuroscience Program

**Hui Li**, Associate Professor, Plant, Soil & Microbial Sciences

**Ning Li**, Assistant Professor, Pathobiology & Diagnostic Investigation

**John E. Linz**, Professor, Food Science & Human Nutrition, and Microbiology & Molecular Genetics

**David T. Long**, Professor, Geological Sciences

**Keith J. Lookingland**, Associate Professor, Pharmacology and Toxicology

**James P. Luyendyk**, Associate Professor, Pathobiology & Diagnostic Investigation

**Jane F. Maddox**, Assistant Professor, Pharmacology & Toxicology

**Burra V. Madhukar**, Associate Professor, Pediatrics & Human Development

**Linda S. Mansfield**, University Distinguished Professor, Large Animal Clinical Sciences, Microbiology & Molecular Genetics

**Michelle Mazei-Robison**, Assistant Professor, Department of Physiology, Neuroscience Program

**Laura R. McCabe**, Professor, Physiology

**J. Justin McCormick**, University Distinguished Professor, Microbiology & Molecular Genetics, Biochemistry & Molecular Biology

**Thomas P. Mullaney**, Professor, Pathobiology & Diagnostic Investigation

**Cheryl A. Murphy**, Assistant Professor, Fisheries & Wildlife

**Lawrence Karl Olson**, Associate Professor, Physiology

**Nigel S. Paneth**, University Distinguished Professor, Epidemiology, and Pediatrics



**James J. Pestka**, University Distinguished Professor, Microbiology & Molecular Genetics, Food Science & Human Nutrition

**Brian K. Petroff**, Associate Professor, Diagnostic Center for Population and Animal Health, Pathobiology and Diagnostic Investigation

**Thomas J. Pinnavaia**, University Distinguished Professor, Chemistry

**N. Edward Robinson**, Professor, Physiology; Matilda R. Wilson Professor, Large Animal Clinical Sciences

**A.J. Robison**, Assistant Professor, Department of Physiology, Neuroscience Program

**Cheryl E. Rockwell**, Assistant Professor, Pharmacology & Toxicology

**Kenneth D. Rosenman**, Professor, Medicine

**Robert A. Roth**, Professor, Pharmacology & Toxicology; Graduate Program Director, Center for Integrative Toxicology

**Craig J. Rowlands**, Adjunct Professor, Institute for Integrative Toxicology

**James G. Sikarskie**, Associate Professor, Small Animal Clinical Sciences

**Greg M. Swain**, Professor, Chemistry

**Brian J. Teppen**, Professor, Plant, Soil & Microbial Sciences

**James M. Tiedje**, University Distinguished Professor, Plant, Soil & Microbial Sciences, and Microbi-

ology & Molecular Genetics

**James E. Trosko**, Professor, Pediatrics & Human Development

**Bruce D. Uhal**, Professor, Physiology

**Brad L. Upham**, Associate Professor, Pediatrics & Human Development

**Almudena Veiga-Lopez**, Assistant Professor, Department of Animal Sciences

**Thomas C. Voice**, Professor, Civil & Environmental Engineering

**James G. Wagner**, Associate Professor, Pathobiology & Diagnostic Investigation

**Michael R. Woolhiser**, Adjunct Professor, Center for Integrative Toxicology

**Felicia Wu**, John A. Hannah Distinguished Professor, Department of Food Science & Human Nutrition, Department of Agricultural, Food, & Resource Economics

**Chengfeng Yang**, Associate Professor, Institute for Integrative Toxicology, and Physiology

**Timothy R. Zacharewski**, Professor, Biochemistry & Molecular Biology

**Wei Zhang**, Assistant Professor, Plant, Soil and Microbial Sciences

**Matthew J. Zwiernik**, Assistant Professor, Department of Animal Science, Director, Wildlife Toxicology Laboratory

## Deans

**John Baker**, College of Veterinary Medicine

**Fred L. Poston**, College of Agriculture and Natural Resources

**Leo Kempel**, College of Engineering

**Aron Sousa**, College of Human Medicine

**William D. Strampel**, College of Osteopathic Medicine

**R. James Kirkpatrick**, College of Natural Science

**Doug Buhler**, Director, AgBioResearch

## Academic Dept. / Disciplinary Ph.D. Programs

(Participate in the IIT's EITS graduate program.)

Animal Science

Biochemistry and Molecular Biology

Cell and Molecular Biology

Chemistry

Comparative Medicine & Integrative Biology

Fisheries and Wildlife

Food Science and Human Nutrition

Forestry

Genetics

Geological Sciences

Integrative Biology

Microbiology and Molecular Genetics

Neuroscience

Pathobiology and Diagnostic Investigation

Pharmacology and Toxicology

Plant, Soil, and Microbial Sciences



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