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CENTER FOR INTEGRATIVE TOXICOLOGY

2011-2012 Annual Report

MICHIGAN STATE
UNIVERSITY

Annual Report 2011-2012

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A TRADITION OF EXCELLENCE

The Michigan State University Center for Integrative Toxicology (CIT) is a multidisciplinary academic unit that supports and coordinates research and graduate education activities for faculty interested in various aspects of toxicology. The Center 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 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 20 years of continuous funding. Graduates of MSU's toxicology program number over 150 and can be found in academia, industry, and governmental positions.

MESSAGE FROM THE DIRECTOR

Arguably the two most important aspects to continued success of an academic unit are the quality of students and faculty it is able to recruit. With respect to student recruitment, CIT through its Graduate Program in Environmental and Integrative Toxicological Sciences (EITS) has continued to grow. Historically, the EITS program has maintained 30-35 graduate trainees at any given time of which approximately two-thirds are in the Biomedical track and one-third in the Environmental track. With the establishment of a joint graduate recruitment program for students interested in the biomedical sciences through the newly formed BioMolecular Science Gateway, there has been an increase in the number of graduate trainees expressing an interest as well as entering the EITS program. All indications, based on historical profiles such as past academic performance, standardized examinations and undergraduate research experiences suggests that the EITS program is on track for continued growth and success.

New faculty recruitment in the area of toxicology has likewise been exceptional in the 2011-2012 academic year. Three new junior faculty joined the MSU toxicology community, with two, Drs. Cheryl Rockwell and Bryan Copple, holding appointments in the Department of Pharmacology and Toxicology, and one faculty member, Dr. James Luyendyk being appointed in the Department of Pathobiology and Diagnostic Investigation. All three faculty have a special connection with MSU as each performed some aspect of their past professional training at MSU. All three also have a history of research collaborations during their time at the University of Kansas Medical Center, which was their prior institution immediately prior to being recruited to MSU. Each also comes with a strong record of NIH funding and we look forward to their long-term professional growth and development within our toxicology community and wish them much success in the coming years. Collectively, I am pleased to convey that the CIT and its EITS graduate program continue to hold a prominent place at MSU, nationally and internationally.

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

Student and Faculty HIGHLIGHTS

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

CIT SHINES AT 51ST ANNUAL SOT MEETING IN SAN FRANCISCO

The MSU Center for Integrative Toxicology was well represented at the 51st annual Society of Toxicology (SOT) meeting in San Francisco, 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 7,500 scientists from industry, academia, and government from various countries around the globe. This year's meeting was held March 11 – 15, 2012 at the Moscone Convention Center.

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

- **Ashwini Phadnis**, training with Dr. Norbert Kaminski, received the Dr. Harihara Mehendale Graduate Student Best Abstract Award from the Association of Scientists of Indian Origin. She also received the Best Presentation by a Student Award – Second Place from the Immunotoxicology Specialty Section for her presentation titled, "*Suppression of activation and altered BCL-6 regulation by 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) in human primary B cells.*" Lastly, she received a SOT Graduate Student Travel Award to attend the annual meeting.

- **Weimin Chen**, training with Dr. Norbert Kaminski, received the Charles River Best Abstract Award – 2nd Prize, from the 2012 American Association of Chinese in Toxicology for her abstract titled, "*Magnitude of stimulation dictates the cannabinoid-mediated differential T cell response to HIVgp120.*" She was also the student representative for the American Association of Chinese in Toxicology (AACT) Special Interest Group of SOT and received funds to travel to the meeting.

- **Angela Deardorff**, training with Dr. Cheryl Murphy, received the Graduate Women in Science Rachel Carson Award for Environmental Excellence. Her biography will be posted in the upcoming "Echoes of Silent Spring: 50 Years of Environmental Awareness" exhibit.

- **Kevin Beggs**, training with Dr. Robert Roth, received a Graduate Student Travel Award for his role as the graduate student representative for the Michigan Regional Chapter of the Society of Toxicology. He also served as the Graduate Student Leadership Committee's (GSLC) secretary this year.

- **Agnes Forgacs**, training with Dr. Timothy Zacharewski, was awarded the Colgate-Palmolive Award for Student Research Training in Alertnative Methods. With funds received from the award, Forgacs will travel to the National Center for Computational Toxicology, US Environmental Protection Agency, Durham, North Carolina, to complete work on her project, "*High-Throughput Assay Development for Steroidogenesis.*" She will work with Dr. Keith Houck to further develop the BLTK1 cell model.

  Forgacs also received second place in the Reproductive and Developmental Toxicology Specialty Section Graduate Student Poster Competition for her poster titled, "*Atrazine-Mediated Disruption of Steroidogenesis in BLTK1 Murine Leydig Cells.*" Lastly, she received a SOT Graduate Student Travel Award to attend the annual meeting.

One undergraduate student and one post-doctoral trainee working with CIT affiliated faculty members also received awards:

- **Alba Katiria Gonzalez Rivera**, an undergraduate student from the University of Puerto Rico-Arecibo, who worked in Dr. Bill Atchison's lab, won the Perry Gehring Award for research by an underrepresented minority student.

- **Rohit Singhal**, Ph.D., who is a post-doctoral trainee with Dr. Robert Roth, was a finalist for the Gabriel L. Plaa Education Award offered through the Mechanisms Specialty Section.

Lastly, affiliated faculty member, **Dr. Barbara Kaplan**, received the prestigious Outstanding Young Investigator Award for the Immunotoxicology Specialty Section. For her contributions to the field of immunotoxicology, including authorship on the chapter titled, "Toxic Responses of the Immune System" in the 7th Ed of Casarett & Doull's toxicology textbook.

MISOT Awards

At the Fall 2011 Michigan Society of Toxicology meeting held November 4, 2011 at the the Hannah Community Center in East Lansing two CIT students were awarded:

Anna Kopec, post-doctoral trainee with Dr. Timothy Zacharewski, was awarded the Outstanding Postdoctoral Poster Presentation Award for her poster titled, "*Toxicogenomic Analysis of Cr(VI) Effects on Intestinal Epithelium in Mice.*"

Ashwini S. Phadnis, graduate student training with Dr. Norbert Kaminski, was awarded the Best Graduate Student Poster for her poster titled, "*BCL-6, a putative candidate gene involved in 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)-mediated suppression of B cell activation.*"

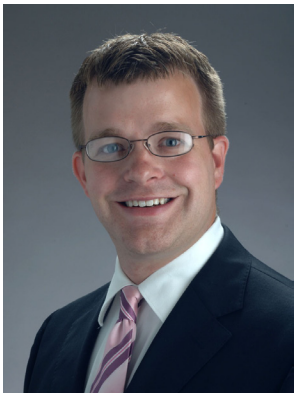
COPPLE, LUYENDYK AND ROCKWELL JOIN CIT AS NEW AFFILIATED FACULTY

Over the past year, the MSU-CIT added the following three affiliated faculty members, all of them with previous ties to Michigan State University. These faculty join the CIT as research collaborators as well as contributors to the Environmental and Integrative Toxicological Sciences Graduate Training Program.

Bryan L. Copple
Associate Professor, Pharmacology and Toxicology

Dr. Copple received his B.S. in Biology from Morningside College in Iowa in 1991 and Ph.D. in Pharmacology from the University of Nebraska Medical Center in 1997. After pursuing post-doctoral studies at Michigan State University in the Department of Pharmacology and Toxicology, Dr. Copple accepted a position as an Assistant Professor at the The University of Kansas Medical Center Department of Pharmacology, Toxicology and Therapeutics in 2003. He rose to the rank of Associate Professor there in 2010.

Dr. Copple joined the Department of Pharmacology and Toxicology at Michigan State University in the fall of 2011 and is also an affiliated faculty member of the CIT at that time. His research deals with the regulation of inflammation in the liver by early growth response factor-1 (Egr-1) and the role of hypoxia-inducible factors in the development of liver fibrosis.



James P. Luyendyk
Associate Professor, Pathobiology and Diagnostic Investigation

Dr. Luyendyk received his B.S. in Biochemistry from Colorado State University in 2000 and Ph.D. in Pharmacology/Toxicology-Environmental Toxicology from Michigan State University in 2004. After pursuing post-doctoral studies at The Scripps Research Institute, Dr. Luyendyk joined the Department of Pharmacology, Toxicology and Therapeutics at The University of Kansas Medical Center in 2007 as an Assistant Professor. There he established a research program funded by the National Institutes of Health and American Heart Association focused on identifying mechanisms whereby coagulation proteases, such as thrombin, contribute to both acute liver toxicity and chronic liver disease.

Dr. Luyendyk joined the Department of Pathobiology and Diagnostic Investigation at Michigan State University as an Associate Professor in March of this year and is also an affiliated faculty member with the CIT shortly thereafter. Dr. Luyendyk continues to focus on identifying novel mechanisms whereby the coagulation cascade contributes to liver disease pathogenesis. Ongoing projects fall under the umbrella of three main themes including 1) identifying mechanisms whereby the coagulation cascade contributes to acetaminophen-induced liver injury, 2) discovering critical gene-environment interactions driving the pathogenesis of fibrosis in autoimmune-mediated cholestatic liver disease, and 3) determining the role of thrombin targets such as protease activated receptor-1 in the pathogenesis of obesity and non-alcoholic fatty liver disease.

Cheryl E. Rockwell
Assistant Professor, Pharmacology and Toxicology

Dr. Rockwell received her B.S. in Biology from the University of Michigan and Ph.D. in Pharmacology and Toxicology from Michigan State University. After a Research Associate position at University of Missouri Kansas City for a year, she went on to be a Postdoctoral Fellow with the University of Kansas Medical Center.

Dr. Rockwell joined the Department of Pharmacology and Toxicology at Michigan State University in the fall of 2011 as an Assistant Professor and is also an affiliated faculty member of the CIT at that time. The overall aim of her research is to determine the effect of xenobiotic sensors on the regulation of lymphocyte function. It is her overall hypothesis that, in general, xenobiotic sensors serve to limit lymphocyte response to reactive xenobiotics thus averting exaggerated or inappropriate immune responses that might otherwise cause autoimmunity or other types of inflammatory conditions. Her current research which is funded by an NIH grant from the National Institute for Environmental Health Sciences, focuses on the effects of xenobiotic activation of the transcription factor, nuclear factor erythroid 2 related factor 2 (Nrf2), on T cell function and T cell-dependent immune responses.

CIT LAUNCHES NEW WEBSITE

The CIT recently launched a revised and newly redesigned website. The site now boasts more in-depth information on the Environmental and Integrative Toxicological Sciences (EITS) Training Program, as well as a more concise navigation system. Information on the website can be accessed through eight main categories along the top of the screen: About, Training, Faculty, Superfund Center, Research, Partnerships, News, and Contact. Individual faculty profiles can still be viewed under "Faculty" and now include listings of each faculty member's current lab trainees.

The "Research" section is a new category which groups the CIT's affiliated faculty into one or more of twelve subdiscipline toxicological science topics. Visitors to the website can search for faculty by the twelve topics listed and click on any faculty member's name to view their full profile and learn more about their individual research interests and laboratory. The "Partnerships" section will be developed in the coming months and will feature information on the CIT's many non-academic partnerships.

Be sure to check out the "News" section often for weekly Toxicology Track newsletters, and other past and current publications.

DISTINGUISHED SCHOLARS IN TOXICOLOGY LECTURES

This spring the MSU-CIT in cooperation with the MSU Neuroscience Program, sponsored the sixth annual Distinguished Scholars in Toxicology Lecture Series, bringing three investigators to the MSU campus who have made substantial scientific contributions to the discipline of toxicology.

The first speaker, Deborah A. Cory-Slechta, Ph.D., visited campus on March 22, 2012. Dr. Cory-Slechta is a Professor in the Department of Environmental Medicine at the University of Rochester School of Medicine. Her research has focused largely on the relationships between brain neurotransmitter systems and behavior, and how such relationships are altered by exposures to environmental toxicants, particularly the role played by environmental neurotoxicant exposures in developmental disabilities and neurodegenerative diseases. She spoke on, "*Early Life Exposures to Lead and Prenatal Stress: Consequences for the Central Nervous System*."

The second speaker, Tomás R. Guilarte, Ph.D., lectured on March 29, 2012. Dr. Guilarte is a Leon Hess Professor and Chairman in the Environmental Health Sciences at the Mailman School of Public Health at Columbia University. His research focuses on mechanism-based neurotoxicology and neuroscience using behavioral, cellular, and molecular approaches, ranging from studies using primary culture of neural cells to the application of brain imaging technologies. He spoke on, "*Synaptic and Cellular Mechanisms of Lead Neurotoxicity*."

The third speaker, Jeffrey A. Johnson, Ph.D., visited campus on May 3, 2012. Dr. Johnson is a Professor in the Division of Pharmaceutical Sciences, School of Pharmacy at the University of Wisconsin-Madison. The goals of his research are to determine the potential for Nrf2 to be a viable therapeutic target in the treatment of neurodegenerative disease. He spoke on, "*Halting the Progression of Neurodegenerative Diseases: What's Nrf2 got to do with it?*"

All seminars were well received and attended by the MSU toxicology community.

CIT DIRECTOR KAMINSKI ELECTED VICE PRESIDENT OF THE SOT

The Center for Integrative Toxicology's Director, Dr. Norbert E. Kaminski, was recently elected vice president-elect for the Society of Toxicology. Kaminski, in addition to his role as CIT Director is a Professor of Pharmacology & Toxicology, and is jointly appointed in MSU's Colleges of Veterinary Medicine and Human Medicine. His election to this office at the SOT will lead to his serving as vice president and then as president of the society.

"The SOT is a dynamic and continuously evolving global scientific society with membership from all sectors of toxicology, including industry, academia, and government," said Kaminski. "My goal is to enhance the perception of toxicology as a scientific discipline to those in other areas of science and to the general public."

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.

Research being conducted in Kaminski's laboratory is in the general areas of immunopharmacology and immunotoxicology and encompasses a number of extramurally funded projects. A major emphasis of all of the projects is the elucidation of the molecular mechanisms for impairment of signal transduction cascades and gene expression during lymphocyte activation by drugs and chemicals. One major research focus is to characterize the mechanism for immune modulation by cannabinoid compounds. This effort has led to the first characterization of cannabinoid receptors within the immune system. Current goals include elucidation of signal transduction events initiated through as well as independently of cannabinoid receptors, including the peroxisome proliferator activated receptor-gamma (PPARγ), leading to aberrant cytokine gene expression by T lymphocytes. A second major research focus is the characterization of the molecular mechanism responsible for altered B cell function produced by halogenated aromatic hydrocarbons, including dioxins and dioxin-like compounds. This research, which resulted in the first characterization of the aryl hydrocarbon receptor (AH) and aryl hydrocarbon receptor nuclear translocator in B cells, has led us to test the hypothesis that dioxin and dioxin-like compounds suppress antibody responses by impairing B cell differentiation in an AH receptor-dependent manner.

Past CIT-Affiliated SOT Presidents

Kendall B. Wallace
President from 2005 - 2006
Former doctoral trainee

Jay I. Goodman
President from 1999 - 2000
Current faculty member

James S. Bus
President from 1996 - 1997
Former doctoral trainee

James E. Gibson
President from 1988 - 1989
Former faculty member

Jerry B. Hook
President from 1987 - 1988
Founding director of the CIT

Perry J. Gehring
President from 1980 - 1981
Former faculty member

Recently Graduated EITS Students

Michelle Manente Angrish, *Genetics*, Postdoctoral Research Fellow, Wayne State University School of Medicine

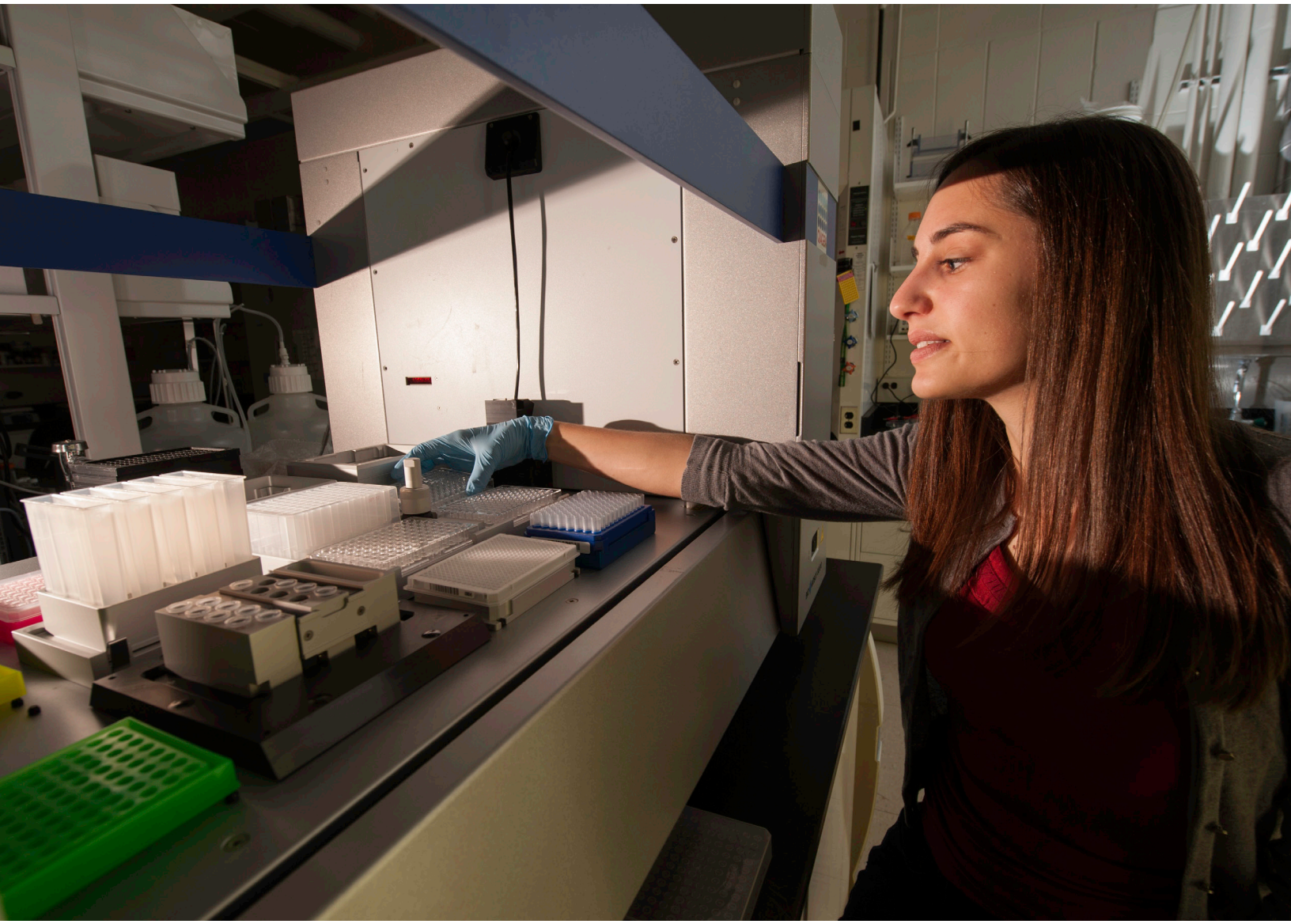
Jingtao Lu, *Biochemistry and Molecular Biology*, Postdoctoral Fellow, The Hamner Institutes for Health Sciences

Peer Karmaus, *Cell and Molecular Biology*, Postdoctoral Research Associate, St. Jude Children's Research Hospital, Department of Immunology

Suntae Kim, *Biochemistry and Molecular Biology*, Postdoctoral Fellow, National Cancer Institute

Priyadarshini Raman, *Pharmacology and Toxicology*, Postdoctoral Research Fellow, University of Michigan Medical School

Erica Sparkenbaugh, *Pharmacology and Toxicology*, Postdoctoral Research Fellow, UNC Chapel Hill School of Medicine with Dr. Rafal Pawlinski



Faculty PUBLICATIONS

During the 2011-2012 academic year, CIT affiliated faculty published more than 200 peer-reviewed articles. As a result, the CIT, and MSU research, has been highly visible in prominent peer-reviewed literature.

Teamwork

Andrea Amalfitano

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William Atchison

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Stephen Boyd

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Steven Bursian

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Bryan Copple

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Susan Ewart

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James Trosko

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Bruce Uhal

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Thomas Voice

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James Wagner

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Michael Woolhiser

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Chengfeng Yang

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Timothy Zacharewski

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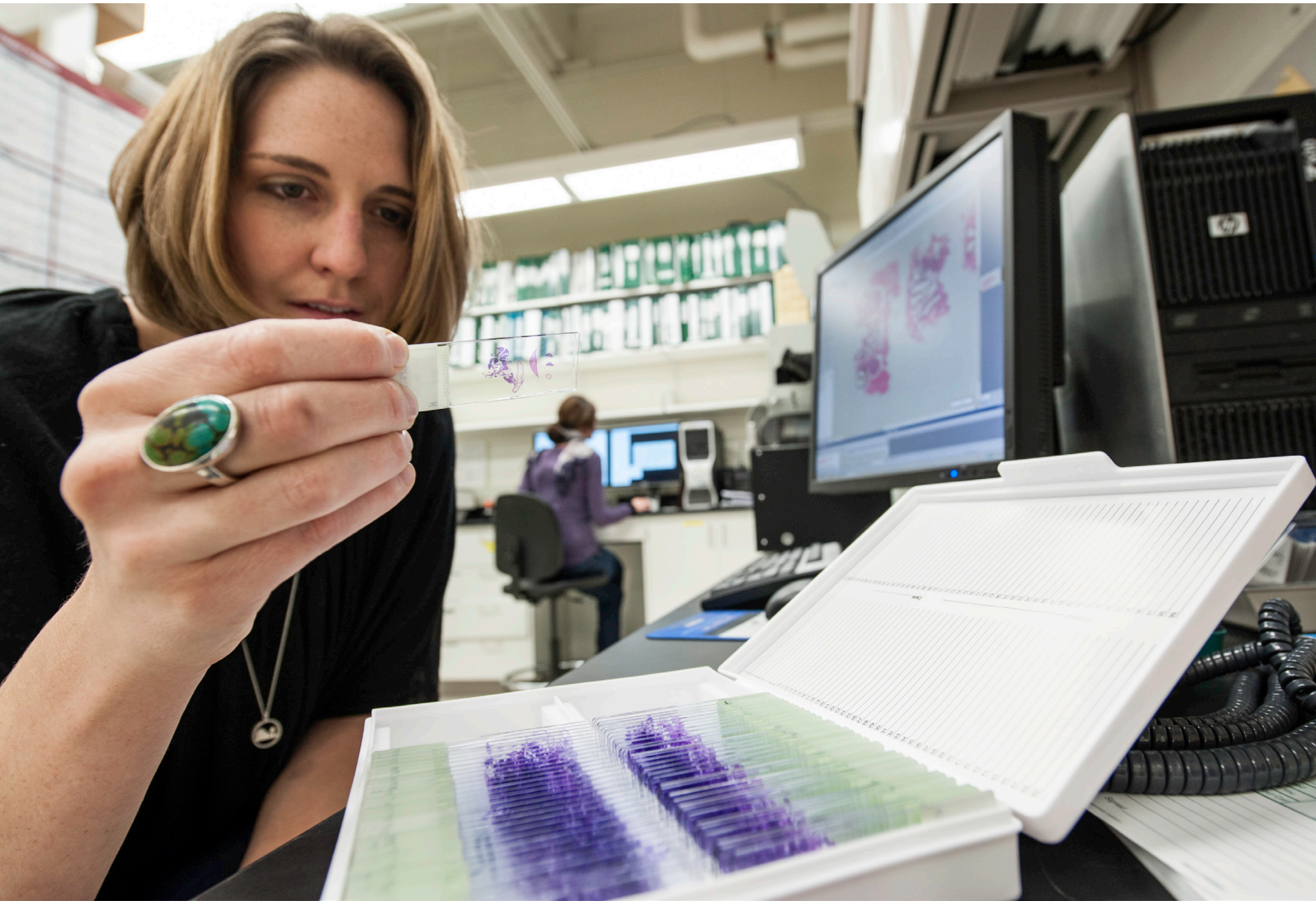

Faculty FUNDING

The CIT and its affiliated faculty maintained a longstanding tradition of external research funding with over $14 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.

William Atchison

- $309,479; Increasing Hispanic Representation in Neuroscience; NIH/PHS
- $997,070; Neurotoxic Mechanism of Methylmercury Poisoning; NIH/PHS
- $27,748; Purinergic neurotransmission in the gut; NIH/PHS

Leslie Bourquin

- $380,100; Development and Evaluation of Standardized, Competency-Based Food Safety Education and Training Programs for the Food Industry; USDA
- $6,660; ASEAN Food Security Conference; Nathan Associates Inc.
- $20,980; Production of educational content for the Asia Pacific Economic Cooperation (APEC) Forum's Partnership Training Institute Network (PTIN); USDA
- $35,000; Food Supply Chain Management Training for the APEC Region; World Bank

Steven Bursian

- $20,000; Research on Nutrition, Toxicology, Behavior and Management of Mink; Mink Farmer's Research Foundation I
- $137,500; Assessing the Toxic potency of Aroclor 1268 to piscivorous Marine mammals using mink as a mammalian model; Environ

Bryan Copple

- $198,474; Role of Early Growth Response Factor-1 in Cholestatic Liver Injury; NIH/PHS

Susan Ewart

- $3,000; 2011 Merial Veterinary Scholars Summer Research Program; Merck-Merial Animal Health Grants Prog
- $39,209; Increasing Diversity in Experiential Research Education at Michigan State University; National Heart Blood Lung Institute, NIH/PHS
- $63,081; Building Researchers on the Diverse Foundation of a Veterinary Medical Education; NIH/PHS
- $29, 805; Veterinary Research Student Training Program: Building Capacity; NIH/PHS
- $4,000; 2012 Merial Veterinary Scholars Summer Research Program; Merial Limited

Patricia Ganey

- $64,591; Dichotomous Roles of Thrombin in Acetaminophen Hepatotoxicity; NIH/PHS

Jay Goodman

- $3,698; The Epigenetic Mechanism of Arsenic Lung Carcinogenesis - Role of MicroRNAs; NIH/PHS

John Goudreau

- $4,192; CD-PROBE: Cervical Dystonia Patient Registry for Observation of Botox Efficacy; ALLERGAN
- $83,160; Michigan State University Parkinson Disease Clinical Center; NATL INST NEURO DIS & STROKES
- $5,028; An open-label, multicenter, follow-up study to evaluate the long-term effects of rasagilne in Parkinson disease subjects who participated in the ADAGIO study; TEVA NEUROSCIENCE INC
- $43,439; Safety of URate Elevation in Parkinson Disease (SURE-PD); Massachusetts General Hospital
- $140,338; The role of Parkin in selective dopamine neuronal degeneration; NATL INST NEURO DIS & STROKES
- $11,165; Safety, Tolerability and Efficacy Assessment of Dynacirc CR for Parkinson Disease (STEADY-PD); Northwestern University

Jack Harkema

- $30,000; Effects of Air Pollution on Asthma in Vulnerable Subpopulations of Arab Americans; Wayne State University
- $45,765; A 91-day oral (dietary) comparative toxicity study of 4-methylimidazole in C57Bl/6 and B6C3F1 mice; American Beverage Association
- $767,484; Great Lakes Air Center for Integrative Environmental Research (GLACIER); Environmental Protection Agency
- $16,146; Dichotomous Roles of Thrombin in Acetaminophen Hepatotoxicity; NIH/PHS
- $56,273; Morphometric and Mechanistic Histopathological Evaluation of Epithelial Changes in the Respiratory Tracts of Rats Exposed to Inhaled Chlorine; Environmental Protection Agency

Syed Hashsham

- $148,467; ERIN CRC: Host-microbiota-pathogen interactions govern enteric health and disease; NATL INST OF ALLERGY & INFEC DIS –NIH
- $149,653; Host, genetic, microbial, and environmental factors associated with Shiga toxin-producing Escherichia coli (STEC) shedding; Council on Anthropology and Education
- $45,000; Feasibility studies for scale up of Gene-Z for corrosion monitoring in the oil industry; Michigan Initiative for Innovation and Entrepreneurship

Robert Hollingworth

- $631,526; Interregional Research Project No. 4 Minor Crop Pest Management Program; US Dept Agriculture
- $2,588; IR-4 Quality Assurance Project for the North Central Region; Rutgers, The State University

A. Daniel Jones

- $287,621; GEPR: Building and operating chemical factories: Comparative studies of biochemical pathways for defense compounds in the Solanum; National Science Foundation
- $10,560; Development of genetic resources for improvement of American ginseng; MSU Project Green

Norbert Kaminski

- $287,383; THC impairment of CD4/CD8 T cell-mediated host resistance to HIV and influenza; NATL INST ON DRUG ABUSE -NIH/PHS
- $851; Endocannabinoid Suppression of T Cell Mediated Host Resistance to HIV; NATL INST ON DRUG ABUSE -NIH/PHS
- $239,943; Immunotoxicology of Chronic Exposure to Estrogenic Bisphenol-A; NATL INST OF HEALTH - NIH/PHS
- $221,984; Impairment of B cell differentiation by TCDD; NIH/NIEHS

John Kaneene

- $5,000; Mycobacterium bovis Survivability in Salt/Minerals Fed to Cattle; Michigan Dept of Agriculture
- $5,150; Elevated nonesterified fatty acids predict colonic volvulus in periparturient mares; Morris Animal Foundation

John LaPres

- $16,146; Dichotomous Roles of Thrombin in Acetaminophen Hepatotoxicity; NIH/PHS

John Linz

- $413,618; Elimination of Dietary Aflatoxin to Prevent Liver Cancer; NIH/PHS
- $29,692; ERIN CRC: Host-microbiota-pathogen interactions govern enteric health and disease; NATL INST OF ALLERGY & INFEC DIS –NIH

David Long

- $84,125; Training and Research in Environmental Health in the Balkans; FOGARTY INTL CENTER -NIH/PHS

Laura McCabe

- $126,027; Probiotics and Bone Health – Role of Gender and Intestinal Health; NIH/PHS

Cheryl Murphy

- $54,400; Estimating the sublethal effects lamprey parasitism on lipid allocation, reproduction and population dynamics of lake trout; Great Lakes Fishery Commission
- $15,000; Scaling the sub lethal effects of MeHg to population level effects in Great Lakes Perch: a multi-tiered approach using an adverse outcome pathway framework; Environmental Protection Agency
- $61,283; The use of sensitive serological assays for determining the distribution of viral hemorrhagic septicemica virus (VHSV) in the Great Lakes; US Fish & Wildlife Service
- $5,940; The Water and Climate Research Facility; National Institute of Standards and Technology
- $49,208; Iraq University Linkage Program: Collaborations in Higher Education between Michigan State University and University of Duhok, Iraq; INTL RESEARCH & EXCHANGES BOARD

L. Karl Olson

- $160,683; Life Course Energy Balance and Breast Cancer Risk in Black/White Women under 50; NATL CANCER INSTITUTE -NIH/PHS

Nigel Paneth

- $2,411,454; Michigan Alliance for National Children's Study(MANCS); NIH/PHS
- $297,151; Training Program in Perinatal Epidemiology; NIH/PHS
- $8,131; Prevention of Neonatal Infection in the Indian Community setting using Probiotics; University of Nebraska Board of Regents
- $81,000; Data Coordinating Center of Autism & Other Disabilities; Centers for Disease Control and Prevention
- $62,743; Neonatal Biomarkers in Extremity Preterm Babies Predict Childhood Brain Disorders; Boston Medical Center

James Pestka

- $703,677; Trichothecene Toxicity and the Ribotoxic Stress Response; NIH/PHS
- $39,023; Mechanisms and Biomarkers for Deoxynivalenol-Induced Growth Retardation; USDA - AGRI RESEARCH SERV US DEPT AGR
- $46,495; Hormonal Biomarkers for Deoxynivalenol Risk Assessment; US Dept Agriculture

Thomas Pinnavaia

- $8,823; Green synthesis of BTX as intermediates for PET production; The Coca-Cola Company

Cheryl Rockwell

- $249,000; Role of Nrf2 in immunotoxicity by food additives and environmental contaminants; NIH/PHS

N. Edward Robinson

- $3,827; Mechanisms of pulmonary vein remodeling in EIPH; GRAYSON-JOCKEY CLUB RESEARCH FDN INC

Kenneth Rosenman

- $44,000; AOEC Exposure Code System Updates; ASSOC OCCUPATIONAL & ENVIRONMENT CLINICS
- $21,500; ABLES; Centers for Disease Control and Prevention

- $857,882; Expanded Program in Occupational Injury and Illness Surveillance; Centers for Disease Control and Prevention
- $57,675; State-Wide Asthma Mortality Review; Michigan Dept of Community Health
- $45,562; Environmental Surveillance system; Michigan Dept of Community Health

Robert Roth

- $352,134; Multidisciplinary Training in Environmental Toxicology; NATL INST OF ENVIRON HEALTH SCI -NIH/PHS
- $253,257; Inflammation and Drug Idiosyncrasy; NIH/PHS
- $226,068; Dichotomous Roles of Thrombin in Acetaminophen Hepatotoxicity; NIH/PHS
- $66,591; An Animal Model of IDILI Using Telithromycin; Cempra Pharmaceuticals, Inc.

James Sikarskie

- $5,000; Analyses of hematological, serum chemistry, and toxicological parameters of freshwater turtles following the Enbridge (Talmadge creek) oil spill in Marshall, Michigan; MI Animal Health Foundation

Greg Swain

- $7,800; Studies of Catecholamine Release from Single Adrenal Chromaffin Cells from Healthy and Hypertensive Test Animals; American Heart Association
- $27,748; Purinergic neurotransmission in the gut; NIH/PHS
- $54,646; SERT KO rats are a model of gender specific visceral pain; NIH/PHS
- $100,000; Prediction of Galvanic Corrosion of Defense Materials; NAVAL RESEARCH US OFFICE OF USDN

James Tiedje

- $58,649; The Ribosomal Database Project: Sequences and Tools for Microbial Analysis; US Dept of Energy
- $264,127; The role of the gut microbiota in ulcerative colitis; University of Michigan
- $74,233; ERIN CRC: Host-microbiota-pathogen interactions govern enteric health and disease; NATL INST OF ALLERGY & INFEC DIS –NIH
- $44,100; Feasibility studies for scale up of Gene-Z for corrosion monitoring in the oil industry; Michigan Initiative for Innovation and Entrepreneurship

Bruce Uhal

- $253,671; Control of Type II Pneumocyte Proliferation; NIH/PHS

Thomas Voice

- $84,125; Training and research in environmental health in the Balkans; FOGARTY INTL CENTER -NIH/PHS

James Wagner

- $30,000; Effects of Air Pollution on Asthma in Vulnerable Subpopulations of Arab Americans; Wayne State University
- $30,509; A 91-day oral (dietary) comparative toxicity study of 4-methylimidazole in C57Bl/6 and B6C3F1 mice; American Beverage Association
- $613,987; Great Lakes Air Center for Integrative Environmental Research (GLACIER); Environmental Protection Agency
- $102,359; Environmental transformation and biological fate of fresh and aged cerium oxide nanoparticles; University of Michigan

Chengfeng Yang

- $329,162; The Epigenetic Mechanism of Arsenic Lung Carcinogenesis - Role of MicroRNAs; NIH/PHS

Professional Service of FACULTY

William Atchison

- Associate Editor, Neurotoxicology
- Expert witness in criminal trial, Ingham County Prosecutor's Office
- Chair, Environmental Health Sciences Review Committee, NIEHS

Leslie Bourquin

- Advisory Council Member, International Food Protection Training Institute (IFPTI)
- Member, GFSI Technical Committee, Consumer Goods Forum, Global Food Safety Initiative

Dan Bronstein

- Member, Council, Section K (Social, political and economic science) American Association for the Advancement of Science
- Proposal Reviewer, 2013 Annual Meeting, American Association for the Advancement of Science
- Member, Environmental Quality Committee, American Bar Association.

Steven Bursian

- Editorial Board, Journal of Toxicology
- Editorial Board, Chemosphere
- Editorial Board, Bulletin of Environmental Contamination and Toxicology
- Member, Health Advisory Board of NSF International

Stephan Carey

- Member, Board of Directors, 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
- Ad Hoc Reviewer, Journal of Veterinary Internal Medicine

Susan Ewart

- National Institutes of Health; Mentoring Programs to Promote Diversity in Health Research 2012/05 Council ZHL1 CSR-F (M1) reviewer, February 2012
- National Institutes of Health Special Emphasis Research Career Award (SERCA) K01 program review conducted by Westat, online focus group member, April 2012
- National Institutes of Health; Allergy, Immunology, and Transplantation Research Committee (AITC) reviewer, June 2012

Patricia Ganey

- Editorial Board, Journal of Pharmacology and Experimental Therapeutics
- Editorial Board, Journal of Toxicology and Environmental Health
- Editorial Board, Toxicology
- Editor, for a volume on "Hepatic Toxicology" for the upcoming, multivolume text "Comprehensive Toxicology"
- Grant Reviewer, Michigan Agricultural Experimental Station
- Chair-Elect, Division of Toxicology, American Society of Pharmacology and Experimental Therapeutics
- Secretary/Treasurer, Mechanisms Specialty Section of the Society of Toxicology
- Scientific Reviewer, NIH U19: Engineered Nanomaterials: Linking Physical and Chemical Properties to Biology

Jay Goodman

- Editorial Board, Toxicology
- Member, Board of Scientific Councilors, National Institute of Environmental Health Sciences
- Board of Trustees Member, ILSI Health and Environmental Sciences Institute (HESI)

John Goudreau

- Coordinator, COMLEX Level 2 Committee National Board of Osteopathic Medical Examiners
- Chair, Key Features-Clinical Decision Making Task Force, National Board of Osteopathic Medical Examiners
- Vice Coordinator COMLEX Level 2 Committee 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
- Udall Center for Parkinson Disease Research Excellence Special Review Group
- Professional Advisory Board, Michigan Parkinson Foundation
- Credentialing Committee, Parkinson Study Group
- Recruitment Committee, NINDS, NET-PD FZ-ZONE Study

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
- Member, Science Advisory Committee, California National Primate Research Center, Davis, CA
- Member, EPA Clean Air Science Advisory Committee (CASAC)
- Member, Board of Scientific Advisors, National Toxicology Program, NIEHS/NIH

Colleen Cosgrove Hegg

- Reviewer, Caroline tum Suden/Francis Hellebrandt Professional Opportunity Awards
- Reviewer, Susan G. Komen Mid-Michigan Community Grants program
- Co-Chair, Judging, College of Veterinary Medicine Phi Zeta Research Day
- Reviewer, Deutsche Forschungsgemeinschaft (German Research Foundation)
- Advocate in Science, Susan G. Komen for the Cure National Panel for Grant Review

Robert M. Hollingworth

- Editorial Board, Insecticide Resistance Newsletter
- Officer, Agrochemicals Division, American Chemical Society
- Review group, ANR (Agence Nationale de Recheche - France)

Norbert Kaminski

- Editorial Board, Toxicology
- Editorial Board, Journal of Immunotoxicology
- Board of Trustees Member, Treasurer Elect, ILSI Health and Environmental Sciences Institute (HESI)
- Ad hoc member, NIH Special Emphasis Panel (ZRG1-F07-C)
- External Advisory Committee, Oregon State University Superfund Center Grant
- Endowment Board, Society of Toxicology
- Vice President-Elect, Society of Toxicology

Barbara Kaplan

- Member, Career Resource and Development Committee, SOT

John LaPres

- Ad Hoc Reviewer, Toxicology and Applied Pharmacology
- Ad Hoc Reviewer, Chemical Research in Toxicology
- Ad Hoc Reviewer, American Journal of Physiology
- Ad Hoc Reviewer, Plos1
- Director, BioMolecular Sciences Recruiting Program

Hui Li

- Associate Editor, Journal of Environmental Quality

James Luyendyk

- Editorial Board, Arteriosclerosis, Thrombosis and Vascular Biology
- Editorial Board, Toxicological Sciences
- Editorial Board, Journal of Biochemical and Molecular 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
- Grant Review Panels: Scotland - Experimental and Translational Medicine Research grant review, Israel Science Foundation Grant Review (ad hoc), NIH – Skeletal Biology Study Section, NIH/CSR/DHHS Review Panel, Croatia – Scientific Grant Review Panel (ad hoc), Diabetic Complications Consortium (DCC) review panel – NIDDK

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- Editorial Board, Ecotoxicology
- Ad Hoc Member, 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), 2011

James Pestka

- Reviewer for: Analytical Biochemistry; Applied and Environmental Microbiology; British Journal of Nutrition; Environmental Health Perspectives; European Journal of Pharmacology Food Additives and Contaminants; Food and Chemical Toxicology; International Immunopharmacology; Journal of Agricultural and Food Chemistry; Journal of Animal Science; Journal of Association of Official Analytical Chemists; Journal of Immunology; Journal of Immuntoxicology; Journal of Food Science; Journal of Food Protection; Journal of Nutrition; Journal of Nutritional Biochemistry; Molecular Nutrition & Food Research; Proceedings of the National Academy of Sciences; Toxicologic Pathology; Toxicology; Toxicology and Applied Pharmacology; Toxicological Sciences; Toxicon; Veterinary Research; World Mycotoxin Journal.

N. Edward Robinson

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

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- Member, Awards Committee, Immunotoxicology Specialty Section, SOT
- Member, Communications Committee, Immunotoxicology Specialty Section, SOT

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- Ad Hoc Member, Safety and Occupational Health Study Section of the Centers for Disease Control and Prevention
- Member, Board of Directors of the Association of Occupational and Environmental Clinics
- 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, Research Funding Committee, Society of Toxicology
- Member/Consultant, Technical Committee on the Application of Genomics to Mechanism-based Risk Assessment, ILSI, Health and Environmental Sciences Institute (HESI)

J. Craig Rowlands

- Member, American Chemistry Council, Public Health and Science Policy Sub-team
- 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, Risk21 Project
- Co-chair, International Life Sciences Institute, Health and Environmental Sciences Institute, Risk21 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

- Online Editor, Journal of Toxicology
- 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

James Trosko

- Editorial Board, Journal of Food Hygiene and Safety
- Editorial Board, International Journal of Stem Cells
- Member, Scientific Advisory Board of the Journal of Carcinogenesis
- Scientific Consultant, Radiobiological Division of the Radiation Effects Research Foundation (RERF) in Hiroshima, Japan
- Scientific Advisor, Princess Chulabhorn Research Institute in Bangkok, Thailand
- Planning Committee Member, 7th Princess Chulabhorn Symposium, Bangkok, Thailand
- MSU-College of Human Medicine Graduate Studies Committee
- Grant Reviewer: Biomed Res Council-Singapore;MRC United Kingdom; Singapore Stem Cell Consortium;Biomed Res Council- United Kingdom; Broad

Med. Res Program; Canada Found Innovation; MSU grant reviewer
- Adjunct Professor International Institute of Health- COM
- Scientific Advisory Committee to the Conference on Cancer, Erice, Sicily
- Awarded "World Class University Invited Professorship", Seoul National University
- Consultant to Biomatrix, Inc., Ann Arbor, Michigan

Brad Upham

- Councilor, Michigan Chapter of the Society of Toxicology
- Treasurer, Michigan State University Chapter of Sigma Xi-The Scientific Research Society
- Editorial Board, Journal of Toxicology
- Editorial Board, Journal of Biomedicine and Biotechnology

James Wagner

- Editorial Board, Inhalation Toxicology
- President, Inhalation and Respiratory Specialty Section, National Society of Toxicology
- NIH Reviewer, NIH: National Heart, Lung Blood Institute. ZHL1 CSR-J (M3).
- Ad Hoc Reviewer: Inhal Toxicol, Environ Health Perspect, Nantoxicol, Toxicol Sci, Tox Appl Pharmacol

Chengfeng Yang

- Grant reviewer: Ad hoc reviewer for The French National Research Agency (ANR) funds research projects
- Journal manuscript reviewer: IUBMB Life

Timothy Zacharewski

- Editorial Board, Toxicological Sciences
- Editorial Board, Toxicology and Applied Pharmacology

CIT AFFILIATES

Academic Dept. / Disciplinary Ph.D. Programs

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

Animal Science
Biochemistry and Molecular Biology
Cell and Molecular Biology
Chemistry
Comparative Medicine & Integrative Biology
Plant, Soil, and Microbial Sciences
Fisheries and Wildlife
Food Science and Human Nutrition
Forestry
Genetics
Geological Sciences
Microbiology and Molecular Genetics
Neuroscience
Pathobiology and Diagnostic Investigation
Pharmacology and Toxicology
Zoology

Deans

Christopher M. Brown, College of Veterinary Medicine

Fred Poston, College of Agriculture and Natural Resources

Satish S. Udpa, College of Engineering

Marsha D. Rappley, College of Human Medicine

William D. Strampel, College of Osteopathic Medicine

R. James Kirkpatrick, College of Natural Science

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