The CIT is proud to announce their National Institute of Environmental Health Sciences Superfund Research Program has been renewed for another five years with the award of $14.1 million. The CIT was one of only two programs awarded a Center grant this year. MSU’s Superfund Program began in December of 1988 and since that time has received $75.6 million in funding. The overall goal of the program is to continue to conduct human health-oriented research on risks from exposure to chemicals commonly found in Superfund sites and on remediation technologies to eliminate the potential for exposure to chemicals from those sites.

The pollutants under investigation are a subclass of chemicals belonging to the halogenated aromatic hydrocarbon family that bind and activate the aryl hydrocarbon receptor (AhR). These chemicals, which include chlorinated dibenzo-p-dioxins, dibenzofurans, biphenyls and polyaromatic hydrocarbons, are environmentally persistent, lipid soluble that accumulate in the food chain leading to human and wildlife exposure.

Biomedical projects in the program are aimed at illuminating the interactions of biochemical pathways with the ligand-activated aryl hydrocarbon receptor (AhR), which cause altered responses in the liver and immune system as well as changes in the gut microbiome. Non-biomedical research topic areas include studies of the diversity and physiogeonomic responses of dioxin-degrading microbial populations and geochemical parameters governing bioavailability of dioxin-like compounds in soils.

A highly integrated, multidisciplinary research program is already underway consisting of six research projects and six supporting core units. The research team of 25 investigators includes faculty at Michigan State University, the Hamner Institutes for Health Sciences, Rutgers University, Purdue University, and the U.S. Environmental Protection Agency.

“This is one of the few National Institutes of Health programs where there’s sufficient funding to bring together a large, multidisciplinary group of investigators,” said Norbert Kaminski, principal investigator and director of the MSU CIT. “We have 25 scientists who are involved, as well as many students, postdoctoral trainees and technicians. It’s a rare opportunity when you can bring all these different areas of expertise together to focus on a single problem or theme, and that’s why we’re very excited about having this type of funding.”
CIT STUDENTS RECOGNIZED AT 52ND ANNUAL SOT MEETING IN SAN ANTONIO

The MSU Center for Integrative Toxicology was well represented at the 52nd annual Society of Toxicology (SOT) meeting in San Antonio, Texas 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 6,500 scientists from industry, academia, and government from various countries around the globe. This year's meeting was held March 10 – 14 at the Henry B. Gonzalez Convention Center, San Antonio, Texas.

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

Agnes Forgacs, training with Dr. Timothy Zacharewski, received 3rd place in the Reproductive and Developmental Toxicology Specialty Section student poster contest for her poster titled, “Atrazine-Elicited Differential Gene Expression in BLTK1 Leydig Cells.”

Kazuhisa Miyakawa, training with Dr. Bob Roth, received 3rd place in the Dynamic Signaling Network Mediating Proinflammatory Response in the Spleen of Mice Under Deoxynivalenol-Induced Ribotoxic Stress. She also won the Robert J. Rubin Student Travel Award from the Mechanisms and Risk Assessment Specialty Section; Immunotoxicology Specialty Section Best Student Presentation Award, first place; Molecular Biology Specialty Section Graduate Student Research Award, second place; American Association of Chinese in Toxicology (AACIT) and Charles Rivier Best Abstract Award, first place.

Weimin Chen, training with Dr. Norbert Kaminski, received the Vera W. Hudson and Elizabeth K. Weisberger Scholarship Award from the Women in Toxicology Special Interest Group. Chen was also awarded the Jean Lu Student Scholarship Award presented by the American Association of Chinese in Toxicology Special Interest Group. Both awards were received for her presentation titled, “Modulation of HIVgp120-Specific T Cell Responses by Delta9-Tetrahydrocannabinol In Vitro and In Vivo.”

Alexandra Colon-Rodriguez, training in Dr. Bill Atchison’s lab, won the Perry Gehring Award for research by an underrepresented minority student.

Xiao Pan, training with Dr. Jim Pestka, won several awards for her presentation, “Dynamic Signaling Network Mediating Proinflammatory Response in the Spleen of Mice Under Deoxynivalenol-Induced Ribotoxic Stress.” She also won the Robert J. Rubin Student Travel Award from the Mechanisms and Risk Assessment Specialty Section; Immunotoxicology Specialty Section Best Student Presentation Award, first place; Molecular Biology Specialty Section Graduate Student Research Award, second place; American Association of Chinese in Toxicology (AACIT) and Charles Rivier Best Abstract Award, first place.

Nikita Joshi, training with Dr. James Luyendyk, received a Spring 2013 College of Veterinary Medicine Fellowship.

Several undergraduate students who worked in Dr. Bill Atchison’s lab during the summer of 2012 also received minority undergraduate student travel awards to attend the meeting: Wilmari Morales, University of Puerto Rico-Cayey (UPR-C), Joshua Rosario, UPR-C, Zuleiras Santana, UPR-Rio Piedras, and Kiomaris Nieves, UPR-Arecibo.

Other EITS students who received travel support from the CIT to attend this year’s meeting included: Tyrell Simkins, Jose Suarez-Martinez, Alexandra Colon-Rodriguez, Erica Clark, Melissa Bates, Sara Fox, Aaron Fullerton, Krista Greenwood, Steve Proper, Kevin Beggs, Alexandra Turley, Ashley Mauiri, Chelsea Hutch, Shawna D’Inglisso, Rance Nault, Agnes Forgacs, Nikita Joshi, Xiao Pan, Ashwini Phadnis, Weimin Chen, Jinpeng Li, Natalia Kovalova.
KAPLAN CHAIRS SOT MENTORING BREAKFAST

The Society of Toxicology’s Career Resource and Development (CRAD) Committee provides an online mentoring database, Mentor Match, as a benefit of membership in the SOT. The Mentor Match database is part of a larger SOT Mentoring Program that matches mentees with potential mentors from the SOT membership. Mentors provide advice on career path selection and success and life/work balance issues. As part of the SOT Mentoring Program, the 2nd annual SOT Mentoring Breakfast took place this year at the annual SOT meeting. Fifty pre-registered potential mentees learned about the Mentoring Program and database, met a successful mentee/mentor match, and communicated their mentoring needs to a volunteer facilitator.

CIT-affiliated faculty member, Barb Kaplan chaired the committee for the SOT Mentoring Breakfast for this year’s SOT meeting. As a member of the Career Resource and Development Committee of SOT, Kaplan began participating in the SOT Mentoring Breakfast in its inaugural year in 2012 as a facilitator who helped match mentees with mentors. In 2013, she went on to chair the committee for the SOT Mentoring Breakfast and looks forward to being co-chair for the coming 2014 meeting. “Many members of all career stages have expressed interest in having mentors outside their home institutions to provide career advice and guidance,” said Kaplan. “The Breakfast provides an opportunity to network, learn about mentoring, and communicate their specific needs for a mentor. It has been a great addition to SOT’s Mentoring Program.”

If you have an interest in learning more about the SOT Mentoring Program and the Mentor Match database, please visit: http://www.toxicology.org/ai/newcrad/mentormatch.asp.

OTHER NOTABLES

Brandon Armstrong, training with Dr. Cheryl Murphy, received the Dr. Howard A. Tanner Fisheries Excellence Fellowship through the MSU Fisheries and Wildlife Department. The award recognizes a student who is committed to fisheries research related to the Great Lakes, connecting waterway or tributary stream research. Armstrong was also selected to serve as a student representative on both the Ohio Valley Society of Environmental Toxicology and Chemistry Chapter and the Society of Environmental Toxicology and Chemistry North American Student Advisory Council.

Agnes Forgacs, training with Dr. Timothy Zacharewski, was awarded the MSU College of Natural Sciences Barnett Rosenberg Fellowship. The prestigious fellowship provides a stipend, health insurance and tuition waiver for an entire year. The recipients of this award are advanced students who have shown a distinguished record of accomplishment at MSU.

Forgacs was also the ILSI North America Technical Committee on Food and Chemical Safety Summer Fellowship recipient conducting a project evaluating food-relevant chemicals in the Tox21 high-throughput screening program for 10 weeks in Washington, D.C. As a result of this work, Forgacs was an invited speaker at their Weight of Evidence workshop in Miami, FL.

Kate O’Brien, training with Dr. Bryan Copple, recently spoke at the 2013 Michigan Pharmacology Colloquium held at Wayne State University. She spoke on, “Bile Acids Elicit Production of Interleukin-23 by Hepatocytes.”
Over the past year, the MSU-CIT added the following group of affiliated faculty members. These faculty join the CIT as research collaborators as well as contributors to the Environmental and Integrative Toxicological Sciences Graduate Training Program.

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

Dr. Andrechek received his B.Sc. in Molecular Biology and Biotechnology from McMaster University in 1997 and Ph.D. in Biology from McMaster University in 2003.

Research in the Andrechek lab focuses on breast cancer using a combination of mouse models (transgenic, knockout and carcinogen induced) and bioinformatics methods. Bioinformatics is used to generate predictions and hypotheses that are then tested with traditional genetics, with recent work identifying a role for key signaling pathways in both tumor development and metastasis.

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

Dr. Gulbransen received his B.S. in Zoology and Physiology from the University of Wyoming in 2003 and his Ph.D. in Neuroscience from the University of Colorado Health Sciences Center in 2007.

Dr. Gulbransen is interested in how the two constituent cell types of the enteric nervous system (neurons and glia) interact and how these interactions influence gut function. Specifically, he is interested in how enteric glial cells influence enteric neurotransmission and neuron survival.

**Gina Leinninger**  
*Assistant Professor, Department of Physiology, Neuroscience Program*

Dr. Leinninger received her B.S. in Chemistry from the University of Michigan in 1999 and her Ph.D. in Neuroscience from the University of Michigan in 2005.

The Leinninger Lab studies neuronal circuits that regulate energy balance. We use molecular and pharmacological tools to identify, activate or ablate specific neuronal populations and study their physiological importance, particularly regarding feeding, movement and weight.

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

Dr. Li received her M.D. from Capital Medical University in 1982. In 1990, she received her M.S. in Endocrinology and Reproductive Physiology from the University of Wisconsin-Madison and 1997 received her Ph.D. in Pathology from the same university.

Dr. Li’s research focuses on using in vitro and in vivo models to study the impact of air pollutants (e.g. particulate matter, vapors and ozone) from different sources on allergic airway inflammation such as asthma and allergic rhinitis. The emphasis is on understanding the mechanisms by which various air pollutants and their combined actions promote allergic airway inflammation and the role of oxidative stress in this process.

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

Dr. Lookingland received his B.S. and M.S. in Biology from Towson State College in 1975 and 1977. He earned his Ph.D. in Physiology from the University of Maryland in 1982.

His research interests are focused on genetic and environmental factors involved in the pathogenesis of progressive neurodegenerative disorders associated with loss of central dopomine neurons such as Parkinson Disease and restless legs syndrome. The goal of his laboratory's research is to develop novel neuroprotective or neurorestorative therapeutics to slow, halt or reverse the progressive neurodegeneration in these diseases.

The work in his laboratory uses rodents and cell culture models to identify and characterize genetic and environmental factors that cause selective DA neuronal toxicity - especially as applied to the underlying mechanisms that determine differential susceptibility of DA neurons to neurotoxic insult. Animals are evaluated on the basis of their neurochemical and immunohistochemical changes in selected regions of the brain, as well as genome-wide mRNA expression profiling to identify changes in gene expression in regions of brain with differential sensitivity to environmental neurotoxins.
Linda Mansfield  
Professor, Large Animal Clinical Sciences, Microbiology and Molecular Genetics

Dr. Mansfield received her B.S. in Biology in 1975 and M.S. in Virology in 1980 at the University of Delaware. She earned her V.M.D. in Veterinary Medicine in 1986 and her Ph.D. in Parasite Immunology in 1990 from the University of Pennsylvania.

Dr. Mansfield’s Comparative Enteric Diseases Laboratory studies the enteric bacterial pathogen Campylobacter jejuni. The incidence of foodborne disease due to C. jejuni remains very high worldwide. Serious disease sequelae can follow gastrointestinal (GI) infections with C. jejuni. The acute neuropathies Guillain Barré Syndrome (GBS) and Miller Fisher Syndrome (MFS), and Reactive Arthritis (RA) are autoimmune conditions associated with recent Campylobacter infection. Her overall hypothesis is that murine model(s) with a “humanized” microbiome will develop spontaneous autoimmune sequelae secondary to C. jejuni infection with strains with class A LOS. These models can be used to dissect mechanisms of autoimmunity and to serve as treatment and prevention surrogates for GBS/MFS patients. The expected outcomes will be new murine models of GBS and MFS and an increased understanding of mechanisms of initiation of autoimmunity following enteric infections with C. jejuni from GBS and MFS patients; this information will lead to future detailed mechanistic studies of how these identified autoimmune pathways are facilitated by particular outer membrane and secreted proteins of this bacterium such as toxins.

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

Dr. Mazei-Robison received her B.S. in Biology and Chemistry, Summa Cum Laude from Central Michigan University in 1999 and her Ph.D. in Pharmacology from Vanderbilt University in 2005.

The Mazei-Robison lab is interested in understanding the molecular mechanisms that underlie changes in ventral tegmental area (VTA) dopamine (DA) neuron signaling, morphology, and activity induced in neuropsychiatric disorders such as depression and addiction. Despite evidence that dysregulation of the mesocorticolimbic DA system contributes to a number of psychiatric disorders, a detailed understanding of the main projection neurons in this pathway, the DA neurons of the VTA, is lacking. This includes the structural and functional neuroadaptations, the molecular mechanisms responsible for these adaptations, and the specific neurons and outputs affected.

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

Dr. Robison received his B.S. in Biology from Rhodes College in 1999 and his Ph.D. in Molecular Physiology and Biophysics from Vanderbilt University in 2005.

Research in the Robison Lab focuses on how models of drug addiction and depression alter gene expression in discreet brain regions, particularly the hippocampus. They use transgenic mice and viral gene-transfer tools to manipulate hippocampal expression of specific genes, as well as the machinery that regulates chromatin structure and gene transcription. They then examine the effects of these manipulations on biochemistry, neuronal structure and physiology, and behavioral responses to drugs and stress with the goal of uncovering novel targets for therapeutic intervention in addiction and depression.

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

Dr. Wu received her A.B. and S.M. in Applied Mathematics and Medical Sciences from Harvard University in 1998 and her Ph.D. in Engineering and Public Policy from Carnegie Mellon University in 2002.

Dr. Wu’s research interests lie at the intersection of global public health, agriculture, and trade. How do agricultural systems affect health in different parts of the world? How do food safety regulations affect global trade of food, and ultimately food quality, particularly in low-income nations? What is the global burden of disease caused by food contaminants, and how cost-effective and feasible are interventions to reduce these risks?

Her research focuses on applying health economic and mathematical modeling techniques to understanding the public health impacts of agricultural practices, both in the United States and worldwide.
This spring the MSU-CIT in cooperation with the MSU Respiratory Research Initiative and the EPA Great Lakes Air Center for Integrated Environmental Research, sponsored the seventh annual Distinguished Scholars in Toxicology Lecture Series, bringing two investigators to the MSU Campus who have made substantial scientific contributions to the discipline of toxicology.

The first speaker, Dr. Terry Gordon, visited campus on April 15, 2013. Dr. Gordon is a professor in the Department of Environmental Medicine at New York University. Dr. Gordon's broad research interest is in inhalation toxicology and a major focus of his research lab is the identification and understanding of the role of genetic host factors in the pathogenesis of the adverse pulmonary effects produced by inhaled environmental and occupational agents. He spoke on, “Particulate Matter Composition Drives Toxicity.”

The second speaker, Dr. Terrance Kavanagh, Ph.D., DABT, spoke on May 24, 2013. Dr. Kavanagh is a professor and Deputy Director of the Toxicology Program at the Center of Ecogenetics and Environmental Health at the Department of Environmental and Occupational Health Sciences at the University of Washington. His areas of research include glutathione metabolism, molecular toxicology, analytical cytology, free radical biology, oxidative stress biomarkers, toxicogenomics, systems genetics and nanotoxicology. He spoke on, “Genetic susceptibility to nanoparticle-induced lung inflammation in mice.”

The Center for Integrative Toxicology’s Annual Research Evening showcased trainees in the Environmental and Integrative Toxicological Sciences Graduate Training Program and their accomplishments. This year’s event took place on Thursday, November 29, 2012 in the Red Cedar Room at the MSU Kellogg Center. The event included dinner, student posters and platform presentations.

Speakers from left are: Agnes Forgacs, who presented, “Reproductive and Developmental Toxicity Testing in BLTK1 Murine Leydig Cells;” Aaron Fullerton, who presented, “2,3,7,8-TCDD enhances the sensitivity of mice to concanavalin A immune-mediated liver injury;” and Weimin Chen, who presented, “Modulation of HIVgp120 Antigen-Specific T Cell Responses by delta9-Tetrahydrocannabinol.”
WHERE ARE THEY NOW: RECENT EITS GRADUATES

Brenna Flannery
Department of Food Science and Human Nutrition
Mentor, James Pestka

Brenna successfully defended her dissertation, "Mechanisms of Deoxynivalenol-Induced Anorexia and Its Impact on Weight in the Female Mouse," in December of 2012 and earned her Ph.D. degree in Food Science and Environmental Toxicology.

She is currently working as a post-doctoral fellow at the University of California Davis in the School of Veterinary Medicine Department of Molecular Biosciences. Her research there involves evaluating the neurotoxicities and the long-term behavioral deficits of organophosphate poisoning. Once her models are established, she will be testing novel therapeutic agents against organophosphate poisoning in hopes to reduce death, seizures, neurodegeneration, neuroinflammation and long-term behavioral deficits associated with exposure.

Five years from now she hopes to be an assistant professor that is successful at publishing and earning grants. She would like to focus on how foodborne toxins/toxicants adversely affect the central nervous system.

Steve Proper
Department of Biochemistry and Molecular Biology
Mentor, John LaPres

Steve successfully defended his dissertation, "The role of hypoxia-inducible factors 1 and 2 in cobalt-induced lung inflammation and development of lung immunity," in May of 2013 and earned his Ph.D. degree in Biochemistry and Molecular Biology and Environmental Toxicology.

As part of the D.O.-Ph.D. Program, Steve is working on finishing his D.O. degree by completing his clinical clerkships (essentially his 3rd and 4th year of medical school where he completes the many rotations and board exams that are required). He is based out of Sparrow Hospital and will be here in Lansing until he graduates with the Class of 2015 from the MSU College of Osteopathic Medicine. From there, he will have to complete a residency (usually a 3 year process). As of now, he is interested in pediatrics or internal medicine.

In five years he hopes to be finishing his residency, and ready to start a fellowship in a pediatric specialty (either pulmonary/critical care medicine, allergy/immunology or neonatology). His research here at MSU has greatly influenced his interest in how our lungs develop their immunity to environmental threats, and especially how environmental exposures affect this process and impact acute clinical care situations as well as future disease risk. Proper said, "Extra training in toxicology was absolutely essential not just for my PhD research but also for taking me in the direction of inhalation toxicology. It's fascinating to me how much overlap our environment has with our development and risk for disease, so no matter what I end up doing in my career, it will probably revolve around toxicology and immunology."

The Center for Integrative Toxicology is on Facebook:
http://www.facebook.com/pages/MSU-Center-for-Integrative-Toxicology/118005904884550

The CIT Facebook page will be updated weekly with news and events at the MSU CIT and in the toxicology community.

When you visit, make sure to click "Like" to keep-up-to-date with all that is happening at the CIT!