DEARING JOINS MSU SUPERFUND AS NEW CEC CORE LEADER

The Michigan State University Superfund Research Program is proud to announce James W. Dearing, Ph.D., as the new Community Engagement Core Leader. Dearing (Ph.D., University of Southern California) is Professor and Chairperson of the Department of Communication at Michigan State University. Recently he was Senior Scientist for Kaiser Permanente, the largest nonprofit healthcare provider in the United States. Dearing is Principal Investigator of the Cancer Communication Research Center, a U.S. National Cancer Institute Center of Excellence (www.crn-crcr.org). Previously, he was on the faculty of Ohio University, Michigan State University, and visiting faculty at the University of California, Berkeley, and the University of Michigan.

Dearing studied at Waseda University in Japan and has conducted research and evaluations in multiple countries.

Dr. Dearing specializes in the diffusion of innovations, and the use of diffusion principles to disseminate and effectively implement and sustain worthy innovations. He works and speaks frequently with research and policy groups to accelerate the spread of evidence-based practices, programs, policies, and technologies, and to measure diffusion.

Dearing has led projects funded by the Bill & Melinda Gates Foundation, the John D. and Catherine T. McArthur
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Foundation, the Robert Wood Johnson Foundation, the W.K. Kellogg Foundation, and U.S. federal agencies including the Agency for Healthcare Research and Quality, the National Science Foundation, and the National Cancer Institute. Recently he has worked on studies about healthcare delivery improvement, cancer care coordination and communication, lifestyle physical activity, pediatric care, university-community knowledge transfer, science teaching and learning, work-family balance in corporate settings, and alcohol and substance abuse innovations.

Dearing will lead the Community Engagement Core of MSU’s SRP towards two main objectives. First and foremost is a commitment to help the Tittabawassee River and Saginaw Bay region residents with their understanding of, and collective response to, many years of industrial contamination.

The second commitment is to learning. The CEC is comprised of researchers and community specialists who not only study how things are, but also how to improve living and working conditions. They do this with particular expertise in communication, community engagement, responsible development, and environmental sustainability. The MSU Superfund team is excited to work with Dearing.

MSU SUPERFUND PROGRAM OUTREACH EFFORTS

Dr. Brad Upham from the MSU Superfund program gave presentations to four science classes (AP chemistry and AP biology) at Midland High on May 16, 2014. The presentations involved an introduction to environmental health with a 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. The presentation also included an introduction to fish advisories, and access to the State of Michigan’s database on levels of contaminants in fish, and the use of Excel to evaluate these data sets. As a follow-up to this lecture, the Midland High teachers led hands-on lessons where students accessed the fish contaminant databases of the State of Michigan. This database was used to help students formulate hypotheses, and answer these hypotheses using actual data sets. They learned how to use spreadsheet to organize data, computational modifications, statistical analyses, and data presentations (graphs and tables).

Prior to the presentation by Dr. Upham, the MSU Superfund program completed an informational resource packet for the teachers at Midland High that included slides for lectures, background information, activity modules for environmental health concerning the contamination problems of their local community, and relevant links to Michigan’s Departments of Environmental Quality and Community Health resources.

A follow-up meeting with the teachers indicated a lot of enthusiasm by the students and plans were made to continue and expand in these educational activities on environmental health sciences. Future plans include forming a student group on “Environmental Health,” assisting in a student-led town-hall meeting, a science café on environmental issues, and initiating a citizen science project. The citizen science project will involve students and the community to identify microorganisms that biodegrade chlorinated organic chemicals using a field-portable gene analyzer developed by Dr. Syed Hashsham. The genomic library for the portable gene analyzer will be developed by Dr. Gerben Zylstra.

JOURNAL CLUB READY FOR FALL

The Training Core of the MSU Superfund program is excited to announce the dates for the fall session of the Journal Club. The Journal Club’s goal is to provide interdisciplinary training to predoctoral and postdoctoral students. In keeping with the integrated research effort of the MSU Superfund program, each paper to be discussed monthly has an interdisciplinary aspect.

Two strategies are employed to simulate discussion and interaction between the individual presenting the paper and the audience, as well as between members of the audience. First, papers to be discussed are distributed in advance along with several thought questions which the presenter will introduce for discussion as part of the presentation. Secondly, part-way into the presentation, the presenter will pose an open-ended question(s) and ask audience members to collaborate with each other to propose different solutions for the class as a whole to consider. This is the think-pair-share-create paradigm (DeHann, 2011). Presenters are mindful that their audience members are not all specialists in the same field and, therefore, they provide appropriate background information. Participants are thus taken out of their comfort zones and forced to extend their knowledge in new directions.

These Journal Club sessions have been beneficial to the Superfund program because they promote cohesion among the participating faculty, graduate students, and postdoctoral fellows. All participants link by video conference to participate with colleagues from Rutgers, Purdue, The Hamner Institutes and Texas A&M. This fall there will be four Journal Club events on September 30, October 21, November 11, and December 9.
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 postdoctoral 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 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 their individual contributions, all three played equal roles in the workshop's presentation and assessment.

Rodríguez and her partners will be recognized at the Society for Neuroscience’s annual meeting in November.

Dr. Bill Atchison, CIT-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 accompanied the completion of the workshop. In addition to their individual contributions, all three played equal roles in the workshop's presentation and assessment.

Rodríguez and her partners will be recognized at the Society for Neuroscience’s annual meeting in November.

Norbert E. Kaminski, director of the CIT, was recently named interim director for the university's new Center for Research on Ingredient Safety (CRIS).

The center was established at MSU earlier this year as part of an initiative led by the food, beverage, and consumer products industries, in association with the Grocery Manufacturers Association.

In making the announcement, Stephen Hsu, vice-president for Research and Graduate Studies said, “Norb has established an excellent rapport with the industry through his role in initially preparing a competitive proposal to acquire industry support for the creation of the center, and through subsequent interactions with industry personnel. This center represents a key addition to our food-related research enterprise and in strengthening our links to industry. I am pleased he is willing to take on this temporary leadership responsibility.”

Kaminski will serve as representative of the ingredient safety center with industry and government stakeholders, and will be the liaison with the University of Michigan Risk Science Center, which leads communications efforts for the initiative. He will also work with industry representatives and the center’s Internal Advisory Committee to identify and appoint members of the External Advisory and Emerging Issues Committees, and the Board of Stakeholders.
Eran Andrechek, physiology professor and CIT-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 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.

Photos by G.L. Kohuth, MSU University Relations.
The Center for Integrative Toxicology hosted an intensive 3-day short course (May 20-22, 2014) titled "Introduction to Physiologically Based Pharmacokinetic (PBPK) Modeling". The course was attended by over 20 participants including EITS students as well as by industry and government toxicologists.

During the short course, participants learned the principles of physiologically based pharmacokinetic (PBPK) modeling and were introduced to the application of this technique in chemical health risk assessment and drug development. At the conclusion of the course participants were able to:

» Understand the fundamental concepts underlying PBPK modeling

» Describe the absorption, distribution, metabolism, and elimination of chemicals using mass balance differential equations

» Build PBPK models to simulate tissue dosimetry using Berkeley Madonna®

» Appreciate the application of PBPK models in human health risk/safety assessment and drug development.

The course comprised lectures and hands-on computer simulation exercises.

The CIT offered this course through the Research Translation Core within its NIH Superfund Research Program Center grant. The course instructors (at left) were Qiang Zhang, Sudin Bhattacharya, Miyoung Yoon, and Alina Efremenko from The Hamner Institutes for Health Sciences, and Rory B. Conolly from the US EPA.
Weimin Chen
Research Investigator, Immunotoxicology, Department of Drug Safety Evaluation, Bristol-Meyers Squib

Dr. Weimin Chen received her Ph.D. in the spring of 2014 after completing the dual degree program in Microbiology and Molecular Genetics and Environmental Toxicology. Her dissertation was, “Modulation of HIV gp120 Antigen-Specific Immune Responses by Delta9-Tetrahydrocannabinol and Cannabinoid Receptors 1 and 2 In Vitro and In Vivo.”

Dr. Chen was a predoctoral trainee in the lab of Dr. Norbert Kaminski for several months following her graduation. In August of 2014 she began at her current position at Bristol-Meyers Squib as a Research Investigator in Immunotoxicology in the Department of Drug Safety Evaluation. She will serve as study director for nonclinical toxicity studies and as drug safety representative for immunomodulatory drug candidates. Her responsibilities will include supporting the development and validation of in vivo / ex vivo / in vitro assays for pharmacodynamic assessment and the investigation of toxicities and immunogenicity assays, and to ensure compliance with all standard operating procedures that govern immunotoxicology activities. In addition, she will also play a role in investigating the mechanisms of drug-induced toxicities, particularly those associated with the immune system.

Dr. Chen explained she looks forward to her career at Bristol-Meyers Squib, "My education and background in immunotoxicology, which includes a Ph.D. degree from the EITS program, provides me a solid foundation for applying my knowledge and skills to my new position."

Agnes Karmaus
ORISE Postdoctoral Research Fellow, National Center for Computational Toxicology, U.S. Environmental Protection Agency

Dr. Agnes Karmaus (formerly Forgacs) received her Ph.D. in the spring of 2013 after completing the dual degree program in Biochemistry and Molecular Biology and Environmental Toxicology. Her dissertation was, “Triazine-mediated disruption of BLTK1 Leydig cell steroidogenesis.” She trained with Timothy Zacharewski.

Following graduation, Dr. Karmaus accepted a postdoctoral research fellowship through the Oak Ridge Institute for Science and Education (ORISE) to work with the U.S. EPA at the National Center for Computational Toxicology in the Office of Research and Development located in Research Triangle Park, NC. She works analyzing hundreds of chemicals effects in in vitro high-throughput screening assays generated as part of the ToxCast program. She is responsible for analyzing results from steroidogenesis and from toxicogenomics platforms, respectively. Karmaus explained, "There is an emerging interest in understanding chemical safety approaches in the food industry. To-date much of food safety has been focused on microbial contaminants rather than chemical additives or food contact substances. The ToxCast program not only includes a lot of these chemicals but is a novel program that screens hundreds of chemicals in high-throughput across a diversity of biochemical endpoints - and all of the data is publicly available making it a valuable resource for any toxicologist."

This past August 2014, Karmaus was an invited speaker at two conferences. She spoke about food-relevant chemicals and the ToxCast screening program at the International Association for Food Protection (IAFP) meeting in Indianapolis, IN and at the 17th World Congress of Food Science and Technology meeting in Montreal, Canada, organized by the International Union for Food Science and Technology.

FOOD INDUSTRY TOXICOLOGY ROUNDTABLE

The Food Industry Toxicology Roundtable held its annual meeting at MSU on August 26-27, which was co-hosted by Kellogg’s and the CIT. Toxicologists and product safety representatives from thirteen companies participated, as did faculty and administrative leaders from MSU and the University of Michigan’s Risk Science Center. The first day of this two-day meeting was focused on steps forward for the Center for Research on Ingredient Safety (CRIS). Discussions included the potential research priorities and governance structure for CRIS, the strategies surrounding effective communication of the state-of-the-science on ingredient safety to the public and possible modifications to the EITS Graduate Program that might better accommodate training for graduate students and postdoctoral fellows interested in pursuing a career in food toxicology. The second day of the meeting was primarily focused on current toxicology-related challenges facing the food industry. Although it is important to emphasize that CRIS will have a broader reach than just food-related toxicology; chemical ingredients present in food, and their safety, will be a significant focus of the research conducted by CRIS. Overall there was significant enthusiasm by all of the attendees for this new partnership between academia and industry.
Andrew Eagle, a postdoctoral fellow on the NIEHS Training Grant in the lab of Dr. A.J. Robison, was awarded a NARSAD Young Investigator Grant. The grant provides support for the most promising young scientists conducting neurobiological research. Two year awards up to $60,000, or $30,000 per year are provided to enable promising investigators to either extend research fellowship training or begin careers as independent research faculty. Eagle will use his grant money to fund his studies of the role of hippocampal gene expression in drug action.

A summary of his funded project:
Depression and posttraumatic stress disorder (PTSD) have considerable physical and emotional costs to the individual and generate a tremendous economic burden on society. Current antidepressant treatments, however, are ineffective in nearly half of patients, thus highlighting the need for novel and more effective antidepressant medications. The hippocampus, a limbic brain region essential for memory consolidation, has been linked to stress associated with PTSD and depression, and aversive memory formation may partially underlie these diseases. Eagle hypothesized that changes in gene expression in the hippocampus may drive PTSD/depression, and that compensatory changes in hippocampal gene expression may underlie the therapeutic effects of current antidepressant compounds. A potential candidate for regulation of these gene expression changes is the transcription factor ΔFosB, which is induced in the hippocampus by antidepressant treatment. The goal of his current study is to examine the role of ΔFosB and its gene targets in hippocampus in both resilience to the depressive phenotype and in antidepressant action. The outcomes of the proposed research are far-reaching, as Eagle seeks novel targets for therapeutic intervention in clinical depression and other stress-related psychiatric disorders.

Dr. Jack Harkema was elected Chair of the Environmental and Occupational Health Assembly of the American Thoracic Society at the 2014 Annual International Conference held in San Diego, CA in May.

Ashwini Phadnis-Moghe, former EITS student and current postdoctoral research fellow in the lab of Dr. Norbert Kaminski, was named Postdoctoral Representative of the Immunotoxicology Specialty Section of the Society of Toxicology for the 2014-2015 election year.

**UPCOMING EVENTS FALL 2014**

**2014 Research Evening**
The Center for Integrative Toxicology will host our annual Research Evening to showcase trainees in the Environmental and Integrative Toxicological Sciences Training Program and their accomplishments on Thursday, December 11, 2014, 5:15 - 8:00 p.m., in the Lincoln Room at the MSU Kellogg Center. The event will include dinner, student presentations and a poster session. Please RSVP by November 20 to Kasey Baldwin, kbaldwin@msu.edu or call 353-6469.

**CIT Seminar Series**
The Center for Integrative Toxicology is excited to host a new seminar series this year that will feature experts and students in the field of toxicology.

- October 31 - Dr. Felicia Wu
- November 12 - Joe Zagorski & Alexandra Colón Rodríguez
- January 30 - Dr. Andrij Holian
- February 27 - Rance Nault & Natasha Kovalova
- March 13 - Dr. Scott Burchiel
- April 24 - Dr. Ivan Rusyn
- May 29 - Dr. Gary Miller

Look for updated information with times and locations in our weekly Toxicology Track newsletter or online at cit.msu.edu.