Columbia University
MAILMAN SCHOOL
OF PUBLIC HEALTH

Department of Environmental Health Sciences

NEWSLETTER Volume 1, Issue 1 *Spring 2013*

Message from Department Chair, Dr. Guilarte: EHS Celebrates: Grant Renewals & Other Honors

On October 26th, I hosted an event at the Faculty Club to celebrate the many noteworthy successes made by EHS faculty, staff and students. This year our NIEHS Center and Superfund Grant received top ratings on competitive renewals. Dr. Graziano, the PI on a Superfund project received almost $15 million over five years; Dr. Santella, the Director of the Center for Environmental Health in Northern Manhattan received over $5 million and as PI for an NIH Training Grant, the department was able to secure almost $1 million over five years in a competitive renewal. In an environment of economic instability, EHS faculty has helped maintain a high profile in research grants as well as teaching. Other faculty who secured NIH funding include: Drs. Herbstman, Hei, Kinney, Orjuela, Whyatt, and me.

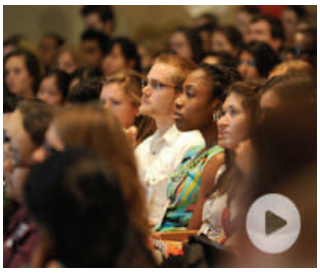
The teaching efforts of this department have also been impressive. In addition to the two new courses required for EHS students (described below), Drs. Freyer and Graziano kicked off the new interdisciplinary core teaching two new units with an EHS focus. I am proud to share that Mailman students across various departments have rated these courses very highly.

Please join me in celebrating all of the wonderful achievements of EHS!

Best Regards,

Tomás

New MPH Curriculum launched at Mailman



The fall of 2012 marked the official launch of a school wide curriculum and EHS welcomed over 30 new MPH students embarking on our new school-wide interdisciplinary curriculum. In their first semester, students participated in a new iteration of the core public health curriculum. In addition, they worked in small groups across departments on case studies drawn from current events in a new course called "Integration of Science and Practice" (ISP) providing a real-world experience as a public health professional. Another new school-wide course is Leadership & Innovation. The course aims to develop and improve MPH students' abilities in leading teams, working effectively within a team and on implementing innovative ideas within organizations and communities. More information about the school-wide new curriculum can be found here.

New courses in EHS

In response to multiple meetings with EHS Stakeholders and current employers, faculty collaborated to develop two new courses as well as enhance pre-existing courses to best meet the needs of our career bound MPH graduates. Our two new required core classes are Environmental Determinants of Human Health II (EDH II) and Analysis of Environmental Health Data. The EDH II course will allow students to gain a deeper understanding of major environmental health issues that were introduced in the EDH core course in the first semester. The course will be taught by multiple EHS Faculty members representing expertise within different topic areas. Dr. Julie Herbstman will be teaching Analysis of EHS Data which will teach students how to work with data at a fundamental level including describing, analyzing, interpreting, summarizing and presenting data.

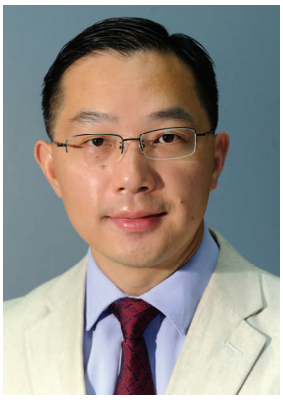
All EHS students will have the ability to select a NY State accredited Certificate across any department at the school. The EHS Department currently offers four options: Toxicology, Molecular Epidemiology, Environmental Health Policy, and our new Certificate, Climate and Health. The new Climate and Health Certificate will provide interdisciplinary researchers and practitioners the tools to understand, anticipate, and prevent adverse health consequences from climate variability and change. We also have one school-wide certificate, EHS Global Health.

Welcome, new members of EHS:

Michael Reilly, DrPH

Dr. Michael Reilly joined EHS as a new Assistant Professor in January, 2012 . He is also Director of the Division of Planning and Response at the National Center for Disaster Preparedness. Dr. Reilly's background is in occupational health and safety, risk assessment and exposure modeling, and occupational health intervention during complex exposures, specifically in those following disasters. He has worked on such environmental hazards as arsenic, PFOA, carbon black, organophosphates and various infectious diseases. As a subject matter expert in the areas of worker safety, risk assessment, health care system preparedness, emergency planning, and disaster response, Dr. Reilly is frequently called upon to provide expert testimony, consultation, and expertise. He has consulted with OSHA on the development of a national training curriculum, as well as at hospitals in the area of patient decontamination from hazardous substances incidents. He is also a Senior Lecturer for multiple Federal Agencies and is an active member of several State and National committees. Read more about his recent research related to Hurricane Sandy here.

Chun Zhou, MD, PhD



Dr. Chun Zhou joined EHS as an Assistant Professor of Clinical in May, 2012. Dr. Zhou has been studying molecular mechanisms of human diseases, such as Parkinson's disease (PD), the second most common neurodegenerative disorder in the United States. Dr. Zhou's research identified a novel mitochondrial pathway by which two PD-related proteins, PINK1 and parkin, interact via the binding of the PINK1 kinase domain to the parkin RING1 domain at the site of mitochondria to induce mitochondrial autophagy. Moreover, Dr. Zhou contributed to the identification of a novel mechanism for mitochondrial anchorage, shedding new light to our understanding of regulatory mechanisms of mitochondrial dynamics. Dr. Zhou's current research focuses on elucidation of mitochondria-related molecular mechanisms underlying interaction between environmental and genetic risk factors. One effort is to investigate how manganese exposure impairs mitochondria-mediated cellular pathways in dopaminergic neurons and to reveal the interaction between manganese and PD-related proteins, such as alpha-synuclein. These studies may offer a better understanding of manganese-induced neurotoxicity including dopamine release defects.

Sara Rose Guariglia, PhD

Dr. Sara Rose Guariglia joined EHS as an Associate Research Scientist in October 2012. Dr. Guariglia earned her Ph.D. in Biology from the CUNY Graduate Center and has a background in developmental neurotoxicology. As a doctoral student, she worked to create an environmentally relevant toxin induced mouse model of autism. During her postdoctoral studies at the Albert Einstein College of Medicine, she helped to characterize a molecular mechanism that regulates energy homeostasis that is affected by diet. As a member of Dr. Guilarte's research team, she will work to create and characterize a toxin induced mouse model of obesity and will investigate the effects of toxins on neurotransmitter release.

Kirstie H. Stansfield, PhD

Dr. Kirstie H. Stansfield joined EHS as a Postdoctoral Research Scientist in July of 2010 and started as an Associate Research Scientist in May 2012. Dr. Stansfield received her MA and PhD in Neuroscience from the University of South Florida where she researched the effect of drugs of abuse on the neurochemistry of the developing brain. Dr. Stansfield has been researching the effects of neurotoxicants on the molecular pathways of several different brain regions since joining Dr. Tomas Guilarte's lab in 2009 at Johns Hopkins University. Dr. Stansfield's main area of interest focuses on the deleterious effects of lead and manganese exposure on the developing brain and the impact these neurotoxicants have on important cellular signaling pathways by utilizing *in vivo*, *ex vivo* and *in vitro* techniques. Moreover, Dr. Stansfield helped develop a working model that provides evidence that lead exposure disrupts synaptic development and function by altering trans-synaptic signaling with subsequent changes in synaptic proteins and impairment in synaptic function.

Student Highlights

Caitlin Howe, PhD Candidate

Caitlin is a 2nd year PhD student working with Dr. Gamble on how nutrition influences arsenic toxicity in Bangladesh, where more than 57 million people are exposed to arsenic through contaminated drinking water. Dr. Gamble's group previously reported that folic acid supplementation enhances arsenic methylation and thereby lowers blood arsenic levels. Caitlin has been investigating whether folic acid facilitates arsenic methylation by increasing levels of S-adenosylmethionine, the body's universal methyl donor, and by decreasing levels of S-adenosylhomocysteine, which is a potent inhibitor of methylation reactions. In October, she presented this research at the Superfund Research Program Annual Meeting and received First Place for her poster presented in the biomedical research category: *Associations between s-adenosylmethionine, s-adenosylhomocysteine and arsenic methylation*.

Read more about her award here.

Leila Larson, MPH Candidate

Leila is a 2nd year MPH student in the EHS Global track. For her practicum, Leila spent six months in Ethiopia as an intern with the Micronutrient Initiative, an NGO working to eliminate mineral and vitamin deficiencies in low-income countries. She focused her efforts on zinc and complementary feeding interventions. More specifically, her work encompassed a national social marketing campaign for zinc in combination with low-osmolarity oral rehydration salts as a treatment for childhood diarrhea, a secondary analysis of diarrheal management practices in the country with the aim of improving and targeting message development and behavioral change communication materials, as well as a systematic review of the efficacy and effectiveness of complementary feeding practices in developing countries. Leila would like to continue research and further her education in the area of nutritional epidemiology and community nutrition, specifically with respect to micronutrient deficiencies.

Alumni Highlights

Christine Marie George, PhD

Christine Marie George completed her Ph.D. in February 2012. She is currently an Assistant Professor in International Health at the Johns Hopkins Bloomberg School of Public Health. Her primary research objective is to develop effective safe drinking water interventions that: (1) utilize local capacity; (2) are low in cost; and (3) can be easily integrated into existing national health systems. During her doctoral studies at Columbia University, she conducted two clustered randomized control trials evaluating the effectiveness of having community workers disseminate risk communication information on arsenic exposure and conduct water arsenic testing for study households in Bangladesh. Her developed intervention strategy was found to be very effective in encouraging households to use arsenic safe drinking water sources. Her current research continues to focus on the development of community and hospital based interventions for safe drinking water.

Alyssa Creighton, MPH

Alyssa received her MPH in February 2012 from the Environmental Health Policy track. She currently is working at the Columbia Center for Children's Environmental Health as the Program Coordinator for the Community Outreach and Translation Core. Her work includes collaborating with the Center's community partners, building educational materials and translating the findings of the Center's researchers to ensure effective communication to a wider audience through various media sources. Her goal is to help increase the visibility of findings from Center researchers linking environmental harms and health outcomes in children.

Read more about the Columbia Center for Children's Environmental Health here.

Recent Findings

Children's urinary phthalate metabolites and fractional exhaled nitric oxide in an urban cohort

Affiliated Investigators: Robin Whyatt, Rachel Miller, Adnan Divjan, Maria Rosa, Frederica Perera, Matthew Perzanowski, Allan Just

Researchers at the Columbia Center for Children's Environmental Health have found that children exposed to diethyl phthalate (DEP) and butylbenzyl phthalate (BBzP), found in common consumer products, have an elevated risk of asthma-related airway inflammation. All of the 244 children in the study, aged five to nine years old and living in Northern Manhattan or South Bronx, had detectable levels of phthalates in their urine. Asthma prevalence is high in these geographical areas, and higher levels of both DEP and BBzP were associated with increased levels of nitric oxide in exhaled breath. This is the first study to use exhaled nitric oxide, a biological marker of airway inflammation, in a children's phthalate exposure study. Learn more about the study here.

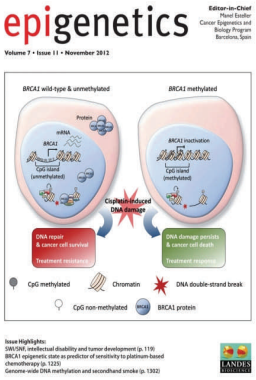
Prenatal Polycyclic Aromatic Hydrocarbon (PAH) Exposure and Child Behavior at Age 6-7 Years

Affiliated Investigators: Frederica Perera, Deliang Tang, Julia Vishnevetsky, Diurka Diaz

Environmental levels of polycyclic aromatic hydrocarbons (PAHs) in New York City may have negative impacts on child behavior. In this study, a sample of 253 children came from a group of mother-child pairs who had complete prenatal PAH monitoring, prenatal questionnaire data from the CCCEH and child behavior outcomes at 6-7 years of age. Using two complementary measures of prenatal PAH exposure, prenatally monitored air concentrations of PAH and a PAH-specific biomarker of exposure in cord blood, researchers found that high exposure was associated with symptoms of Anxiety/ Depression and Attention Problems in children aged 6-7 years old. In urban areas such as NYC, traffic and residential heating are major sources of high PAH concentrations. Fortunately, it is possible to decrease PAH emissions with the use of pollution controls, higher energy efficiency, alternative energy sources, and regulatory action to remove highly polluting sources. Read the study here.

Genome-wide aberrant DNA methylation of microRNA host genes in hepatocellular carcinoma

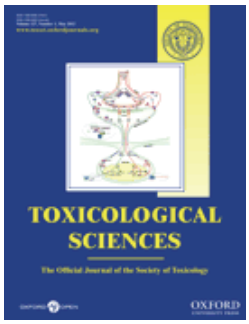
Affiliated Investigators: Jing Shen, Yu-Jing Zhang, Maya Kappil, Hui-Chen Wu, Qiao Wang, Regina Santella



Hepatocellular carcinoma (HCC) is known to be caused by a multi-step process involving accumulated genetic and epigenetic alterations, mediating the dysregulation of genes relevant to tumorigenesis. Previous studies have found that downregulation of microRNAs, small non-coding RNAs involved in gene silencing, is a common feature of HCC. Researchers studied whether DNA methylation alterations in microRNA host genes may cause deregulated microRNA expression in HCC. Significant downregulation of the microRNA precursor miR-10a was observed in tumor compared to non-tumor tissues, suggesting that aberrant DNA methylation may lead to dysregulation of miR-10a in HCC tumor tissues. Decreased miR10-a expression in tumor tissues was related to its host gene's hypermethylation, supporting a tumor suppressor role for miR-10a in the repression of downstream target oncogenes. Thus, aberrant microRNA methylation and expression markers have the potential to be used as biomarkers for assessing HCC risk and early diagnosis. See the study here.

Dysregulation of BDNF-TrkB Signaling in Developing Hippocampal Neurons by Pb^{2+}: Implications for an Environmental Basis of Neurodevelopmental Disorders

Affiliated Investigators: Kirstie Stansfield, Tomás Guilarte

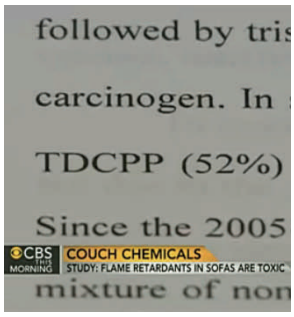


Dysregulation of synaptic development and function has been implicated in the pathophysiology of neurodegenerative disorders and mental disease. A neurotrophin that has an important function in neuronal and synaptic development is brain-derived neurotrophic factor (BDNF). In this communication, we examined the effects of lead (Pb^{2+}) exposure on BDNF-tropomyosin related kinase B (TrkB) signaling during the period of synaptogenesis in cultured neurons derived from embryonic rat hippocampi. We show that Pb^{2+} exposure decreases BDNF gene and protein expression and it may also alter the transport of BDNF vesicles to sites of release by altering a protein essential in vesicular trafficking. We identified additional negative effects of Pb^{2+} on trans-synaptic bidirectional communication that likely impairs synaptic function in the form of impaired vesicular release as well as retraction of synaptic elements. The present study demonstrates that Pb^{2+} exposure during the period of synaptogenesis of hippocampal neurons in culture disrupts multiple synaptic processes regulated by BDNF-TrkB signaling with long-term consequences for synaptic function and neuronal development. These effects are likely to alter synaptic maturation and the disruption of neurodevelopmental processes that may underlie the cognitive and behavioral deficits in Pb^{2+}-intoxicated children. See the study here.

EHS in the News!

Dr. Herbstman discusses flame retardants with CBS News

CBS News 'This Morning,' November 28, 2012



Following a study released by Duke University about the presence of a toxic flame retardant found in over 80% of sofas manufactured in the past seven years, Dr. Herbstman discussed the potential health implications with CBS' 'This Morning.' After penta BDE (a class of the polybrominated diphenyl ethers, or PBDEs, used as flame retardants) was banned from consumer products in 2005, the Duke study showed that Tris (1,3-dichloro-2-propyl) phosphate, or TDCPP, is being used as its replacement. TDCPP, which was previously phased out from children's pajamas in the 1970s, is listed as a possible carcinogen and has been shown to affect sperm quality.

As seen in the case of children's pajamas, TDCPP can be absorbed through the skin from the fabrics in which it is nested and subsequently cause the human body to excrete mutagens. While the flame retardants are in the couches to meet flammability standards, it is questionable whether the chemicals, as used, actually prevent fire-related death. However, the more serious risk seems to be the exposure to carcinogens.

Watch the interview here.

The Atlantic Consults Dr. Hei and Dr. Reilly on Environmental Hazard Exposure Post-Sandy

'The Basics of Post-Sandy Asbestos Exposure,' The Atlantic*, November 16, 2012*

Most homes constructed before the 1970s contain asbestos, primarily in insulation or floor tiles, and thus it would be no surprise to find it in wreckage from Superstorm Sandy, as remarked by Dr. Hei.

Dr. Reilly reports of other concerns post-Sandy, such as thick, dark mold infesting homes and businesses. The mold can become airborne and can lead to "respiratory problems, pneumonia and serious infections" if it enters the lungs. Floodwater is also an area of concern if it has been let stand since the storm, such as in the highly bacteria-infected Gowanus canal which was already deemed a Superfund site and, since the storm, has made its way into houses and streets. In addition to the hydrocarbons and volatile organic compounds found in the water from years of dumping, raw sewage is now another component of the water.

To protect from these environmental hazards post-Sandy, responders are urged to wear proper protective clothing, get a tetanus shot, and to alert an expert if mold, asbestos, or toxic water is observed or suspected.

See the article here.

For more EHS Faculty In the News, please check out the Spring 2013 Climate and Health Newsletter:

⇒ Dr. Shaman explains the link between weather changes and the flu

⇒ Dr. Kinney discusses the long-term public health impacts of Sandy

⇒ Dr. Knowlton elaborates on the health care costs related to climate change

Feedback

Please email Dr. Alysa Turkowitz-Lewis, Associate Director of Educational Affairs, at aat2009@columbia.edu with questions and suggestions about future newsletter content.

For more information about the Department of Environmental Health Sciences, please visit our website and our EHS Facebook Page.