

Your Health

News from the
University of Rochester
Environmental Health
Sciences Center

Summer 2014



The Environment

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Air Pollution Linked to Autism and Schizophrenia

Adapted from <http://www.urmc.rochester.edu/news/story/index.cfm?id=4100>

Changes in Brain Chemistry Caused by Air Pollution May Help Explain Observed Autistic and Schizophrenic Symptoms in Males

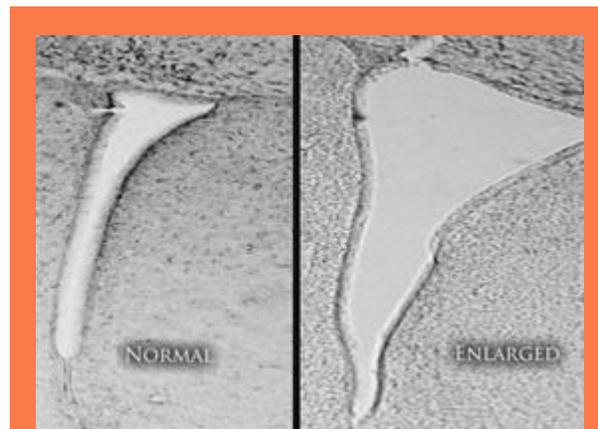
Epidemiological and other research studies increasingly point toward air pollution as a potential risk factor for brain impairment. Of greatest concern for impacts on the neurological system are ultrafine particles (smaller than 100 nanometers in diameter). The U.S. Environmental Protection Agency regulates larger particle emissions, yet no standards for ultrafine particles have been adopted.

Because of their small size, these particles can pass through cell membranes and enter the bloodstream. This increases exposure to the body's organs, including the brain. Dr. Deborah Cory-Slechta, Professor of Environmental Medicine, hypothesized that this may have a damaging effect on the brain. To test this theory, Dr. Cory-Slechta and graduate student Josh Allen designed a set of experiments using a mouse model to show whether exposure to ultrafine particles caused changes in the brain, and if so, to reveal the mechanism by which they inflict harm. The study was funded by two grants from the National Institute of Environmental Health Sciences, grant numbers ES012105 and ES001247.

The model studied two groups of young mice – one group was exposed to clean air, the other to air contaminated with ultrafine particles. The exposures were conducted during the first two weeks after birth, a critical time in the brain's development. The mice were exposed to polluted air for four hours each day for two four-day periods at concentrations similar to rush hour traffic exposure in US cities such as Los Angeles, CA and Minneapolis, MN.

The research team compared the mouse pups' brains at 14 and 55 days after birth. They also compared 270 day-old mouse brains collected from a different study. Longitudinal comparison allowed the researchers to look for both temporary and long-term effects.

The researchers found that air pollution early in life produced harmful changes in the brains of mice, including an enlargement of part of the brain that corresponds to changes seen in humans who have autism and schizophrenia. As in autism and schizophrenia, the changes occurred predominately in males.



Enlarged lateral ventricle from the brain of a male mouse exposed to air pollution as a pup. Similar enlargement is seen in some humans who have autism and schizophrenia.

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Recognitions and Awards

Air Pollution, continued...



*Dr. Deborah Cory-Slechta
(Photo by Steve McCaw)*

Behavioral tests with the young adult male mice in the study demonstrated poor performance in short-term memory, learning ability, and impulsivity tests.

The permanent effects seen in male mice included inflammation throughout the brain and enlarged lateral ventricles (chambers that contain cerebrospinal fluid). The inflammation appeared to inhibit full brain development around the ventricles. Increased size of the lateral ventricle has been associated with poor neuro-developmental outcomes in children, and has been observed in some cases of autism and schizophrenia. Additionally, brains of mice in the experiments had elevated levels of glutamate, a neurotransmitter. Increased glutamate is also seen in humans with autism and schizophrenia.

Changes were also observed in the brains of very young female mice in the studies, but they did not appear to be permanent (the changes were not seen in older female mice). Additional research is warranted to address whether higher pollution levels or more extended periods of developmental exposures would also permanently affect female brain development.

These findings offer new evidence to support past epidemiological findings that link air pollution to neurological and other disorders. They also raise new questions about whether air quality standards in the US and elsewhere sufficiently protect children's growing brains from ultrafine particulates. After completing his dissertation, Dr. Allen accepted a Women's Health and the Environment over the Entire Lifespan (WHEEL) scholarship to further study this relationship. Funded by the Building Interdisciplinary Research Careers in Women's Health (BIRCWH) program from the National Institutes of Health Office of Research on Women's Health and other co-sponsors, the WHEEL program provides salary and research support for junior faculty members. Refer to page 11 for more information about Dr. Allen's ongoing work.

Center Updates

Increasing Awareness of Chemicals in Personal Care Products

In February 2014, the EHSC Community Outreach and Engagement Core and the Breast Cancer Coalition of Rochester co-hosted an informal discussion about the recent rollout of the California Safe Cosmetics Program Product Database (CSCP). The CSCP is an online registry of personal care products that contain one or more chemicals known to cause cancer or reproductive toxicity.

The discussion started with a presentation by Dr. Assunta Ritieni, a medical resident at University of Rochester Medical Center. Before attending the California School of Osteopathic Medicine (Touro University), she worked as an epidemiologist for the California Department of Public Health. There she designed and conducted HIV/AIDS research among at-risk populations in California and later led efforts to reduce worker exposure to carcinogenic chemicals (including implementing the California Safe Cosmetics Act and building the product database). After Dr. Ritieni's presentation, COEC staff moderated a discussion among local community leaders interested in learning about and leveraging the CPSC database in New York. Participants discussed potential opportunities to use the California database for enhancing chemicals exposure prevention efforts. The event resulted in new connections for EHSC researchers and an article in *Voices of the Ribbon*, the Breast Cancer Coalition of Rochester's newsletter reaching over 10,000 cancer survivors and supporters.



- » The chemicals listed in the California Safe Cosmetics Act can be found online at <http://www.cdph.ca.gov/programs/cosmetics/Documents/chemlist.pdf>
- » The Product Database can be found online at <https://safecosmetics.cdph.ca.gov/search/>

Center Research Aligns with Local Efforts to Reduce Public Exposures to Environmental Tobacco Smoke and E-Cigarettes

In May, advocates for smoke-free parks, politicians, and community residents gathered to celebrate the City of Rochester's landmark smoking ban passed by Rochester City Council in December 2013. The ban applies to all city-maintained parks, including ball fields and trails. The ban occurred at a particularly relevant time for the Environmental Health Sciences Center, as several center researchers are actively investigating the health effects of smoking and environmental exposure to tobacco smoke (often referred to as second- or third-hand smoke) and other tobacco products including electronic cigarettes (e-cigarettes).

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Center Updates

Tobacco Smoke, continued...

Recent publications from the Rahman lab highlight significant findings about the impact of tobacco smoke on circadian daily rhythm and the mechanisms by which cigarette smoke leads to chronic lung diseases. In February, graduate student Claire McCarthy (Sime lab) presented her findings on the mechanisms by which smokeless tobacco products contribute to oral cancer. Looking forward to new research goals, Dr. Richard Phipps, Dean's Professor of Environmental Medicine, received an NIH/NHLBI funding award to study potential clinical use of a lipid (Resolvin D1, or RvD1) to reduce cigarette smoke-induced lung inflammation. RvD1 is part of a class of mediators known as proresolving lipid mediators, which recent studies show may inhibit inflammation and promote cell repair. Dr. Isaac Sundar, a senior post-doctoral fellow in the Rahman Lab, also received an American Lung Association Biomedical Grant to study the effects of tobacco smoke exposure on epigenetics of premature lung aging.

Center Members Present on Health Effects of Early-life Exposures

A June symposium hosted by the URM Department of Pediatrics, "*Early-life Antecedents of Children's Health and Disease*," featured talks by three center researchers, Drs. Deborah Cory-Slechta, Michael O'Reilly (Professor of Pediatrics), and Gloria Pryhuber (Professor of Pediatrics). Their talks addressed research on the synergistic effects of heavy metals exposure and prenatal stress, oxygen exposure for premature infants, and new approaches to understanding lung disease beginning in early life. The keynote speaker was Dr. Ed McCabe, Chief Medical Officer for the March of Dimes, who spoke to a mixed audience of students, faculty, and community members about the March of Dimes' successes in reducing infant mortality and future advocacy and action goals. Dr. Joshua Allen, Research Assistant Professor of Environmental Medicine, joined the afternoon panel, where he presented ongoing research on the effects of postnatal exposure to ultrafine particles on the central nervous system.



Center members present at the March of Dimes Symposium. From top to bottom: Dr. Deborah Cory-Slechta, Dr. Michael O'Reilly, Dr. Gloria Pryhuber, and Dr. Ed McCabe (March of Dimes)

Center Updates

Internationally-Recognized Researchers Visit Rochester to Discuss Environmental Effects on the Epigenome and Genetic Expression



Presenters and students gathered together after the workshop for lunch and further discussion.

In April, the URM Department of Environmental Medicine hosted an Environmental Epigenomics workshop co-chaired by Center members Dr. Irfan Rahman and Dr. Deborah Cory-Slechta, along with Dr. Michael Bulger (Department of Pediatrics). Presenters included Dr. Trevor Archer (NIEHS), Dr. Cheryl Walker (Texas A&M), Dr. Dana Dolinoy (University of Michigan), and Dr. Moshe Szyf (McGill University); discussion was led by Dr. Michael Bulger. This workshop brought colleagues from across the US together to discuss current

techniques used to study environmental epigenomics and research findings on environmental factors influencing epigenomics.

In connection with this workshop, the EHSC COEC and the Child Care Council co-hosted a public talk by Dr. Dana Dolinoy, John G. Searle Assistant Professor of Environmental Health Sciences at the University of Michigan's School of Public Health. Her talk, entitled "A Tale of Two Mice or Why DNA Is Not (Necessarily) Your Destiny," addressed how chemicals including Bisphenol A (BPA) and lead may affect the body by altering normal gene activity. The talk was attended by community members, Child Care Council staff and New York State Senator Ted O'Brien. Several media outlets reported the event, including WXXI, WHEC and The Daily Record.



From left: Barbara-Ann Mattle (CEO, Child Care Council), Dr. Dana Dolinoy, Senator Ted O'Brien, and Kate McArdle (Child Care Council) (Photo by Tom Morrissey)

Center Updates

Enhancing Perinatal Environmental Health Education

Community Outreach and Engagement Core (COEC) staff at the EHSC continue a series of projects aimed at evaluating environmental health knowledge and offering education for healthcare professionals – particularly OB-GYN and family medicine residents – and pregnant women. This COEC focus reflects research showing that pregnancy is a unique window of susceptibility for health impacts from environmental exposures. Therefore, environmental health education is important for pregnant women. However, uncertain science and health effects that often manifest later in life make environmental health information difficult to accept, interpret, and act upon in the face of more pressing health concerns.

The COEC utilizes myriad strategies to address these barriers, building on past center research to inform strategies and messaging. In 2013, Dr. Katrina Korfmacher, associate Professor of Environmental Medicine, partnered with Dr. Ann Dozier (Department of Public Health Sciences) to add environmental health questions to the Pregnancy Risk Assessment Monitoring System (PRAMS) survey, which was administered to over 1,000 pregnant women in Monroe County, NY. Among other results, their findings suggest that few women are counseled by health care providers about environmental health during pregnancy, and that there is a need for better environmental health surveillance. In response, COEC staff initiated several partnerships to conduct environmental health education for providers and pregnant women.

Dr. Korfmacher and COEC program manager Valerie Garrison partnered with Perinatal Network of Monroe County (PNMC) and Highland Family Medicine (HFM) to reach pregnant women in group prenatal care. PNMC worked with HFM to pilot the Centering Pregnancy™ curriculum with two prenatal groups. The model engages a group of 8-10 pregnant women throughout their pregnancies with regular sessions covering a wide range of topics. The curriculum does not, however, address environmental health hazards. COEC staff reviewed the curriculum to identify potential sessions in which environmental health messages can be worked in. They developed and piloted lead and asthma modules with two groups, developed and piloted materials to train nursing staff in these topics, and supplied activity kits for future facilitated discussions.



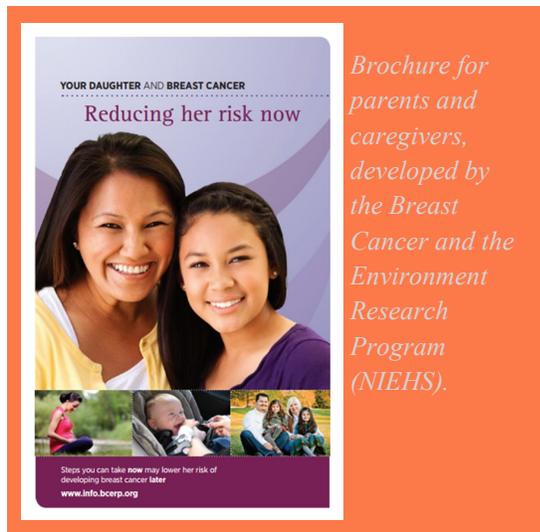
Training kits for groups included items to help guide discussion about how to identify and address home health hazards such as lead and asthma triggers.

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Center Updates

Perinatal Environmental Health Education, Continued...

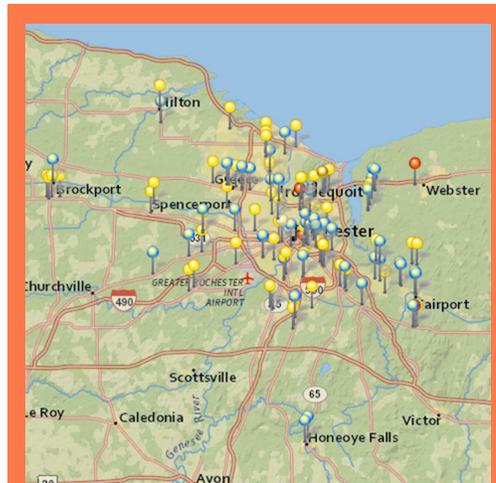
The COEC continues to work with HFM and PNMC to discuss the potential for further integration of environmental health into group prenatal care.



COEC staff also partnered with the Breast Cancer Coalition of Rochester (BCCR) and Finger Lakes Occupational Health Services (FLOHS) to build understanding and awareness of the intergenerational impacts of environmental chemicals on health. The partners adapted materials developed by the Breast Cancer and the Environment Research Program (BCERP, NIH) for outreach to four key audiences: young women living in high risk areas; occupationally-exposed women; breast cancer survivors, their families, and supporters; and public health professionals. Brochures were handed out at health fairs and other public events; two summer interns surveyed brochure recipients about the brochures’

effectiveness. BCCR interns canvassed over 120 nail salons to provide information to young female workers and lay a foundation for future outreach to this population. COEC staff also conducted focus groups with family medicine residents to review materials for healthcare providers and receive their feedback on effectiveness, and additional support or resources healthcare providers need in order to feel comfortable sharing this information with patients.

Additional education efforts for the professional medical and research community include several presentations by Dr. Korfmacher about perinatal environmental health education, overviews of recent center research findings such as Dr. Deborah Cory-Slechta’s work on heavy metals and stress, and the BCERP outreach materials. Dr. Korfmacher and Ms. Garrison also authored a summary on lead and pregnancy for PeriFacts, an online subscription-based program that reaches over 10,000 health care professionals. The PeriFacts Lead Case outlines recent developments in lead poisoning research, screening and testing guidelines, and counseling messages.



Monroe County nail salons mapped by BCCR interns. Primary languages of workers included English (blue), Vietnamese (yellow), Chinese (red), and Korean (white).

Center Updates

2014 Annual Toxicology Retreat



Dr. Guillette is Director of Marine Biomedicine and Environmental Sciences, and Professor of Obstetrics and Gynecology at the Medical University of South Carolina; he also serves as Director and Endowed Chair at the Center for Marine Genomics, Hollings Marine Laboratory.

The Department of Environmental Medicine Toxicology Training Program Annual Retreat was held on May 29th. The event started with a keynote lecture by Dr. Louis J. Guillette Jr., titled “Health or Disease: Environmental Contaminants, Epigenetics and the Developing Embryo.” Dr. Guillette’s talk reviewed research on humans as well as sentinel wildlife species such as the American alligator and Nile crocodile, examining the effects of various environmental contaminants on the development and functioning of the endocrine and reproductive systems. Sentinel species have similar molecular, cellular and physiological systems to humans, which allows research on these animals to help illuminate human impacts.

2014 Annual Toxicology Retreat graduate student and postdoc awards:

- » **Brian Palmer:** received awards for **Best 1st Year Student Poster** and **Best Question**
- » **Jennifer Judge:** received **Best Overall Poster** award
- » **Emma Reilly, PhD:** received the **Best Presentation** award

Save the Date!

The Annual Toxicology Picnic will be held on September 13, 2014 at Powder Mills Park.



Recognitions and Awards

Graduate student and postdoc awards:

- » **Joshua Allen, PhD: Harold C. Hodge Award** for best Ph.D. thesis in the Environmental Health Sciences
- » **Amanda Croasdell: William F. Neuman Award** for exemplary scholarship and citizenship in the Toxicology Training Program. Amanda was also awarded a CTSI Trainee Grant to study “*Specialized proresolving mediators act as novel therapeutics against infection*” (2014-2015)
- » **Allison Greminger, PhD: Robert F. Infurna Award** for publishing the best research paper in toxicology
- » **Chad Lerner, PhD: University of Rochester Medical Center Pulmonary Training Grant** to study the toxicity of e-cigarettes and other tobacco products
- » **Lisa Prince and Marissa Sobolewski, PhD: First annual Weiss Toxicology Scholar Award** for talented future leads in the field of toxicology, particularly those with an interest in neurotoxicology
- » **Emma Reilly, PhD: Poster abstract selected for a symposium session at the American Association of Immunologists Annual Meeting (“Neonatal oxygen supplementation in mice leads to persistent modifications in NK cell functions during influenza A virus infection”)**
- » **Emily Resseguie: Graduate Women in Science Travel Award** for the American Thoracic Society conference (May 2014)
- » **Isaac Sundar, PhD: American Lung Association Biomedical Grant** to study the effects of tobacco smoke exposure on epigenetics of premature lung aging
- » **Marissa Terry: University of Rochester Clinical and Translational Science Institute Consultation Services Award (“Social Correlates of Stress in Wild Chimpanzees”)**



Dr. Bernie Weiss celebrates with graduate student Lisa Prince (right) and Dr. Marissa Sobolewski (left), first ever recipients of the Weiss Toxicology Scholar Award.

Welcome to the Center

New Toxicology Training Students

- » Kelly Hanson (York College of Pennsylvania)
- » Katrina Jew (UC Davis)
- » Shannon Lacy (Major, US ARMY)
- » Keith Morris-Schaffer (SUNY Geneseo)
- » Sarah Phelan (Roberts Wesleyan College)
- » Candace Wong (University of Illinois at Urbana-Champaign)
- » Elana Youssef (Kean College of New Jersey)

New EHSC Faculty

Dr. Joshua (Josh) Allen



Dr. Josh Allen is a Research Assistant Professor in the Department of Environmental Medicine. Dr. Allen joined the Center faculty as a Building Interdisciplinary Research Careers in Women's Health (BIRCWH) Scholar after completing his doctorate through the University of Rochester's Toxicology Training Program in 2013. Dr. Allen's research focuses on how early life and *in utero* exposures to ambient air pollutants, including ultrafine particles, adversely affect the central nervous system. He aims to clarify the role of such exposures in the etiology of neurodevelopmental disorders, such as autism. In addition to expanding his research using *in vivo* models, Dr. Allen is pursuing additional training in epidemiology and is working with faculty in the Kirch Developmental Services Center and Center members Dr. Dave Rich, Associate Professor of

Public Health Sciences, and Dr. Edwin Van Wijngaarden, Associate Professor of Public Health Sciences, to complete a case-control study examining *in utero*/early life exposure to air pollutants and later risk for autistic spectrum disorder diagnosis.

He received the 2013 Robert Infurna Award for best scientific publication and the 2014 Harold C. Hodge Award for especially meritorious research from the Department of Environmental Medicine/Toxicology Training Program.

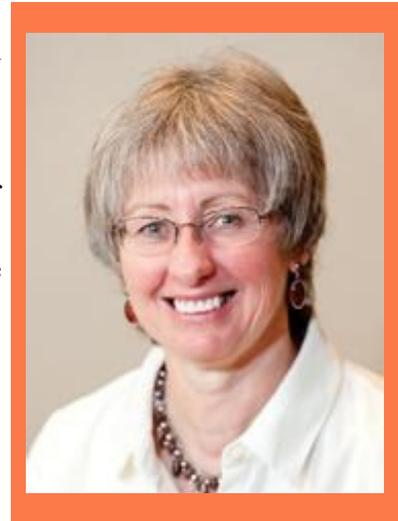
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Welcome to the Center

New EHSC Faculty, Continued...

Dr. Jacqueline (Jacky) P. Williams

Dr. Jacky Williams joined the Center as Professor of Environmental Medicine & Radiation Oncology after more than twenty years on the faculty of URMC and many years of close collaboration with a number of Center members, including Drs. Jack Finkelstein, Kerry O'Banion, Rick Phipps and Sally Thurston. Her research focuses on the complex late response of normal tissues to radiation injury, whether it comes in the form of high dose radiation (therapeutic/accident-related) or low dose exposure (environmental/space-related), and she has particular interests in lung, brain, skin and their interaction through the inflammatory and immune systems. Dr. Williams is currently the PI of the University of Rochester's Center for Medical Countermeasures against Radiation, a U19 grant, which has its main goal of bringing together the knowledge, technologies, and effort of a multidisciplinary team to develop drugs to



mitigate and treat the effects of radiation exposure due to radiological terrorism or accident (radoncu19.urmc.rochester.edu). She hopes to generate new collaborations through her

interactions with other members of the EHSC, applying findings from the CMCR to risk assessment and mitigation of environmental radiation exposures. Dr. Williams serves as a member of the Advisory Council for the National Space Biomedical Research Institute, was chair of the Scientific Advisory Committee for the Center for Acute Radiation Research, and is a council member on the National Council on Radiation Protection and Measurements. Dr. Williams has received numerous teaching and research awards, including the 2014 John Yuhas Award for Excellence in Radiation Research and is a Fellow of the American Society of Radiation Oncology (ASTRO).