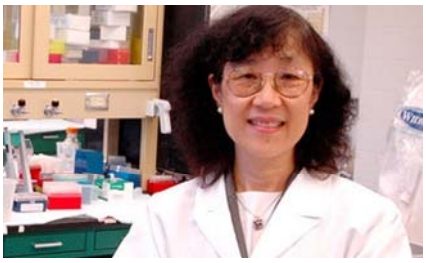
Issue 35

INTERFACE:
GENES AND THE ENVIRONMENT

CENTER FOR ENVIRONMENTAL GENETICS UNIVERSITY OF CINCINNATI Summer 2008

From the Director, Dr. Shuk-mei Ho



Environmental health sciences research continues to grow at the University of Cincinnati, spear-headed by Center for Environmental Genetics investigators and mentees. CEG scientists have been awarded new research and training grants from NIEHS (see page seven for the full story). Students from graduate and post-doctoral fellow levels have taken the initiative, under the mentorship of CEG investigators, to attain funding for their research interests and career development. We are very proud of the achievements of our young investigators!

The Department of Environment Health weekly seminar series, held on Wednesdays at 10:00 a.m. in Kehoe Auditorium, will include several CEG members and a CEG Invited Speaker this quarter, including:

October 8: Dr. Glenn Talaska *The BEI for polycyclic aromatic compounds: Is it protective?*
October 22: Dr. Kim Dietrich and Dr. Kim Cecil *Lifelong consequences of early low to moderate exposure to lead: Neuroanatomical, neurometabolic, and neurofunctional outcomes.*
November 5: Dr. Michael Borchers
November 11: Dr. Nira Ben-Jonathan *Bisphenol A : Effects on human adipose tissue and breast cancer*
November 19, Dr. Kenneth Ramos, Director of the University of Louisville P30 Center for Environmental Genomics and Integrative Biology, will be presenting as the CEG Special Speaker for Fall quarter.

The CEG would like to thank **Dr. John DiGiovanni,** Director of the University of Texas MD Anderson Cancer Center P30 Mechanisms and Prevention of Environmental Disease, for his presentation on the role of signal transducer and activator transcription 3 (Stat3) in multistage carcinogenesis, on September 5th.

Bisphenol A and Adiponectin Release: Relevance to the Metabolic Syndrome

Bisphenol A (BPA) is a component of a variety of plastics. It is found in polycarbonate bottles and epoxy linings of food cans and can leach into food that comes into contact with these plastics. Most individuals that have been tested have detectable BPA in their systems. Research by CEG investigator **Dr. Nira Ben-Jonathan** examined the direct effect of BPA at concentrations commonly measured in human blood (0.1-10 nanomolar) on adipose tissue.

Human fat tissue was obtained from patients undergoing cosmetic (breast reduction and abdominoplasty) and gastric bypass procedures. Small pieces of fat tissue were exposed to various concentrations of BPA for 6 hours. We then measured the amount of adiponectin released by the tissue. We chose adiponectin as our endpoint because of its importance to metabolic homeostasis. Adiponectin is a protein secreted exclusively by adipose tissue. Adiponectin plays an essential role in maintaining insulin sensitivity, blood glucose, and lipid levels. Low adiponectin levels are found in both obesity and the metabolic syndrome.

Our study found that BPA, at environmentally relevant concentrations, caused a significant decrease in the amount of adiponectin secreted by fat tissue in culture. These results were observed using fat from different anatomical locations in multiple individuals. The implication of these results is that BPA may contribute to the development of the metabolic syndrome, which can lead to coronary artery disease, atherosclerosis, and type II diabetes. Unlike many other studies, these experiments were done using human tissues rather than animal models and BPA was used at concentrations commonly found in people. These results clearly advocate the need to further examine the adverse effects of BPA on human metabolism and metabolic diseases.

Interface is supported by NIH grant # P30 ES06096 from the National Institute of Environmental Health Sciences, and is published by the Center for Environmental Genetics
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Childhood Lead Exposure Associated With Criminal Behavior in Adulthood

New research from the University of Cincinnati (UC) reports the first evidence of a direct link between prenatal and early-childhood lead exposure and an increased risk for criminal behavior later in life.

Kim Dietrich, PhD, received a CEG Pilot Project Grant in 2005 to initiate this work, which has resulted in an NIEHS-supported R01 (ES015559).

Based on long-term data from a childhood lead study in Cincinnati, Ohio, Kim Dietrich, PhD, and his team have determined that elevated prenatal and postnatal blood-lead concentrations are associated with higher rates of criminal arrest in adulthood.

"Previous studies either relied on indirect measures of exposure or failed to follow subjects into adulthood to examine the relationship between lead exposure and criminal activity in young adults," explains Dietrich, principal investigator of the study and professor of environmental health at UC. "We have monitored this specific sub-segment of children who were exposed to lead both in the womb and as young children for nearly 30 years," he adds.

"We have a complete record of the neurological, behavioral and developmental patterns to draw a clear association between early-life exposure to lead and adult criminal activity." Dietrich says few studies have attempted to evaluate the consequences of childhood lead exposure as a risk of criminal behavior.

The UC-led study is the first of its kind to demonstrate an association between developmental exposure to lead and adult criminal behavior. Dietrich and his colleagues report their findings in the May 27, 2008, issue of the journal PLoS Medicine. This new study is part of a long-term lead exposure study conducted through the Cincinnati Children's Environmental Health Center, a collaborative research group funded by the National Institute of Environmental Health Sciences (NIEHS) and U.S. Environmental Protection Agency (EPA) that involved scientists from the UC College of Medicine and Cincinnati Children's Hospital Medical Center.

Led by Dietrich, researchers recruited pregnant women living in Cincinnati neighborhoods with a higher concentration of older, lead-contaminated housing. Recruitment took place at four prenatal clinics between 1979 and 1984. Dietrich's team has monitored this population group since birth to assess the long-term health effects of early-life lead exposure.

Of the original 376 newborns recruited, 250 were identified for the current study. Researchers measured blood-lead levels during pregnancy and then at regular intervals until the children were 6 ½ years old to calculate cumulative lead exposure.

Blood-lead level data was then correlated with public criminal arrest records from a search of Hamilton County, Ohio, criminal justice records. These records provided information about the nature and extent of arrests and were coded by category: violent, property, drugs, fraud, obstruction of justice, serious motor vehicle, disorderly conduct and other offenses. Researchers found that individuals with increased blood-lead levels before birth and during early childhood had higher rates of arrest—for both violent and total crimes—than the rest of the study population after age 18.

Approximately 55 percent of the subjects had at least one arrest—the majority of which involved drugs (28 percent) or serious motor vehicle violations (27 percent). The strongest association between childhood blood-lead level and criminal behavior was for arrests involving acts of violence. Dietrich says that although both environmental lead levels and crime rates in the United States have dropped in the past 30 years, they have not done so in a uniform way.

"Lower income, inner-city children remain particularly vulnerable to lead exposure," he explains. "Although we've made great strides in reducing lead exposure, our findings send a clear message that further reduction of childhood lead exposure may be an important and achievable way to reduce violent crime.

"Aggressive or violent behavioral patterns often emerge early and continue throughout life," adds Dietrich. "Identifying the risk factors that may place youth on an early trajectory toward a life of crime and violence should be a public health priority."

(continued on page 3)

Childhood Lead Exposure Associated With Criminal Behavior in Adulthood (cont)

(continued from page 2)
Study coauthor John Wright, PhD, a member of UC's criminal justice faculty who studies the impact of factors like genetics, psychology and biology on criminality, says he had limited expectations for how strong a correlation between lead exposure and criminality could be established.

"I did not expect we would see an effect, much less a substantive effect and even less likely a highly resilient effect," says Wright. "The fact that we are able to detect the effects from childhood exposures now into adulthood stands as a testament of lead's power to influence behavior over a long period of time."

UC coauthors include M. Douglas Ris, PhD, Richard Hornung, PhD, Stephanie Wessel, Bruce Lanphear, MD, Mona Ho, and Mary Rae, PhD. Funding for the study came from grants from the NIEHS and U.S. EPA.

CEG Next-Generation Biomedical Investigator: Tianying Wu

The Center for Environmental Genetics Career Development Core, directed by Dr. Grace LeMasters and Dr. Daniel Woo, supports the development of the next generation of environmental health scientists. The Next-Generation Biomedical Investigator (NGBI) development track is designed to attract junior investigators or new-to-environmental-health-science investigators who have begun their research careers but need help crossing the interface between environmental health sciences and a basic, translational, or clinical discipline. NGBIs are in a limited pool of people eligible to apply for mentor-mentee Pilot Project Grants from the CEG.

Tianying Wu, M.D., Ph.D., Sc.M., was appointed in 2007 as the first CEG Next-Generation Biomedical Investigator (NGBI).

The first CEG NGBI to be appointed is Dr. Tianying Wu, M.D., Ph.D., Sc.M. She is a tenure-track assistant professor who joined the Biostatistics and Epidemiology Division, Department of Environmental Health in 2007. Dr. Wu earned her medical degree from Capital University of Medical Sciences in Beijing, followed by her clinical practice at Beijing Medical University People's Hospital. She later received her Ph.D. in nutrition from the University of North Carolina and joined Harvard School of Public Health in 2002, where she completed her postdoctoral training in nutrition and epidemiology and her master's degree of science in epidemiology.

Dr. Wu's research focus is to understand the biologic pathways leading to the development of chronic diseases and to explore dietary/lifestyle factors that can modify these pathways for future prevention. Dr. Wu's current research base is the Health Professionals Follow-up Study and the Nurses' Health Study, where thousands of plasma samples are available for determining biochemical predictors of diseases. Dr. Wu has evaluated several oxidative stress biomarkers and established the fluorescent oxidation marker in her lab for large epidemiologic studies. Dr. Wu's research is closely integrated with basic research, and she has a laboratory focusing on exploring and applying new biomarkers into large-scale human studies. Dr. Wu's current projects include studies on biomarkers, especially oxidative stress related biochemical predictors of cancer and coronary heart disease in non-diabetic and diabetic men and women, and on dietary predictors of biomarkers related to carcinogenesis, insulin resistance and metabolic syndrome.

Dr. Wu also has long-standing interests in modification of diet to improve health through nutrition interventions and the implication of nutrition epidemiology methods in environmental epidemiology, focusing on the interaction between nutrition and occupational exposures in the development of complex diseases.

The 2008 NGBIs will be announced on October 15, 2008 at 10:00 a.m. in Kehoe Auditorium, prior to the Wednesday Department of Environmental Health seminar.

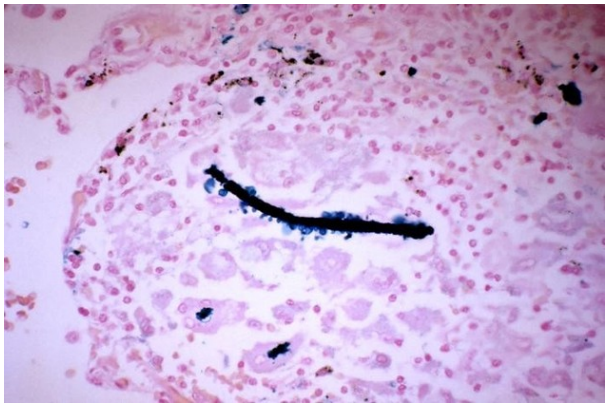
Articles on page 2, 4, 5, 6 and 8 were contributed by Amanda Harper and the University of Cincinnati Academic Health Center Public Relations & Communications, which also supplied many of the photographs.

Low-Level Exposure to 'Asbestos-Like Mineral' From Montana Vermiculite May Increase Risk for Lung Disease

Workers exposed to low levels of an asbestos-like mineral from Montana more than two decades ago are at an increased risk for lung disease today, according to research from the University of Cincinnati (UC). Vermiculite is a mineral with a flaky, fluffy-looking structure. Previous studies revealed that the vermiculite ore mined in Libby, Mont., contained increased levels of an asbestos-like mineral fiber that can become airborne and inhaled when used in manufacturing.

In a 25-year follow-up study of workers at a plant which stopped using Libby vermiculite in 1980, current chest X-rays revealed that 20 percent of workers who experienced low cumulative exposure to these fibers had changes in the lining around their lungs. In the group with the highest exposure, changes on chest X-rays were noted in 54 percent of workers.

James Lockey, MD, senior research investigator, says the study indicates that this particular asbestos-like mineral contained in the Libby vermiculite ore can cause chest X-ray changes at previously unrecognized lower exposure levels.



An example of how asbestos and asbestos-like mineral fibers lodge in lung tissue.

"Workers with low-level exposures to Libby vermiculite ore may not have obvious health effects right away, but the past exposure is something of which their physicians should be aware," says Lockey, a UC professor of pulmonary and environmental health.

"Once inhaled, these fibers are very persistent and stay in the lung for a long time," he explains. "They lodge in the lung tissue and the tissue that lines the chest wall and cause inflammation, which can lead to chronic lung problems and diseases."

His team reports its findings in the March 15, 2008, issue of American Journal of Respiratory and Critical Care Medicine. Records show that until the Montana mine was closed in 1990, it provided up to 80 percent of the world's vermiculite supply—which was widely used in both commercial and residential applications, including home insulation, packing materials, construction materials and gardening products. Vermiculite ore is now mined from other sources that reportedly do not contain similar asbestos-like mineral fibers.

"The chest X-ray changes associated with the low cumulative fiber exposure are a public health concern," Lockey adds. "The Libby vermiculite ore was widely distributed across the United States for residential and commercial use, which means it could impact not only the workers who processed it but also consumers who used it for home insulation."

This project received a Pilot Project Grant from the CEG in order to investigate the roles that genetic variation may play in the formation of pleuritis.

Lockey's team conducted a 25-year review of available data on workers who used the Libby vermiculite as an inert carrier for lawn care products. About 84 percent of the original 513 workers were living and 280 workers were able to participate fully in the study. Former workers were asked to get a current chest X-ray and complete an interview with researchers about their lung health and job history since the original study was conducted. Chest X-rays were taken and reviewed independently by three radiologists to determine the extent of changes in the chest cavity.

"Our findings indicate that exposure within an industrial process to Libby vermiculite ore is associated with pleural thickening at low lifetime cumulative fiber exposure levels," says Lockey. "We've discovered the high propensity of these asbestos-like fibers in Libby vermiculite to dramatically increase the prevalence of pleural changes 25 years after exposure ended.

"This study serves as a reminder that there are naturally occurring asbestos-like mineral fibers in our environment that are not currently regulated," he adds. "More attention should be given to this issue so we can properly regulate and control these substances to minimize human health exposure risks."

Funding for this study was provided by the Centers for Disease Control and Prevention's Agency for Toxic Substances and Disease Registry and National Institute of Environmental Health Sciences. Members of the research team included UC's Amy Rohs, MD; Kari Dunning, PhD; Rakesh Shukla, PhD; Huihao Fan; Tim Hilbert; Eric Borton; Jerome Wiot, MD; Ralph Shipley, MD; and Grace LeMasters, PhD. Former UC faculty member Cristopher Meyer, MD, and Vikas Kapil, DO, of the CDC, were also involved in the study.

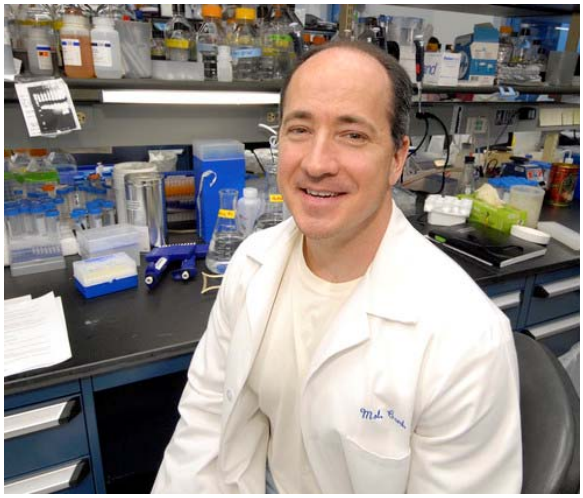
UC, Cincinnati Children's Researcher Receives Howard Hughes Medical Institute Investigator Designation

Jeffery Molkentin, PhD, a scientist and professor at the UC College of Medicine and Cincinnati Children's Hospital Medical Center, has been named one of 56 new Howard Hughes Medical Institute (HHMI) investigators.

This will place Molkentin among an elite group of the nation's most promising scientists who are challenged to extend the boundaries of science by pursuing bold and creative research. A researcher in the division of molecular cardiovascular biology at Cincinnati Children's and the department of pediatrics at UC, Molkentin was among 1,070 scientists who applied for the appointment. In making its selections, HHMI sought outstanding scientists studying biomedical problems in a variety of disciplines.

"We look for scientists who have demonstrated originality and productivity in biomedical research and show exceptional potential for future contributions," says Jack Dixon, PhD, vice president and chief scientific officer at HHMI. "This infusion of fresh scientific talent allows us to refresh our commitment to original and creative biomedical research."

Molkentin's research has advanced the understanding of molecular events behind heart disease and muscular dystrophy. His team studies the signaling mechanisms that control cell growth, differentiation and death. One study from Molkentin's laboratory, published this spring in the science journal Nature Medicine, identified a possible a new treatment for muscular dystrophy. The research showed an investigational antiviral drug undergoing human trials in Europe for hepatitis C infections may also have potential in reducing muscle cell damage in muscular dystrophy patients.



Jeffery Molkentin, PhD, is the first UC scientist to be receive the Howard Hughes Medical Institute investigator award at the mid-career level.

Molkentin says the HHMI award will allow him to expand his research in a more exploratory way.

"HHMI encourages innovative research," he says. "This award is typically given to individuals from institutions that have strong and pioneering programs. This shows the success of both UC and Cincinnati Children's. It is an example of how the tie between these two institutions can strengthen the impact of our research on a local and national scale."

The HHMI provides long-term, flexible funding to about 300 Hughes scientists across the nation, allowing researchers to pursue their scientific interests no matter where they lead.

Molkentin is the fourth HHMI investigator ever appointed in Ohio, the third at UC and first to be named while at Cincinnati Children's.

The non-profit medical research organization—founded in 1953 by aviator-industrialist Howard Hughes—has invested more than $8.3 billion in the last 20 years to support, train and educate the nation's most creative and promising scientists. The institute is based in Chevy Chase, Md., just outside Washington, D.C.

Once selected, investigators continue to be based at their host institutions but become HHMI employees and derive their salaries and benefits from the institute. The collaboration agreement also provides for payment to the host institution for a researcher's laboratory space. Investigators retain their faculty positions and continue to participate in teaching and other professional activities at their university or research institute.

Molkentin joined UC and Cincinnati Children's in September 1997, after completion of his post-doctoral fellowship at the University of Texas Southwestern. He received his bachelor's degree at Marquette University and his doctoral degree at the Medical College of Wisconsin, both in Milwaukee. He currently serves on the editorial boards of the Journal of Molecular and Cellular Cardiology, Physiological Reviews and the Journal of Biological Chemistry.

Many U.S. Public Schools in 'Air Pollution Danger Zone'

One in three U.S. public schools are in the "air pollution danger zone," according to new research from the University of Cincinnati (UC). UC researchers have found that more than 30 percent of American public schools are within 400 meters, or a quarter mile, of major highways that consistently serve as main truck and traffic routes. Research has shown that proximity to major highways—and thus environmental pollutants, such as aerosolizing diesel exhaust particles—can leave school-age children more susceptible to respiratory diseases later in life.

Research by Sergey Grinshpun, PhD, indicates that new schools should be built further from major highways.

"This is a major public health concern that should be given serious consideration in future urban development, transportation planning and environmental policies," says Sergey Grinshpun, PhD, principal investigator of the study and professor of environmental health at UC. To protect the health of young children with developing lungs, he says new schools should be built further from major highways.

"Health risk can be mitigated through proper urban planning, but that doesn't erase the immediate risk to school-age children attending schools that are too close to highways right now," he adds. "Existing schools should be retrofitted with air filtration systems that will reduce students' exposure to traffic pollutants."

The UC-led team reports its findings in the September 2008 issue of the Journal of Environmental Planning and Management, an international scientific journal. This is believed to be the first national study of school proximity and health risks associated with major roadways. For this study, Grinshpun's team conducted a survey of major metropolitan areas representative of all geographical regions of the United States: Atlanta, Boston, Cincinnati, Denver, Philadelphia, Los Angeles, Memphis, Minneapolis and San Antonio. More than 8,800 schools representing 6 million students were included in the survey. Primary data was collected through the U.S. Department of Education's National Center for Education Statistics. Schools within this data set were then geocoded to accurately calculate distance to the nearest interstate, U.S. highway or state highway.

Past research on highway-related air pollution exposure has focused on residences located close to major roads. Grinshpun points out, however, that school-age children spend more than 30 percent of their day on school grounds—in classrooms, after-school care or extracurricular activities.

"For many years, our focus has been on homes when it comes to air pollution. School attendance may result in a large dose of inhaled traffic pollutants that—until now—have been completely overlooked," he adds.

These past studies suggest this proximity to highway traffic puts school-age children at an increased risk for asthma and respiratory problems later in life from air pollutants and aeroallergens. This includes research from the UC Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS) which has reported that exposure to traffic pollutants in close proximity to main roads has been associated with increased risk for asthma and other chronic respiratory problems during childhood. Grinshpun's team found that public school students were more likely to attend schools near major highways compared to the general population. Researchers say the rapid expansion of metropolitan areas in recent years—deemed "urban sprawl"—seems to be associated with the consistent building of schools near highways.

"Major roads play an important role in the economy, but we need to strike a balance between economic and health considerations as we break ground on new areas," says Alexandra Appatova, the study's first author. "Policymakers need to develop new effective strategies that would encourage urban planners to reconsider our current infrastructure, particularly when it comes to building new schools and maintaining existing ones."

The state of California, for example, has passed a law prohibiting the building of new schools within 500 feet (168 meters) of a busy road. New Jersey is moving a bill through the legislature to require highway entrance and exit ramps to be at least 1,000 feet from schools.

This study was funded in part by grants from UC's Center for Sustainable Urban Engineering and the National Institute of Environmental Health Sciences. UC's Patrick Ryan, PhD, and Grace LeMasters, PhD, also participated in this study. Appatova was an intern in UC's department of environmental health when the study was being conducted.

All publications and presentations resulting from CEG support must acknowledge NIEHS P30 ES06096 The Center for Environmental Genetics

Center for Environmental Genetics: Grant News

The Center for Environmental Genetics would like to congratulate our investigators on the success of recent grant submissions.

Dr. Susan Pinney, leader of the CEG Integrative Health Sciences Core, has received an NIEHS R21 to evaluate exposure biomarkers of polyfluoroalkyl compounds in persons living in the Ohio River Valley. Co-investigators include **Dr. Paul Succop** and CEG members **Dr. Frank Biro, Dr. Robert Bornschein,** and **Dr. M. Kathryn Brown.**

Dr. Jagjit Yadav received an R01 from NIEHS, with the collaboration of **Dr. Jodi Shann**, Department of Biological Sciences, to study fungal p450 systems in biodegradation of higher polycyclic aromatic hydrocarbons. Preliminary data for this proposal was made possible, in part, by the CEG Genomic and Microarray Laboratory and Bioinformatics Cores.

A new T32 training program designed to produce graduate and post-doctoral fellows with expertise in gene-environment interactions has been awarded, under the direction of **Dr. Daniel W. Nebert,** with deputy directors **Dr. Carol Rice** and **Dr. Alvaro Puga. Greg Motz**, mentored by NIEHS-Ones recipient **Dr. Michael Borchers** and genetic variability expert **Dr. Ranjan Deka,** will study genetic variation and smoker susceptibility in the development of chronic pulmonary disease (COPD) as one of the premier students in this training program. A special January issue of Interface will introduce the training program and trainees.

Dr. Nira Ben-Jonathan, Cancer and Cell Biology, has received an R21 Exposure to Bisphenol A: Inhibition of Adiponectin Release by Human Adipocytes. A description of her preliminary work, published in the August 14th issue of Environmental Health Perspectives, is on page 1 of this *Interface.*

Young investigators under the mentorship of CEG members have also be successful with recent grant submissions:

Dr. Wan Yee (Winnie) Tang is the first Department of Environmental Health post-doctoral fellow to receive a K99/R00 award for her project "*Estrogens/xenoestrogens and epigenetic regulation of gene expression.*" This NIEHS-supported research and training grant addresses one of the strategic visions of the CEG, which is mapping the estrogen-epigenome. Dr. Tang will be under the mentorship of **Dr. Shuk-mei Ho,** CEG Director, with additional mentoring from CEG members **Dr. Nira Ben-Jonathan**, **Dr. Scott Belcher,** and **Dr. Neville Tam**, **Dr. Linda Levin** from the Department of Environmental Health, and **Dr. Patricia Revelo**, University of Utah. This strong team of mentors helped to contribute to the success of this training and research grant.

Saikumar Karyala, Senior Research Associate of the Genomic and Microarray Laboratory Core, received an award from the Department of Defense for "Discovery of Dysregulated miRNA-mRNA Interactions as Therapeutic Opportunities for Breast Cancer"

Monica Summe, graduate student in the Department of Cancer and Cell Biology, received a Predoctoral Traineeship Award from the Department of Defense to study "*Exposure to Maternal Diabetes in Utero and Transgenerational Breast Cancer Risk.*"

Major Scientific Exciting Breakthroughs— as highlighted by Dr. Daniel W. Nebert, CEG Associate Director

A bacterium has been found that uses ***electrons from arsenic*** to drive photosynthesis in the absence of oxygen [Science 2008; **321**: 967-970]. This could have been an important process on earth before oxygenic photosynthesis reshaped the atmosphere (some 2.8 billion years ago).

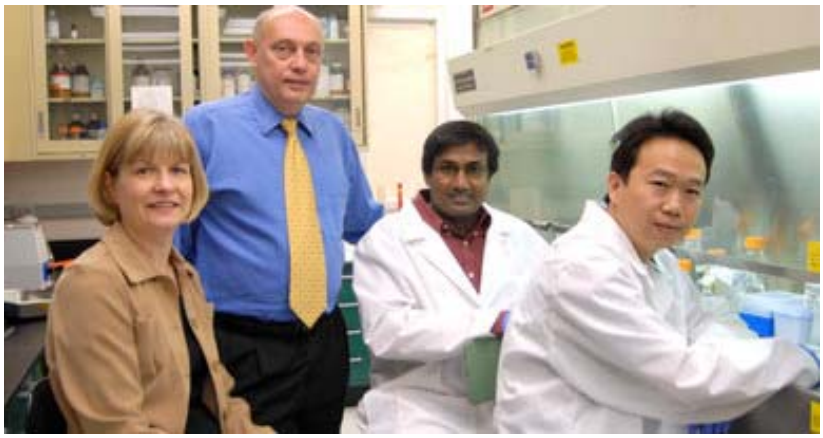
One especially weird feature of quantum mechanisms is ***quantum entanglement*** (a physical property of a particle or larger system can become instantly dependent on the properties that are being measured on another particle or larger system---***regardless of the distance*** that the two are apart. Einstein (in 1947) dismissed this phenomenon as "absurdity" and called quantum entanglement a "spooky action at a distance" and, if true, would prove that the theory of quantum mechanics is incorrect. Well, ...

Now photons have been passed from near Lake Geneva, east and west on fiber-optic cables of exactly equal length and their entanglement was checked by interferometers in two Swiss village 18 km apart. The calculated "speed" (if it's not considered simply instantaneous) was "at least ten thousand times faster than the speed of light". This experiment [Nature 2008; **454**: 861-864] just blows me away.

$1.3 Million Basic Science Grant Takes Aim at Weapons of Mass Destruction

University of Cincinnati (UC) bioaerosol experts have received a $1.3 million basic science grant to investigate a new method for killing the biological agents most likely to be used in "weapons of mass destruction." Led by Sergey Grinshpun, PhD, director of UC's Center for Health-Related Aerosol Studies, the multi-institutional team's goal is to create a single, self-contained compound that can be released into the air after an explosion to target and destroy dangerous biological agents.

The funding comes from the U.S. Department of Defense's Defense Threat Reduction Agency, which recently began awarding basic science grants for research aimed at reducing, eliminating or countering the threat of weapons of mass destruction in the battlefield and for civilians. The UC-led team is one of a few groups to receive funding for basic research this year.



Tiina Reponen, PhD, Sergey Grinsphun, PhD, Atin Adhikari, PhD and Chunlei Li, PhD, are developing a new method for combating weapons of mass destruction.

"Destroying aerosolized bioaerosol agents is very challenging," says Grinshpun, a UC professor of environmental health and principal investigator of the grant. "Some biological agents are resistant to environmental stress, including high temperature. They survive. Once in the air, these bacteria and viruses can travel through the air like any other aerosolized particles and wreak havoc."

He says the predominant thinking is that if a biological weapons storage facility is hit with an explosive device, the heat generated from the explosion will also destroy viruses and bacteria.

"But that is not necessarily the case with a microorganism that has been specifically prepared to be part of a weapon intended to inflict massive harm," explains Grinshpun. "That explosion may actually just help disseminate the microorganisms through the air."

Grinshpun and his team have partnered with researchers at New Jersey Institute of Technology (NJIT) and its business incubator, Reactive Metals, Inc., to develop and validate an experimental method for deactivating biological agents using a new class of energetic materials: filled nanocomposite materials, which are engineered to have specific properties. UC and NJIT researchers will develop a prototype of the filled nanocomposite material that could be released into the air after detonation of a weapon of mass destruction. The idea is that these materials will release specific components—iodine, for example—into the atmosphere to kill or "deactivate" the potentially lethal bacterial agents.

Small-scale tests using non-pathogenic surrogates will be conducted in specialized biosafety chambers in UC's environmental health department. The entire process happens in milliseconds, so in order to accurately measure exposure and the effects of the pellets the research team will use an algorithm of experimental simulation that allows it to slow down the process and achieve necessary conditions for accurate laboratory measurements.

Since there are thousands of species of bacteria, Grinshpun's team has selected two low-risk simulants of microorganisms most likely targeted for use in weapons of mass destruction: Bacillus subtilis, a bacterial spore, and MS2 bacteriophage virus.

"It's important to note that this is a laboratory study—not a real-to-life simulation. Our goal is to understand the biological reasons a microorganism will not die after being exposed to heat stress," explains Grinshpun. "We're pioneering a novel method we hope will work under specific conditions, but the broad-reaching outcome of combating weapons of mass destruction is more important."

UC's Tiina Reponen, PhD, and Atin Adhikari, PhD, are co-investigators in this study. The team also includes Chunlei Li, PhD, a visiting fellow from Fudan University in China, and graduate student Robert Eninger. Researchers Mirko Stoenitz, PhD, Edward Dreynzin, PhD, and Mike Trunov, PhD, represent the NJIT team collaborating in this study.

Center for Environmental Genetics Faculty Happenings

Carol Rice receives Alice Hamilton Award

Professor Carol Rice, is this year's recipient of the prestigious Alice Hamilton Award, given by the American Industrial Hygiene Association.

Established in 1993 by the AIHA Board of Directors with the first award granted in 1995, the Alice Hamilton Award shall be presented to an outstanding woman who has made a definitive, lasting achievement in the field of occupational and environmental hygiene through public and community service, social reform, technological innovation or advancements in the scientific approach to the recognition, evaluation, and control of workplace hazards. The awardee shall have been engaged in occupational hygiene or a related discipline a minimum of 10 years and shall be recognized by her peers to be competent in her chosen field, dedicated to scientific truth, and committed to positive change for worker health.

The first recipient of this award, in 1995, was also a member our faculty, Professor Eula Bingham. Dr. Rice is the Director of the Environmental and Occupational Hygiene and Hazardous Substances Academic Training programs, and of the Midwest Consortium for Hazardous Waste Workers, and Deputy Director of the Gene-Environment Interactions Training Program, and NIEHS-sponsored T32.

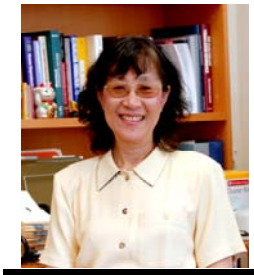
Randy Seeley to Be Presented With Ernst Oppenheimer Award

Randy Seeley, PhD, professor of psychiatry and associate director of UC's Obesity Research Center, will be presented with the Ernst Oppenheimer Award from the Endocrine Society at the society's annual meeting in June. Considered the "premier award for a young investigator in recognition of meritorious accomplishment in the field of basic or clinical endocrinology," the Ernst Oppenheimer Award was first awarded in 1944 and is given only to scientists under age 45. Seeley was recruited to UC in 1997 from the University of Washington. He has published more than 170 peer-reviewed articles and has authored 12 book chapters. In 2003 he was presented with the Lilly Scientific Achievement Award from the North American Association for the Study of Obesity. Seeley shares the 2008 Ernst Oppenheimer Award with Joel Elmquist from the University of Texas Southwestern Medical Center.

Marsha Wills-Karp Named Associate Dean for Strategic Initiatives

Marsha Wills-Karp, PhD, has been named associate dean for strategic initiatives at the College of Medicine. Wills-Karp will play an essential role in identifying collaborative opportunities, especially in the college's "Centers of Excellence and Emerging Programs," which include cancer, cardiovascular, neuroscience, metabolic disorders, digestive diseases and immunology-inflammation-infectious diseases. She also will be pivotal in aligning the college's missions in research, education and clinical care more closely with Cincinnati Children's Hospital Medical Center. Wills-Karp serves as professor of pediatrics at UC and director of the division of immunobiology at Cincinnati Children's. She received her doctorate in physiology from the University of California, Santa Barbara, and held postdoctoral fellowship positions at both Yale and Johns Hopkins universities. She also directs the immunobiology graduate program at UC and the Center for Immunological Research at Cincinnati Children's.

Environmental Health Chair Opens Lecture Series



Shuk-mei Ho, PhD, chair of environmental health, was the keynote speaker at the Feb. 20 Distinguished Lecture Series on Advances in Toxicology and Risk Assessment, sponsored by the state of California Office of Environmental Health Hazard Assessment. Ho, an expert in hormonal carcinogenesis and steroid hormone action, discussed "Epigenetics: The Interface Between Environment and the Genome." Epigenetics is defined as heritable changes in gene expression that do not alter DNA sequence but are mitotically and transgenerationally inheritable. To view slides of her presentation, visit oehha.ca.gov.

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Websites

FASEB has launched http://www.ScienceCures.org, an exciting new voter education initiative aimed at raising the profile of federal funding for biomedical research among the presidential candidates and the general public. "When Presidential candidates are making speeches or answering questions about health and health care, we want to make sure that the National Institutes of Health and medical research are an integral part of that discussion," said Robert Palazzo, Ph.D., FASEB President. "Federal funding of biomedical research should be a high priority for the nation in 2008 and beyond."

The National Institute on Aging has recently published the Clinical Research Study Investigator's Toolbox, to provide a Web-based information repository for investigators and staff involved in clinical research. The Toolbox contains templates, sample forms, guidelines, regulations and information materials to assist investigators in the development and conduct of high quality clinical research studies. http://www.nia.nih.gov/ResearchInformation/CTtoolbox/