biennial report 2005–2007

DEPARTMENT OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH SCIENCES school of public health and community medicine university of washington



Cover art: Detail from "Ethel, Mildred, Constance, Josephine, Ingrid"

Our cover artist, Sarah Fischer, is the department's administrative coordinator and winner of our 2007 art competition. Fischer received her BA in Fine Arts from Seattle University and produced this series as part of her post-baccalaureate studies in fiber arts at the University of Washington. She stains cloth with oxidized metal and fashions it into mixed-media embroidery work and 3D forms. Her pieces include abstract design elements with a likeness to microscopic worlds. Fischer draws inspiration from Victorian embroidery and needlework.

Cover photo: Jennifer Gill photos this page: Jennifer Gill, Carol Martin



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### ACKNOWLEDGMENTS

#### DEPARTMENTAL ADVISORY COMMITTEE 2005-2007

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> Undergraduate student in a laboratory class Jennifer Gill

# WHO WE ARE... PEOPLE AND PROGRAMS

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# ORGANIZATIONAL CHART

Chair Associate Chair Administrator Director, External Relations

#### ACADEMIC PROGRAMS

#### Environmental Health

Occupational and Environmental Exposure Sciences

Occupational and Environmental Medicine

Toxicology

Jon Sharpe, Community Outreach and Education, and Rebecca Birdsong, Occupational and Environmental Medicine

#### Jennifer Gill

#### SEF PR(

Graduate Program C

Office Undergraduate Program Office

**STUDENT** 

**SERVICES** 

#### SERVICE PROGRAMS

Continuing Education

- Worker Education and Training Program
- Northwest Center for Occupational Health and Safety, Continuing Education
- Pacific Northwest OSHA Education Center
- School to Work Program

Environmental Health Laboratory

Field Research and Consultation Group

Occupational and Environmental Medicine Clinic

#### CENTERS, INSTITUTES, AND RESEARCH PROGRAMS

Center for Chemically Related Illness

Center for Ecogenetics and Environmental Health

- Community Outreach and Education
- Functional Genomics Laboratory

Collaborative Center for Healthy Work and Environment (Fogarty)

Institute for Risk Analysis and Risk Communication

- Center for Child Environmental Health Risks Research
- Center for the Study and Improvement of Regulation
- Pacific Northwest Center for Human Health and Ocean Sciences

Northwest Center for Occupational Health and Safety

Occupational Epidemiology and Health Outcomes Program

Pacific Northwest Agricultural Safety and Health Center

Pediatric Environmental Health Specialty Unit

Superfund Basic Research Program

Toxicogenomics Consortium

# BRIDGING THE GAP

From our department's origins as a component of UW Preventive Medicine 60 years ago, we have sought to bridge the gap between research and practice. Our first graduates found work in departments of public health and local industries. Six decades later, when governmental funding requires a research-to-practice component, we are in the forefront of exciting research initiatives.

In this, our fifth formal biennial report, we describe research that addresses a global health dilemma, helps clean up environmental health problems, and supports changes in computer technology.

We tell you about our partnerships with the medical community, an art school, and the construction industry in the Puget Sound area.

We also profile six of our alumni, whose careers range from roles in local nonprofits to global corporations as examples of how our students give back to their communities.

We had an opportunity to meet with many of our alumni earlier this year when we celebrated our department's 60th anniversary. This successful celebration has prompted us to look for new ways to connect with our friends and alumni.

The cover of this biennial report features the art of Sarah Fischer, the winner of our department's first art competition. Last year, we put out a call for artists among our faculty, staff, and students, with gratifying results. We will feature more of their work in future publications.

We hope you find the following stories and images about our department and its many activities enjoyable. All of our activities are directed toward improving public health outcomes through sound science that is translated into effective public health practices and policies. Please join us as we describe a number of ways in which we strive to accomplish this goal.

—David Kalman, chair

# 



alumni profile

## Environmental Justice

Just five miles from campus, the International District (ID) is a lively blend of cultures with a dark side high rates of respiratory illness, aging housing, and air polluted by nearby highways and the Port of Seattle.

The complex issues affecting the ID require a comprehensive and collaborative effort: a mix of science, grantsmanship, and a deep understanding of the community. This is why Joyce Tseng was drawn to the International District Housing Alliance (IDHA) when she graduated from the UW Master of Public Health program. Tseng is a manager for IDHA's community building programs, working on environmental justice and health projects focused on ID community concerns.

At IDHA, Tseng is a project manager for a CARE grant (Community Action for a Renewed Environment) from the US Environmental Protection Agency, coordinating the efforts of community stakeholders and partners—including numerous community organizations, educational institutions, and governmental agencies.

# JOYCE TSENG

Community Building Program Manager International District Housing Alliance

> A pilot project funded by the CARE grant aims to simultaneously address two top priorities identified by the ID community: solid waste management and public safety. By removing dumpsters from alleys, encouraging recycling, and initiating regular pick-ups of garbage and recyclables, solid waste problems will be reduced, while clear alleys will lead to fewer hiding places for illegal activity.

Before enrolling at the UW, Tseng was familiar with IDHA's reputation for environmental justice, so she chose the agency for her MPH practicum. She recommends the internship/practicum opportunity as a way for students to introduce themselves to communities and agencies that are likely to be their future employers.

Much of her UW coursework helped Tseng prepare for her work at IDHA. She worked with Associate Professor Matthew Keifer on a community-based participatory research project in the Yakima Valley, El Proyecto Bienestar (The Well-Being Project), which taught her, among other things, to be patient with the sometimes lengthy collaborative process. That project, along with her work on Professor Noah Seixas' day labor project, led her to examine how class differences affect interactions with research subjects. Through Professor Elaine Faustman's courses on risk assessment, Tseng learned how a given risk can be perceived and valued differently by a scientist, a policy maker, and a community member at risk, as well as the importance of understanding cultural and institutional contexts.

# **DEOHS** PROGRAMS CENTERS INSTITUTES

In the Department of Environmental and Occupational Health Sciences, we identify, seek to understand, and help manage the effects of the environment on human health by

- evaluating and controlling workplace hazards
- investigating issues of food and water safety
- discovering the mechanisms of occupationally and environmentally related diseases
- improving methods for treatment and disposal of solid and toxic wastes
- researching how the environment interacts with genetics to influence human health
- studying how environmental chemicals affect the health of children
- educating the next generation of occupational and environmental health professionals

#### ACADEMIC PROGRAMS & DEGREES

**Environmental Health** students learn to identify sources of contamination in air, water, soil, and food; how contamination is spread; strategies to prevent or control effects on human health or environmental quality; and the best ways to communicate risk information to the public and to health professionals. Students may earn a Master of Science (MS) or a Doctor of Philosophy (PhD) degree.

**Exposure Sciences** (formerly Industrial Hygiene and Safety) students learn to identify, evaluate, and manage health risks found in a wide variety of community and occupational settings. Students earning the MS degree become skilled occupational and environmental health professionals and have the option of completing either a thesis or a practical project. Students earning the PhD degree obtain advanced research training in exposure assessment and control methods.

#### The Occupational and Environmental Medicine

program gives physicians a better understanding of the clinical and scientific principles in environmental and occupational health. Training can focus on epidemiology, occupational and environmental hygiene, biostatistics, health services, or toxicology. This program leads to a Master of Public Health (MPH) degree. A concurrent residency/fellowship program is available. The **Toxicology** program focuses on identifying, understanding, and analyzing toxic agents and their effects on human health. Research areas include neurological, hepatic, renal, and respiratory systems; prenatal and neonatal development; and carcinogenic and genetic effects of toxicants. The program offers a strong focus on risk assessment. Both MS and PhD degrees are offered.

The Master of Public Health in Environmental and Occupational Health degree provides an opportunity for students to focus on recognition, assessment, and control of environmental and occupational hazards; effects of these hazards on health and society; and approaches to regulation, enforcement, and policy development. In contrast to the MS degree programs, which are measurement-oriented and specialized, the MPH degree provides a broader perspective, with emphasis on applications and policy implications.

Through our **Bachelor of Science** program in Environmental Health, students learn to identify, prevent, and control environmental factors that can damage human health. The program is flexible, providing a grounding in environmental health sciences and an emphasis in one of four interest areas: biological sciences, physical sciences, medical professions, or environmental health practice.

### SERVICE PROGRAMS

The **Continuing Education** program provides environmental and occupational health training in Washington, Oregon, Idaho, and Alaska. The program has four components:

- The Worker Education and Training program provides training on hazardous waste, emergency response, and related topics to tribal governments and organizations, and other underserved worker populations in our region.
- The continuing education component of the Northwest Center for Occupational Health and Safety supports professional education in industrial hygiene and safety, occupational medicine, and occupational health nursing.
- The Pacific Northwest OSHA Education Center offers open enrollment courses, courses tailored to individual employers, and Safety and Health Specialist certificate programs, meeting standards set by the Occupational Safety and Health Administration (OSHA).
- The School to Work program develops and distributes statewide high school curriculum materials to raise awareness of workplace health and safety issues for working teenagers.

The **Environmental Health Laboratory** provides consultation and chemical analytical services to Washington's employers, labor groups, and governmental organizations. It also assists researchers within the university. The Laboratory has been accredited by the American Industrial Hygiene Association since 1977.

The Field Research and Consultation Group conducts fieldbased research and provides occupational health and safety consultation to companies that request assistance. Consultants observe work practices, collect samples or data, obtain laboratory analyses, coordinate medical examinations, and make recommendations for controlling workplace exposures. Priority is given to small businesses whose problems are not readily addressed by the private sector.

The Occupational and Environmental Medicine Clinic provides care to patients with illness or injury caused by occupational or environmental exposures. The multidisciplinary group includes specialists in occupational medicine, internal medicine, neurology, pulmonary medicine, pediatrics, industrial hygiene, toxicology, epidemiology, and public health. In collaboration with the Washington State Department of Labor and Industries, the clinic plays a key role in evaluating clusters of occupational disease. It is also a Center of Occupational Health and Education, improving workers' compensation through educational outreach to the community. The clinic provides consultation services on a wide range of medical, legal, and regulatory issues that affect workers throughout the state of Washington.

### CENTERS, INSTITUTES, & RESEARCH PROGRAM

The **Center for Chemically Related Illness** is based at Harborview Medical Center in Seattle, with affiliated clinics in Spokane and Toppenish, Washington. Chemically related illnesses result from toxic exposure to occupational and environmental chemicals. These include solvents, heavy metals, and pesticides. Doctors at the center diagnose and treat these illnesses, educate the public about prevention, and conduct research on medical issues involving chemical exposures.

#### The Center for Ecogenetics and Environmental Health

(CEEH), funded by the National Institute of Environmental Health Sciences (NIEHS), studies how environmental factors interact with genetics to influence diseases. A key focus is to understand how different people metabolize drugs and chemicals, which can affect their susceptibility or resistance to disease. The center, in collaboration with the Institute for Public Health Genetics, also addresses the ethical, legal, and social issues related to genetic information and gene-environment interactions.

The **Collaborative Center for Healthy Work and Environment** (CCHWE), formally the International Scholars in Occupational and Environmental Health, is funded by the Fogarty International Center of the US National Institutes of Health (NIH). CCHWE focuses on training through research on high priority health issues in collaborating countries, primarily Vietnam, Thailand, Cambodia, and Laos.

The **Institute for Risk Analysis and Risk Communication** (IRARC) works to improve risk assessment methods and the scientific foundations supporting risk assessments. It has three research programs:

- The Center for Child Environmental Health Risks Research is funded by the US Environmental Protection Agency (EPA) and NIEHS to further knowledge of children's susceptibility to toxicants.
- The **Center for the Study and Improvement of Regulation** is funded by Carnegie Mellon University to merge the study

of pollution, risk, public health, technology, economics, organizations, and history to improve environmental health and safety regulations

The Pacific Northwest Center for Human Health and Ocean Sciences investigates how genetic and environmental variability define toxicity and dynamics of harmful algal blooms and impacts on susceptible human populations. The center is funded by the NIEHS and the National Science Foundation and includes researchers from our department and the UW College of Ocean and Fishery Sciences.

The Northwest Center for Occupational Health and Safety is one of 17 education and research centers funded by the National Institute for Occupational Safety and Health (NIOSH). It supports graduate and continuing professional education in industrial hygiene and safety, occupational medicine, and occupational health nursing. The center serves practitioners in Washington, Oregon, Idaho, and Alaska.

The Occupational Epidemiology and Health Outcomes Program conducts research to identify factors related to preventable disability among injured workers, develops evidence-based quality indicators, guidelines, and technology assessments related to injured worker health care, and conducts program evaluation of health care delivery innovations for the state workers' compensation system.

The Pacific Northwest Agricultural Safety and Health Center (PNASH) conducts research, and develops intervention and education programs to improve the safety and health of Northwest workers in farming, fishing, and forestry. Center researchers work closely with colleagues at northwestern universities and with employers, labor, community organizations, health care providers, the agricultural industry, and government agencies. The PNASH center is funded by NIOSH and the state of Washington.

The **Pediatric Environmental Health Specialty Unit** (PEHSU) is a regional information center for clinicians and public health professionals in Alaska, Idaho, Oregon, and Washington. Its services address prevention, diagnosis, management, and treatment of environmentally related health effects in children.

Our School to Work program teaches high-school students about on-the-job safety

Darren Linker

The **Superfund Basic Research Program** (SBRP) is an NIEHSsponsored, interdisciplinary program among our department, Civil Engineering, Forest Resources, and Epidemiology. Its goals are to examine biological markers (biomarkers) to predict who might be especially susceptible to, or already impaired by, exposure to toxic substances with particular focus on substances commonly found at hazardous waste sites. The UW SBRP studies controlled exposures, epidemiology, the effects of toxicants on wildlife near hazardous waste sites, and the potential for trees and other plants to clean contaminated soils. Our Research Translation and Outreach Core has partnerships with communities at contaminated sites in the Puget Sound area.

The **Toxicogenomics Consortium** uses microarray technology to study how toxic substances affect the ways genes are expressed in cells. Changes in gene expression are thought to be important events in many environmentally related diseases. The consortium supports research to develop and refine microarray analysis techniques, and conducts studies on the health effects of specific toxicants, including methylmercury and organophosphate pesticides. It has been supported by the NIEHS for six years. In 2007, Helmut Zarbl, director of the program, left the Fred Hutchinson Cancer Research Center, and the leadership of the program was transferred to Professor David Eaton. The NIEHS has decided not to continue funding this program, but UW investigators are continuing to conduct research in this important area, building on the infrastructure and capacity created by this consortium.





# RADIOLOGICAL SCIENCES WITH ENVIRONMENTAL OPTION

# WAYNE J. MARTIN

Product Line Manager Chemical, Biological, and Nuclear Surety (CBNS) Pacific Northwest National Laboratory (US Department of Energy)

## **Risk Assessment at Hanford**

Wayne Martin, an environmental scientist at the US Department of Energy's Pacific Northwest National Laboratory (PNNL), has been nationally recognized as the 2007 Black Engineer of the Year for Community Service.

Martin, a technical group manager at the time, was honored for his efforts to increase involvement of underrepresented minorities in the engineering and scientific fields and for his leadership and significant contributions to the Tri-Cities community of Washington.

He had been an environmental scientist at Hanford for a decade when he came to the UW to pursue a master's degree in the interdisciplinary program in Radiological Sciences, formerly based in DEOHS.

He says his degree at UW inspired him to pursue his PhD in Environmental and Natural Resource Sciences (Washington State University, 1996). From there, he moved from researcher, to principal investigator, and into administration as a line manager, project manager, and currently product line manager.

The Hanford site has the largest quantity of radioactive waste in the world, and Martin's work

is significant in understanding and remediating that waste. He manages the Chemical, Biological, and Nuclear Surety product line, which consists of laboratory-intensive sampling projects. He has oversight responsibilities for approximately 80 research projects.

"My job is exciting because it always brings new challenges and allows me the opportunities to explore new and innovative science," he says.

His research team is nationally and internationally known for its scientific research in the field of contaminant fate and transport and for developing material that will safely and effectively remove contaminants, such as arsenic and mercury, from drinking water and wastewater.

The stakes are high and Martin says, "My experience at UW sharpened my ability to exercise the scientific method."

Martin mentors graduate students at PNNL and would like to hear from those whose interests lie in research and development of technologies and technical approaches related to the protection of the environment.

> An Exposure Sciences student discusses noise exposures with a forklift driver

alumni profile

# WHAT WE DO...



# RESEARCH TO PRACTICE

Spurred by funding agencies' new priorities plus a continuing effort to put the "public" in "public health"—departmental investigators more often are linking their research programs to realworld outcomes.

Different agencies have different terms for this. The National Institute of Environmental Health Sciences (NIEHS) speaks of translating knowledge from "bench to bedside," which means taking basic and population-based studies and translating them into research findings that have direct relevance to human health and the treatment of disease.

The National Institute for Occupational Safety and Health (NIOSH) calls it "Research to Practice" or, for short, "r2p," a new initiative focused on the transfer and translation of research findings, technologies, and information into prevention practices and products adopted in the workplace.

Another group that supports the r2p concept is the UW Technology Transfer program (TechTransfer), which seeks to extend the impact of UW research through the creation of partnerships that encourage investment in innovation.

At a recent roundtable discussion in the NIOSHfunded the Northwest Center for Occupational Health and Safety (NWCOHS), participants expressed surprise that r2p is even an issue. "Isn't this what public health has always been about?" one researcher asked. However, others suggested that the concept may be emphasized less in occupational and environmental health than in other public health disciplines.

NWCOHS External Advisory Board Member Robin Baker, from the Labor Occupational Health Program (LOHP) at the University of California in Berkeley shared ideas for a course curriculum focused on r2p concepts. NWCOHS Director Noah Seixas supports this move toward practice-oriented research and is considering a pilot offering of the LOHP proposal in a new graduate course, tentatively titled "Research to Practice in Occupational Health." The idea, he says, would be to provide students funded through the Center with the skills needed to "bridge the gap between what the research tells us about effective injury and illness prevention, and what is practiced in the workplace."

To complete the circle, Seixas and other researchers listen to concerns from the workplace as they develop new research protocols.

The following project descriptions provide examples of our department's research being translated to public health or biomedical practice.

#### For further reading

NIEHS http://www.pubmedcentral.nih.gov/ articlerender.fcgi?artid=1459945 NIOSH http://www.cdc.gov/niosh/r2p/ UW TechTransfer http://depts.washington.edu/techtran/

Mosquito-borne virus under an electron microscope CDC Public Health Image Library

# **KEYBOARDS AND MICE FOR THE REST OF US**

Research in the our department's Ergonomics lab will soon demonstrate how the standard computer keyboard and mouse fit only 5% of the world population. Associate Professor Peter Johnson is slowly building a case for the need to consider the other 95%.

Today's keyboards and mice are designed to accommodate the biggest users, using the hands of a Western male as the design norm. The work of master's student Sean Hwang shows that this design strategy may put a large percentage of the world population at risk of pain, including females (49% of the world's population), children (20% of the world's population), and non-Western populations such as Asians (60% of the world's population).

Johnson is quick to point out the irony of the "one size fits all" approach to computer input devices in a world where bicycles, skis, and golf clubs come in sizes for men, women, and children. This is especially puzzling when adults and children alike often spend more time typing and manipulating a mouse than they do playing sports.

Johnson has measured the force exerted by larger and smaller computer users. He concluded that, even with the best ergonomic workstations, smaller computer users experience more strain in their wrists, arms, and shoulders.

The Johnson laboratory has also measured children as they use adult-sized and smaller, child-proportional sized mice and keyboards. Researchers found that not only do children's muscles work less when using smaller mice, but so do the adults'. In addition, both children and adults perform tasks faster and make fewer errors with smaller mice. Finally and perhaps most importantly, their research demonstrated that children operate smaller mice with more natural hand and wrist postures, reducing muscle strain. Today's children start using computers at an earlier age and spend more time on them than previous generations. One study surveyed sixth graders and half reported pain in their muscles and joints that they attributed to computer use.

Likewise, as a result of strength differences, women and smaller-statured men have to use higher force to operate standard keyboards and mice and, as a result, may be at higher risk for musculosketal pain than are largerstatured Western males.

It's one thing to develop a solution in a laboratory, another to encourage computer companies to manufacture, market, and sell different-sized devices. Widespread public awareness will help create the market for these devices.

Johnson is starting to bridge that gap by collaborating with Microsoft, Logitech, and Hewlett-Packard on mouse and keyboard design and evaluation projects.

He has teamed with Microsoft on two keyboard designs, the Comfort Curve Keyboard and the next generation Microsoft<sup>™</sup> Natural<sup>®</sup> Ergonomic Keyboard, which was designed by departmental alumnus and Microsoft usability researcher Hugh McLoone (MS Industrial Hygiene, 1990).

These commercial applications of UW basic research affect millions of computer users. Since its introduction last fall, the new Microsoft<sup>™</sup> Natural<sup>®</sup> Ergonomic Keyboard has been the top selling wired keyboard in the US market.

#### Further reading

Johnson P. How the UW helped Microsoft build a better mouse. *Puget Sound Business Journal*, Nov. 24, 2006

> Hugh McLoone of Microsoft and DEOHS Associate Professor Pete Johnson won the Human Factors and Ergonomics Society's 2007 User Centered Design Award for the new Microsoft Natural Ergonomic Keyboard

Courtesy Hugh McLoone



# THE SERENDIPITY OF RESEARCH



...when you do basic research, you never quite know what you will find —David Eaton Sometimes basic research can yield surprise findings. Professor David Eaton, while researching a connection between diet and cancer, made a surprise finding that may lead to better treatment of tuberculosis in developing countries. "This just shows that, when you do basic research, you never quite know what you will find," says Eaton, who is also associate vice provost for research at the University of Washington.

This story starts with studies on a fundamental public health problem of certain regions in China, Central Africa, and Southeast Asia. Subsistence farmers in those regions grow corn and peanuts, which are frequently contaminated with a common mold called *Aspergillus*. Certain forms of this mold produce a potent toxin, called aflatoxin B1 (AFB) that can give rise to liver cancer. The problem is exacerbated by the hepatitis B virus, which is common in these parts of the world.

Eaton and his students have been studying how dietary factors can make AFB less carcinogenic. In recent years, their focus has turned to a natural chemical found at high concentrations in broccoli —and especially broccoli sprouts—that can "turn on" the expression of a gene that detoxifies AFB. This phytochemical, called sulforaphane, can trigger an antioxidant response pathway in many types of cells, making them resistant to chemical damage.

Aflatoxin is broken down in the liver by a family of enzymes called cytochromes P450. One of the oxidation products of AFB, called AFB-epoxide, can



react with DNA, causing mutations that can eventually lead to cancer. Eaton's lab discovered that mice have a specific form of an enzyme called glutathione S-transferase (GST), which protects liver cells from cancerous mutations. But it was not clear whether humans had a similar "protective" GST gene.

To test human responses, Kerstin Gross-Steinmeyer, a postdoctoral fellow in Eaton's lab, treated human liver cells (obtained from organ donors in circumstances where the liver could not be used for a life-saving transplantation) with sulforaphane, then exposed the cells to AFB.

The results were evaluated using a gene expression microarray, which can assess the effect of the treatment on more than 20,000 different genes. Theo Bammler, a senior scientist in the Eaton lab, and Fred Farin, director of the UW Functional Genomics Laboratory Microarray Facility, conducted the analysis. As predicted, no human GSTs were "turned on" by sulforaphane.

However, much to the researchers' surprise, sulforaphane pretreatment apparently protected against DNA damage from aflatoxins through another mechanism.

Eaton's lab discovered that the expression of one gene involved in AFB activation, cytochrome P450 3A4 (CYP3A4), was eliminated by pretreatment of liver cells with sulforaphane. Eaton hypothesized that he was seeing a stop light on the activation pathway, rather than a green light on detoxification pathways, a critical distinction that led him to the conclusion that sulforaphane may block the expression of the CYP3A4 gene.

If further studies confirm these results, it would explain not only how sulforaphane can alter the metabolism of carcinogens such as aflatoxins, but also could provide a way to prevent some adverse reactions between drugs. CYP3A4 contributes to the metabolism of more than 60% of the pharmaceutical compounds on the market today, so drugs and other chemicals that affect the expression of CYP3A4 can have important therapeutic implications for many prescription drugs.

**David Eaton** 

#### Tuberculosis clinic in Ghana, West Africa

To understand how sulforaphane blocked the expression of the CYP3A4 gene, Eaton began a collaboration with Professor Ken Thummel, chair of the UW Department of Pharmaceutics. Thummel's lab is widely known for its contributions to the understanding of how CYPs, in particular CYP3A genes, are regulated in the liver, intestine, and kidneys.

Changcheng Zhou, then a postdoctoral fellow in the Thummel lab, joined forces with the Eaton lab to figure out how sulforaphane blocked the transcription of the CYP3A4 gene. He started with a molecular "switch" known as the Pregnane X-Receptor (PXR). Many drugs turned on this switch, which greatly increases the expression of the CYP3A4 gene.

That can be a problem. It is widely recognized by specialists in treating infectious diseases that people with HIV/AIDS who become infected with tuberculosis should not be treated with the antibiotic rifampin because it reduces the effectiveness of their antiretroviral therapy.

Using a variety of molecular approaches, the Eaton and Thummel labs found a way to block rifampin's action on the CYP3A4 gene. The answer was to pretreat liver cells, intestinal cells, and other *in vitro* gene expression systems with sulforaphane.

The observation that sulforaphane can prevent CYP3A4 induction from drugs such as rifampin holds clinical promise as a means to prevent drug-to-drug interactions. This is an especially important problem in the developing world, where tuberculosis is the most common opportunistic infection in HIV/AIDS patients. Rifampin and first-generation antiretroviral drugs are used widely because of their relatively low cost, but the two cannot be used together. The discovery that sulforaphane can block this drug-drug interaction might provide a way around this problem.

The National Institutes of Health (NIH) awarded a grant to the Eaton and Thummel labs for a Phase 1 clinical trail, and the Puget Sound Partners for Global Health funded a pilot project that will use a new, specifically bred animal model to further investigate how sulforaphane modulates the expression of genes regulated by the Pregnane X-Receptor. Collaborators



on the clinical trial include Johanna Lampe of the Fred Hutchinson Cancer Research Center and Danny Shen, chair of the UW Department of Pharmacy. Emma-Jane Poulton, a pre-doctoral student in the Eaton laboratory, is also working on the project, with support from a training grant from the National Cancer Institute.

In the clinical trial, healthy human volunteers will receive one week of treatment with either sulforaphane (given as a broccoli sprout extract in a cheese soup), rifampin (given as a pill), or a combination of rifampin and sulforaphane. The study is designed to determine if sulforaphane, when administered in the diet, can effectively block CYP3A4 induction by rifampin in humans.

If the pilot project is successful, Eaton's study of diet and cancer risk may lead to a new way to fight adverse drug-drug interactions, and improve treatment of both TB and HIV/AIDS worldwide.

Based on these findings, the UW has filed a patent on the potential use of sulforaphane as an inhibitor of the Pregnane X-Receptor. With funding from the Bill & Melinda Gates Foundation and the NIH, Eaton hopes that his basic research in both mice and humans will provide the necessary data to encourage the development of sulforaphane as a novel means of eliminating many unwanted drug-drug interactions, especially in the treatment of TB and AIDS.

#### TB bacteria under high magnification Janice Carr, CDC



# SAFE LAST STEP

The last step can be a doozy for apple pickers in Washington's orchards. Going up the ladder is easy with an empty bag. Coming down is the hard part. Not only is the bag full with 20 to 50 pounds of fruit, but its bulge makes it hard for workers to see their feet.

Associate Professor Matthew Keifer and graduate student Jon Hofmann combed through volumes of accident reports and researcher Karen Snyder analyzed interviews of workers and came upon an important fact: Pickers miss the last step.

They usually climb down with their back facing the ladder, and the full apple bag can obscure their view of their feet. Workers may inadvertently step off the ladder at an upper rung, causing a potentially dangerous fall.

Keifer, with the help of Associate Professor Pete Johnson, consultant Tom McMonagle, and Professor Karl Kapur from UW's College of Engineering, have developed a device that can alert workers—through a buzzer or a light—when they have reached the last rung of the ladder. The device, made from offthe-shelf equipment, consists of a strain gauge connected to the bottom rung. When the gauge is compressed by a worker stepping down, it will trip the signal. The device also logs the number of times the last rung is missed, which can provide important data for prevention campaigns.

Keifer's group has built and tested a working model, and UW TechTransfer is reviewing the technology for worldwide patent protection.

The device could provide a small, light, and inexpensive solution to a surprisingly large problem. Keifer and Hofmann's study of workers' compensation claims in the main tree fruit-growing region of Washington found that 31% were ladder-related injuries. Ladder-related claims accounted for nearly half of all "compensable" claims (those involving time loss, disability, or loss of earning power in addition to medical expenses). On a per-claim basis, ladder-related injuries were found to be among the most severe and costly reported injuries.

#### Further reading

Hofmann J, Snyder K, Keifer M. A descriptive study of workers' compensation claims in Washington State orchards. Occup Med (Lond). 2006 Jun;56(4):251-257.

Pacific Northwest Agricultural Safety and Health Center http://depts.washington.edu/pnash/

Harvest bags obscure vision of the bottom rung of a ladder

PNASH archives

# BIOTECH-HIGH-TECH ENVIRONMENTAL HEALTH

Environmental health runs from the low-tech—keeping the poison out of the well—to the frontier areas of biotechnology.

The dictionary defines biotechnology as the manipulation of living organisms for commercial products, such as the production of antibiotics and hormones. In agriculture, biotechnology has uses in food production, sustainable agriculture, fisheries, and forestry.

Seattle is the fifth-largest biotechnology center in the nation, according to city statistics, with some 7,600 people and 55 companies, many of which are connected to the UW.

Our department has few biotechnology patents to date, said Professor Terrance Kavanagh (see "Serendipity," page 12). However, its graduates learn techniques that make them attractive hires in the highly competitive biotechnology sector. Many graduates of our Toxicology program go on to work with Seattle biotechnology companies from A (Amgen) to Z (ZymoGenetics).

Development of a novel therapy generally involves teamwork, said Rafael Ponce, a departmental graduate who is director of safety assessment in the preclinical development section of ZymoGenetics. Success in the field also involves communication skills, especially with regulatory agencies nationally and worldwide.

Ponce is part of a team from the local biotech industry that is working with UW faculty in our department, in Pharmaceutics, and in Comparative Medicine to expand awareness of biotechnology as an industry, develop content for new classes, and provide internships and other opportunities for students.

"There is a strong and growing demand for toxicologists and pathologists to evaluate the safety of the novel therapies coming out of biotechnology," he says.

Our Superfund Basic Research Program is using biotechnology to fight air and water pollution. Working with the UW College of Forest Resources, Superfund researchers have developed transgenic poplar trees that can remove volatile hydrocarbons, such as trichloroethylene, vinyl chloride, and benzene, from the groundwater.

Using modified trees raises controversy about genetic manipulation and unintended consequences, but, handled cautiously, it holds promise as a means to clean contaminated sites faster and more cheaply than conventional techniques, said Sharon Doty, a UW Forest Resources professor.



Rafael Ponce (left) talks with students and faculty at Career Day, 2005

#### For further reading

Washington Biotechnology and Biomedical Association http://www.wabio.com/

Superfund Basic Research Program: Phytoremediation of organic pollutants using transgenic plants http://depts.washington.edu/sfund/projects/project\_6.html

#### TWO ALUMNI IN BIOTECHNOLOGY

#### Francisco Dieguez, PhD Toxicology, 2003

Head of Imaging and Proteomics Merck Pharmaceuticals Research Laboratories Dieguez undertook a post-doctoral position at Harvard University/Massachusetts General Hospital in Boston, later becoming a research fellow there. Last year, he accepted the position with Merck in West Point, Pennsylvania.

#### Rafael Ponce, PhD Toxicology, 1995

#### Director of Safety Assessment/Preclinical Development, ZymoGenetics

In 2001, Ponce became the first toxicologist for ZymoGenetics and now heads a section. He is an affiliate associate professor in our department, a board member of the Northwest Association for Biomedical Research, and a diplomate of the American Board of Toxicology.

# MEASURING INVISIBLE HAZARDS

Professor Michael Yost is our department's most prolific inventor. He holds seven patents on products and processes large and small, and has others in the pipeline.

Yost combined his Environmental Health Sciences major at the University of California, Berkeley, with minors in Electrical Engineering and Biostatistics. The combination produced a scientist who can invent new instruments and detection methods, and also develop the analysis techniques needed to interpret them.

His research focuses on developing novel tools for environmental and occupational exposure assessment. His Optical Remote Sensing (ORS) Laboratory invents sampling techniques that use electromagnetic radiation such as ultraviolet, visible, and infrared light, or lasers to identify and measure environmental pollution across large areas. These instruments solve the problem of how to sample air across a stockyard, a freeway, or a Hanford radioactive waste tank farm.

For sampling the smallest personal environments, Yost's lab developed and tested an air-sampling device that varies the airflow in proportion to the actual breathing volume inhaled by a worker. Unlike conventional fixed-flow rate samplers, this device would measure a sample proportional to a worker's inhaled dose, whether at work or at rest. National Institute for Occupational Safety and Health (NIOSH) is further developing this pump for use in the field.

In 2006, UW TechTransfer licensed Yost's patented technology for mapping air pollution to Arcadis, an international environmental remediation and engineering firm.



**Mike Yost** 

He continues to work with Ram Hashmonay, a former postdoctoral fellow, who joined Arcadis' offices in Research Triangle Park, North Carolina.

Their new technique, radial plume mapping, combines the ORS with a radial scanning technique, and is more sensitive, less expensive, and faster than its two component parts, and can map both high and low levels of pollutants using a single instrument. The US Environmental Protection Agency and Department of Defense have tested the method.

With another doctoral student, Rob Crampton, Yost filed an invention disclosure for a next-generation remote sensing system that can improve detection limits of environmental contaminants. They took the unusual step of embargoing Crampton's dissertation after he graduated in Autumn 2007, so the patent could be processed.

A third affiliation is with Professor Terrance (Terry) Kavanagh, Assistant Professor John Scott Meschke, and Enertechnix Corp., a small Washington-based business. This five-year collaboration has taken a micro-machined aerosol lens developed by Enertechnix, and refined it for application in a variety of environmental and bioaerosol sampling products.

The patented aerosol concentrator has received funding from the Department of Homeland Security for detection of anthrax and other agents. It could also have applications in global health. The team is working with PATH, a Seattle-based global health organization, to apply this technology for detecting tuberculosis and other infectious diseases in exhaled breath.

These collaborations exemplify the type of partnership through which small businesses can invest in technology transfer from the university, rather than create their own research and development departments, Yost says.

#### Further reading

Optical Remote Sensing lab http://depts.washington.edu/orslab/ UW TechTransfer http://depts.washington.edu/techtran/



A Lateral-Transfer Retroreflector (LTR for short) that the Yost lab built for Puget Sound Clean Air Agency

# OCCUPATIONAL AND ENVIRONMENTAL MEDICINE

# STEPHEN C. HUNT

Director, Deployment Health Clinic VA Puget Sound Health Care Systems



## Caring for Wounded Veterans

Troops in Iraq and Afghanistan survive with more severe wounds than those from previous wars because of advances in body armor, field hospitals, and evacuation flights. However, these successes yield a growing population of severely wounded veterans who will need a lifetime of care.

Stephen Hunt directs a multidisciplinary post-combat assessment and follow-up clinic for returning veterans in the Puget Sound area. He also co-chairs the national Technical Assistance Team, providing leadership for a national Department of Veterans Affairs (VA) initiative for establishing similar integrated post-combat care clinics nationwide.

"I feel very fortunate to be involved with the incredibly meaningful, challenging, and rewarding work of providing health care and other support services for combat veterans returning from Iraq and Afghanistan," he says.

When he entered our Master of Public Health (MPH) program, he was a physician working with combat veterans at the VA, and he completed his Occupational and Environmental fellowship and MPH training on the job. He says the Occupational and Environmental Medicine (OEM) program enhanced his clinical work, expanded his research capabilities, opened up additional teaching and training opportunities, and contributed to his professional development in innumerable other ways.

He applies the principles of occupational and environmental medicine, and preventive health care daily in his clinical care of veterans who have suffered the traumas of war and combat. These principles also guide his development of programs for comprehensive post-combat services.

Hunt particularly admires the interdisciplinary nature of the OEM program. He remains involved with the program as a clinical assistant professor of Medicine.

He hopes current students consider the rewards of working with veterans. The VA health care system has a wide variety of opportunities for health professionals in all fields. "There is a place for all disciplines, including clinical, research, educational, administrative, and policy making in the VA," he says. alumni profile

# **BASSING** AWARENESS OF KNOWN HAZARDS

In academic circles, "research-to-practice" usually refers to the transition from basic to applied science—from the laboratory to the patent office. This part of the biennial report looks at ways to translate evidence-based public health findings and help the information find its way to the people who need it. Our audiences range from coffee harvesters in Central America to Alaskan natives, and from medical doctors to people with little formal education.

Our department is beginning to use participatory action research, which involves affected communities in developing the research project and communicating its results. Partners can include labor, management, and communitybased organizations.

Working at heights in Central America Kate Stewart



# SILICOSIS: ANCIENT DISEASE, NEW AUDIENCE

ET SILI

Silica is a classic public health problem. It causes an irreversible, but entirely preventable, disease. Breathing silica deep into the lungs can cause silicosis, permanent scarring of lung tissue.

Silicosis is one of the oldest known occupational diseases, dating back to stonecutters in ancient Greece. Still, today's construction workers and apprentices may be unaware of or nonchalant about its risks.

With that in mind, Mary Ellen Flanagan, recently retired industrial hygienist with the Field Research and Consultation Group (Field Group), embarked on a campaign to tell construction workers about the research she had amassed over two decades on the job.

This time, her medium wouldn't be professional journals, but tools the construction worker would use. Flanagan boiled down an extensive research database she collected for the American Conference of Governmental Industrial Hygienists (ACGIH) to the "Choosing a Respirator" section of a new silica website.

To publicize the site, she and a team turned to a construction-specific medium—the hard-hat sticker. These stickers were developed through collaboration with building trades apprenticeship programs and other partners.

The partners told Flanagan's team that hard-hat stickers are an immediate and lasting way to reach the target population. Construction workers are always looking for new stickers for their hard hats, and wearing them creates a peer-to-peer marketing of the website. The team chose an image of a worker using a jackhammer—a tool requiring strength and skill. Younger workers said they preferred designs that were a bit "edgy" with a bold, orange color scheme.

The role of the stickers is to create awareness of our silicosis prevention campaign, drive workers to

> the website, and create a peer-based support system within the construction sector. Because of the cumulative nature of silicosis, the campaign targets younger workers.

Other partners were the state Building and Construction Trades Council, Associated General Contractors, and the Associated Builders and Contractors. Their endorsements were key to getting buy-in from construction companies and unions. Research Scientist Marc Beaudreau and

Industrial Hygienist Gerry Croteau of the Field Group are carrying on Flanagan's work.

#### For further reading

Silica website (with information on obtaining posters and stickers) http://depts.washington.edu/silica/ Reports on UW studies on silica in construction http://depts.washington.edu/frcg/prj\_silica.html Other online resources http://depts.washington.edu/ silica/resources.html

Concrete work at building site Field Group Archives

Hard hat sticker used in silicosis campaign

# IN-COUNTRY TRAINING

Two exceptional women with ties to our department are laying the groundwork for a Center for Ergonomics in Central America.

Professor Aurora Aragon from the UNAN (*Universidad Autonoma de Nicaragua*) has invited Lecturer Kate Stewart to provide concentrated ergonomics assistance and supported Stewart's successful bid for a five-month Fulbright Scholar grant.

Aragon was our department's main collaborator in Nicaragua when our International Scholars Program had a Central American focus. It was supported by the Fogarty International Center of the National Institutes of Health.

Now that our Fogarty center's focus has shifted to Southeast Asia as the Collaborative Center for Healthy Work and Environment, some of our faculty members are remaining involved in Central America through programs such as Stewart's Fulbright.

Stewart owned an ergonomics consulting firm for many years and co-teaches two graduate courses, ENVH 556, Fundamentals of Ergonomics, and ENVH 559, Applied Industrial Hygiene, Safety and Ergonomics, both co-listed in Environmental and Occupational Health and Industrial and Mechanical Engineering. She has been to Nicaragua three times through Fogarty program activities and as part of our OSHA Education Center.



#### **Kate Stewart**



During her Fulbright tour, she will work with Aragon to set up long-term projects for applied ergonomics. Aragon and other occupational health faculty in Central America have studied in Sweden, and have adopted a Swedish model of hands-on occupational health and safety to develop in-country experts.

Two in-country experts are Nicaraguan PhD candidates, who want to improve the efficiency and working conditions in *maquilladoras* (foreign-owned factories) and on coffee plantations, where pickers wear poorly designed bags. As their mentor, Stewart could approach US bag designers or coffee companies; instead she will work with faculty from the UNAN to identify problems and preferred solutions.

Stewart doesn't discount her US connections. Central America is becoming increasingly industrialized, and Stewart wants to raise awareness among western-owned companies, such as a Nicaraguan-based Ford plant that makes electrical harnesses for the F-150 truck.

Her primary goal will be to work with Aragon to create a coordinating center in Nicaragua that will serve all Central American countries. To help start the process, Stewart, who is fluent in Spanish, plans to teach a five-month post-graduate *diplomade* to UNAN faculty and graduate students and provide several short seminars (two to three days) in El Salvador, Costa Rica, and possibly Panama.

When she comes back, she plans to teach Spanish-language courses in our Continuing Education program and be involved in future agricultural research projects involving the Latino population. She would also like to mentor ergonomics graduate students from Central America and Mexico.

#### For further reading

Collaborative Center for Healthy Work and Environment http://depts.washington.edu/cchwe Fulbright Scholars http://www.cies.org/us\_scholars

Construction companies in Central America often don't employ the same safeguards as those required in the US



Chuck Mitchell (without protective suit) conducts hazardous materials training in Alaska

# HARD-TO-REACH AUDIENCES

#### Native villages

Everything that goes to Alaska stays in Alaska. It's true of trucks, snow machines, and—unfortunately—hazardous waste drums. Native villages may not know what to do with this unintended legacy.

Our department's Continuing Education (CE) program teaches annual hazardous waste refreshers in the Puget Sound region, and is just beginning to build relationships with tribes to the north and west. In June 2008, our department will collaborate with Alaska natives, indigenous tribes from Russia, native villages from Canada, native organizations from all three countries, and the US Environmental Protection Agency and its Russian counterpart for on-site training at a dump site in the westernmost Aleutian Islands.

The UW is part of a Western Region University Consortium based at University of California at Los Angeles, funded by the National Institute of Environmental Health Sciences (NIEHS), which provides hazardous waste and emergency response training. Our area covers Alaska, Idaho, Oregon, and Washington.

CE Instructor Chuck Mitchell, Director Steve Hecker, and Assistant Director Mike Willis are participating in a cleanup plan with the Yukon River Watershed Intertribal Council in Alaska. The focus is on teaching hazardous waste management and emergency response to all 82 villages along the Yukon River Delta.

They are also working with the Alaska Rural Water Association to help native villages deal with leftover mining waste and dumped motor oil. There is no safe place to dispose of hazardous wastes in the tundra, says Hecker.

The CE program and the Tribal Solid Waste Advisory Network (TSWAN) are collaborating on courses several times a year. In June 2008, the UW, in partnership with the TSWAN, the Washington State Patrol, and the Environmental Protection Agency will put together a course for tribal workers to learn how to protect themselves from the hazards of illegal methamphetamine labs can be a problem on reservations and other rural lands.

#### Day labor

The CE program's other major educational outreach to new audiences is the day labor project. This research-to-practice program is based on Professor Noah Seixas' findings about hazards among casual workers in construction, landscaping, moving, and cleaning jobs—all high-hazard occupations.

His research has found a high injury rate among day laborers. Most of the workers he surveyed reported exposures to heavy lifting and eye hazards. More than half feared serious bodily injury, and a large number had been compelled to refuse dangerous work.

Based on the survey data, Seixas and the CE staff developed educational materials and training sessions for day laborers, using participatory action research methods to foster working relations between the laborer communities and our researchers.

#### For further reading

Continuing Education *http://depts.washington.edu/ehce* EPA Region 10 Tribal Programs in the Pacific Northwest and

Alaska http://yosemite.epa.gov/R10/TRIBAL.NSF Worker Education and Training Program

http://www.niehs.nih.gov/careers/hazmat/

Seixas NS, Blecker H, Camp J, Neitzel R. Occupational health and safety experience of day laborers in Seattle, WA. *Am J Ind Med.* 2008; 51(6):399-406.



# MEASURING ARTISTS' EXPOSURES

Pratt Fine Arts Center has substituted vegetable oil for chemical solvents in its printmaking studios

border: type drawer for the sheet-fed printing presses

22

Industrial hygiene has its roots in—well—industry. For example, any industrial hygienist should be able to evaluate chemical exposures for a welder working an eight-hour shift on an automobile assembly line. But what about a metal sculptor, who does a little

welding, some polishing, and perhaps some metal casting to create a work of art? These fleeting exposures are more difficult to capture, creating a challenge for Gerry Croteau, an industrial hygienist with our Field Research and Consultation Group.

Little has been published about airborne exposures in the arts, he says. Artists often work alone, and he characterized art production as "millions of artists and artisans using thousands of products in hundreds of different ways." Rarely does an arts organization support efforts to assess, monitor, and control workplace health and safety hazards.

One arts organization that has made the commitment is the Pratt Fine Arts Center, a nonprofit education and resource center located in Seattle's Central District. "Pratt has been committed to safety in the arts for its entire 32-year history, but in the past five years we have made it more of an emphasis," says Executive Director Michelle Bufano.

In many ways, Pratt serves as a national model for its mission and structure, and Bufano also wants it to be a safety model for other schools. Pratt Facilities Manager James Brandalise is developing standards for the tasks and tools that artists might use.

Artists often want to know whether a material or a technique is safe, Bufano says. She wants to integrate safety into the curriculum and develop take-home information for artists and a safety resource on the school's website.

Croteau is helping provide that information. He approached the problem of airborne exposures at Pratt in three steps: 1) understanding the artistic process and media used, 2) monitoring airborne exposures, and 3) interpreting the resulting exposure monitoring data.

He started by talking with artists and watching them work. This allowed him to identify the substance being worked, its toxicity, and its potential for becoming airborne. He then fit artists with a small lapel monitoring device to collect air samples from their "breathing zone." A canopy hood is appropriate for the relatively low exposure levels in a glass flame studio

He sampled for the duration of the task,

and sometimes took additional samples in the studio.

After the exposure has been measured, Croteau determines whether it presents a potential health hazard. This is where science becomes an art. Exposure criteria for a specific toxicant are based on a combination of epidemiology and animal studies and sometimes this information is limited.

For most workplace contaminants, this is readily accomplished by comparing the worker's measured full-shift exposure level to the permissible exposure limit (PEL) that is enforced by the Washington Division of Occupational Safety and Health. The PEL is established as the airborne concentration the average worker can be exposed to eight hours per day for a working lifetime without experiencing adverse health effects. Again, this doesn't work so well in the artist's studio.

For shorter duration exposures, there is a Short Term Exposure Limit (STEL), typically set at three times the PEL for a 15-minute duration. Croteau uses these as the basis of his calculations. If he finds an artist's exposure exceeds an occupational exposure limit, he offers several recommendations.

The best solution, which is rarely feasible, is to discontinue use of the product. However, this has been done in the metal arts by introducing fluoride-free fluxes and lead-free solders, and polishing metal by tumbling instead of buffing.

The next best solution is the use of ventilation, water spray, or some other engineered control that reduces the exposure level. The last resort for addressing an elevated airborne exposure is using masks for respiratory protection.

Croteau says that Pratt, due to its prominence and stature, sets a standard for health and safety in the arts that artists will tend to employ in their own studios. The school has agreed, when possible, to reduce exposure levels and improve ventilation, even if a given exposure level is found to be less than a regulatory limit.

#### **Further information**

Pratt Fine Arts Center http://www.pratt.org/index.html Field Research and Consultation Group/Job Hazards

http://depts.washington.edu/frcg/jobhaz.html ACTS: Arts, Crafts & Theater Safety

http://www.artscraftstheatersafety.org/ Health and Safety in the Arts database

http://www.ci.tucson.az.us/arthazards/

# EXPANDING BEYOND INDUSTRIAL HYGIENE

Our master's program in Industrial Hygiene has been reorganized into a degree called the Master of Science in Occupational and Environmental Exposure Sciences to better represent the current content and professional practice of this discipline.

Students can now focus on exposure assessment methods, regulations, and controls for both occupational and community settings. As an alternative to completing a thesis, students can choose to develop an online portfolio based on a practical project, capstone course, and internship experience.

Occupational hygiene remains one of four learning emphasis areas. The others are ergonomics and human factors, health and safety management, and exposure biomarkers.

> Field Group monitoring found minimal exposures to silica and heavy metals in the glass blowing studio at Pratt



# PREDICTING THE FUTURE FOR INJURED WORKERS

What if we had a crystal ball that predicted when an injured worker might return to the job?

> It's more science than magic, but the Occupational Epidemiology and Health Outcomes program has developed a three-question survey that can be used soon after a work-related back injury to predict whether the worker is at risk for a long-term disability.

If the risk is high, the worker's health-care provider can put the worker on a fast-track intervention program to diminish the risk of disability.

Predictors of long-term disability:

> Pain interferes with work

Pain radiates to the leg

Not currently working The Occupational Epidemiology program's mission is to reduce the incidence and disability of occupational injuries and illnesses.

To that end, the Occupational Epidemiology group has been working with health providers and the Washington State Department of Labor and Industries (L&I) to develop and implement best practices in occupational health. Often a family doctor or chiropractor is the first to assess an injured worker, and information on the best practices will provide them with a quick review of occupational health concepts.

Two pilot projects, or centers for occupational health and education (COHE), were developed in Renton and Spokane, Washington. L&I has expanded the program with new COHEs, including our Occupational and Environmental Medicine (OEM) Clinic at Harborview Medical Center.

"By combining this new survey tool with the COHE, we can reduce disability by 20%," said Gary Franklin, director of the Occupational Epidemiology group. Since 5% of the cases account for 80 to 85% of our workers compensation costs, there is a tremendous incentive. If the COHE and these predictor questions can reduce that percentage from 5% to 4% or lower, we will have made a big difference in the cost of work-related disability in this state, he says.



The OEM clinic will apply lessons learned from the Renton and Spokane sites to Harborview Medical Center, the only Level 1 Trauma Center in Washington state.

The "best practices" approach began in Harborview's emergency department and the OEM Clinic, and is now being expanded to other parts of the hospital, says Jordan Firestone, director of the clinic.

Hospital paperwork is being streamlined to make it easier for both providers and patients to follow workers' compensation claims. The goal is to return injured workers safely to their jobs as soon as possible. The Harborview center's next step is to follow and implement quality indicators to ensure and measure "best practices."

#### Further reading

- Fulton-Kehoe D, Stover B, Turner JA, Sheppard L, Gluck J, Wickizer T, Franklin GM. Development of a short questionnaire to predict long-term disability. *JOEM*, in press.
- Wickizer TM, Franklin GM, Mootz RD, Fulton-Kehoe D, Plaeger-Brockway R, Drylie D, Turner JA, Smith-Weller T. A community-wide intervention to improve outcomes and reduce disability among injured workers in Washington State. *Milbank Q*. 2004;82(3):547-567.

# AND WHERE WE'RE GOING



# TAKING STOCK THE BIENNIUM IN REVIEW

Although the 2005–2007 biennium was at times challenging, both economically and professionally, our department had several successes that position us for growth and achievement in the next decade and beyond.

Historically, our department has been successful in obtaining competitive grants. When research funding opportunities decrease, competition increases, and our faculty and staff must work hard to stay even. We also have to work harder to attract and support top graduate students, and to become more creative with our academic programs.

The current period of national economic stress is not over. However, we are weathering this period in good shape (arguably in great shape, compared with many similar programs at the UW and across the nation). I am confident that we will continue to accomplish gains in our teaching, research, and service missions.

#### Students

Our student population has remained reasonably stable and looks to continue that way. Our entering classes in Autumn 2005 and 2006 were 23 and 28 graduate students, respectively. This compares with the average entering class in the 2003–2005 biennium of 29 graduate students. The number of students entering our newest degree program, the Master's of Public Health in Environmental and Occupational Health, was five in 2005 and four in 2006.

Our undergraduate program has continued its growth curve and, in 2008, we will institute a competitive admissions program.

It has been a challenge to attract qualified physicians to our MPH and medical residency in Occupational and Environmental Medicine. This difficulty reflects a national trend. In 2007, we admitted no new doctors to our residency program, but continue to have several new enrollees in the MPH program who are taking their medical residency through the military at Madigan Army Medical Center. During the past two years, we granted 34 baccalaureate degrees, 25 MS degrees, 22 MPH degrees, and 11 PhDs (see pages 36–38). The DEOHS Outstanding Undergraduate Award went to Eric Coker and Sean Sweeney in 2006, and Quynh Ngoc Bui in 2007. The Outstanding Graduate Student Award went to Christopher Carlsten in 2006, and Lisa Tolbert in 2007. (Chris Carlsten recently accepted a faculty position at the University of British Columbia). Many of our students won awards from professional societies for outstanding papers and research projects, scholarships, and recognition for community service and other professional contributions.

Of special note were the UW School of Public Health and Community Medicine (SPHCM) awards received by our students: Joseph (Jay) Smith won the 2006 Gilbert S. Omenn Award for Academic Excellence, and Victor Van Hee won in 2007. This award recognizes the top graduate students across the six departments of the school. Yolanda Sanchez was awarded the Community Service Award in 2006, and Joyce Tseng (see page 4)

#### WHERE ARE THEY NOW? 1997-2007 master's & doctoral grads



received it in 2007. Also in 2007, Christopher Diangco was the first recipient of our new Jack Hatlen Scholarship Award, which was established in 2006, using donated funds to support undergraduate education in our department

The bibliography on pages 50–58 shows about 25 papers published by students in academic journals. About 75% of our master's students and 100% of our doctoral students publish their research findings in the scientific literature while in our programs or shortly after they graduate.

#### Educational program development

In the 2005–2007 biennium, our undergraduate program experienced unparalleled growth. This program, which dates back to 1947, had a typical head count of 30 to 40 students for much of the 1960s, 1970s, and 1980s. However, the late 1990s saw a nationwide downturn in enrollments in undergraduate programs in environmental health, and our enrollment followed this trend and declined substantially.

Since 2002, we have steadily built enrollment through program reorganization, curriculum changes, and increased outreach by faculty and staff. In the 2005–2007 biennium, our enrollment more than doubled to approximately 60. This has been satisfying to the faculty and staff who worked to make it happen, but led to a new problem of how to increase our instructional capacity. We have added instructors and class sections to accommodate the increased enrollment, yet will need to limit enrollment in the coming biennium to maintain instructional quality.

A related capacity issue is the need to provide internships for 30+ undergraduates each year. The practice-oriented internship is a key feature of our program and provides our students with opportunities to focus their career plans and, in some cases, to directly transition from the UW to employment. In 2007, we launched a joint internship program with Public Health-Seattle & King County (PHSKC). We were able to place four students with mentors at PHSKC, where each carried out a project in addition to taking part in routine Health Department activities and learning about the diversity of activities and roles in the agency.

In 2006, we initiated a summer program for undergraduates—not only for our own students, but also students across the UW and from other institutions—to experience research activities in environmental health. Recruiting students from diverse backgrounds, and especially from groups that are underrepresented in environmental health science fields, is a major goal of this program. We were able to collaborate with other UW programs that had training funds aimed at diversity recruitment to support five or six students in 2006 and again in 2007. Based on this success, we sought and received a training grant from the National Institute for Environmental Health Sciences to continue this program for the next five years, funding six undergraduates each year.

These two programs in experiential learning will continue to add value to our undergraduate program, and to spread awareness of public health, environmental and occupational health, and health science research to other undergraduates here and in other parts of the country.

At the graduate level, the Toxicology program joined with the Department of Comparative Medicine and the School of Pharmacy to launch an interdisciplinary program in health and safety issues associated with biological compounds in the biotechnology industry (see page 15). A new course on biopharmaceutical product development was introduced in 2007, and attracted 15 graduate students from multiple departments. In addition, four students completed summer internships in local biotechnology companies.

In the 2005–2007 biennium, the Industrial Hygiene and Safety program reviewed, renewed, and reconfigured its course work and organization. The updated curriculum now termed Occupational and Environmental Exposure Sciences—was rolled out in time for the 2007 entering class.

This new Master of Science curriculum offers four emphasis areas (occupational hygiene, ergonomics and human factors, health and safety management, and exposure biomarkers) and expands context and concentration options. This new organization recognizes the continued blurring of "environmental" and "occupational" categories in the professional roles our graduates fill.

#### Faculty

Our faculty taught more than 100 courses during the biennium, from undergraduate introductory courses to graduate seminars. Of note, Professor Michael Morgan was nominated for the UW Distinguished Teaching Award in 2007.

While we had no vacant professorial positions to fill in the biennium, we did have a few faculty additions. Marilyn Roberts and Michael Rosenfeld, both full professors, joined our department from the SPHCM Pathobiology Department. This department is being eliminated and faculty have transferred to DEOHS, Epidemiology, and Global Health. Roberts, a microbiologist/immunologist, is interested in antibiotic resistance and environmental pathogens. Rosenfeld, an expert in atherosclerosis, has been a long-term collaborator on departmental studies of the health effects of air pollutants. His emphasis on the cardiac effects of air pollutants plays an important role in new research initiatives in our department.

In addition, Steve Hecker joined us as senior lecturer, replacing longtime faculty member Sharon Morris who retired in 2005. Hecker is now directing our educational outreach and continuing education programs.

We had no other retirements or departures of primary faculty in 2005–2007. However, clinical faculty member, Timothy Takaro (joint with Medicine) was appointed associate professor at Simon Fraser University, BC, Canada. He continues as affiliate faculty with our department.

There was no shortage of faculty achievement and related awards and recognition. Promotions were awarded to John Kissel, Joel Kaufman, Thomas Burbacher, and Zhengui Xia, all to full professor. Elizabeth (Lianne) Sheppard (joint with and primary in Biostatistics) was promoted to research professor; Peter Johnson was promoted to associate professor.

Matthew Keifer was recognized by the SPHCM with the 2007 Faculty Community Service Award. David Eaton presented the school's Distinguished Faculty Lecture in Spring 2006: "Genes and cancer-causing chemicals: Understanding why humans are not just big rodents." Eaton was also recognized at the university level by being recruited to serve as associate vice provost for research.

Richard Fenske was named associate chair of our department in 2006, and his outstanding research contributions in pesticide exposure assessment using fluorescent tracers earned him two national and international awards: in 2006, the NIOSH Director's Award for Scientific Achievement in Occupational Safety and Health, and in 2007, the International Society of Exposure Analysis Jerome Wesolowski Award for "sustained and outstanding contributions to the knowledge and practice of human exposure assessment."

Janice Camp was appointed as DEOHS Director, External Relations in 2005. In this role, she assumed and expanded upon many of the activities conducted by Sharon Morris prior to her retirement. Camp represents the DEOHS at state level meetings such as the Workers Compensation Advisory Committee, WISHA Advisory Committee, and the WISHA Monitoring Committee of the Washington State Labor Council. She also works with Kathy Hall and Cathy Schwartz on key publications for the DEOHS.

#### Staff

Our department is home to some 150 staff, of whom approximately 115 are researchers and support staff on externally funded grant projects. In 2005–2007, we had 49 new staff appointments, including Jim Hogan, who was recruited to head our department's information technology support; James Meadows, who replaced Namura Nkeze as undergraduate program manager; and Michael Willis, hired as assistant director in the continuing education program. Staff talent, energy, and skill underlie our success in research, teaching, and service, and we are fortunate to have such a strong and motivated group. There a few highlights, with apologies that I can't list everything our staff have contributed and accomplished. Phillip Buff, Roosevelt building receptionist, who has led several community-oriented efforts, was awarded the 2007 King County Combined Fund Drive Sustained Excellence Award. In 2005, he was named UW Outstanding Combined Fund Drive Coordinator.

Marcy Harrington, manager of the Pacific Northwest Agricultural Safety and Health Center (PNASH), received our department's Outstanding Staff Award for 2006, and Rosie Schaffer, manager of the Environmental Health Laboratory, received this recognition in 2007. Kathy Hall, director of communication, and Cathy Schwartz, graphic designer, also received recognition: the 2007 DEOHS calendar received the Best of Show award in the Society for Technical Communication's Puget Sound publication competition. Two long-term staff members retired: Neil Horike, computer specialist, and Mary Ellen Flanagan, industrial hygienist.

#### Facts & Figures

In this recent climate of limited funding for research, teaching, and service, our faculty, staff, and students worked hard to generate grant proposals to federal, state, and private sources. During the 2005–2007 biennium, our federal research dollars increased about 14% from the 2003–2005 biennium. This increase reflected continued funding for research efforts, including the Center for Ecogenetics, Children's Health Center, Oceans Center, and individual grants focusing on topics such as hearing loss in the construction industry and children's exposure to diesel bus fumes.

Large-scale efforts, such as the MESA air pollution project, served as the foundation for additional studies, including a related project funded by the Health Effects Institute. We also benefited by successful competitive renewals such as the PNASH Center, Superfund, Basic Research Program, and the Fogarty International Scholar's grant, now called the Collaborative Center for Healthy Work and Environment.

Faculty also were successful in seeking alternatives to federal funding, primarily from private contracts and gifts.



#### DEOHS FUNDING (BIENNIAL)

DEOHS SPENDING (BIENNIAL)



One example is the diesel bus study headed by Research Associate Professor Sally Liu. This five-year study, started in 2004, examines school children's exposure to diesel bus fumes. During the 2005–2007 biennium, Liu received a generous gift from the International Truck & Engine Corporation to help expand the scope of this study.

The Pacific Northwest OSHA Education Center, part of our continuing education program, also pursued alternative funding by expanding its customized and on-site training. During the 2005–2007 biennium, this center, which relies solely on course revenue for funding, generated more than \$800,000 in revenue.

Washington state funds continue to provide essential support to our department's missionrelated activities. During the 2005–2007 biennium, state funds increased 10% from the last biennium. This includes financial support allocated directly from the Washington Legislature through the Medical Aid and Accident Funds, state contracts from entities such as the Departments of Health and Ecology, and central university resources. As in 2003–2005, this increase was primarily due to the return of indirect costs from federal grants.

#### Research

The figures on this page show that we continue to rely on research funds for about two-thirds of our department's biennial activity. The bulk of these funds are from federal sources through highly competitive peer-reviewed programs. Each nationwide competition might receive hundreds of proposals, and the fraction that is actually funded fell to as low as 10% in the 2005-2007 biennium. Broad success in this environment is hard to come by, and I am proud to point to our department's record as evidence of our excellence in research. We continue to be among the top three or four academic units at the UW in grant success, and on a per-person basis are probably number one. I am also happy to report that our school received a top ranking nationally, according to the Faculty Scholarly Productivity Index of top research universities (second after Yale University).

In the 2005–2007 biennium, we received 40 new research awards, and two of those were of

a dramatic scale. Our newly funded National Institutes of Health DISCOVER (Disease Investigation through Specialized Clinically Oriented Ventures in Environmental Research) Center is a multi-investigator, five-year program that is one of just three such centers in the US.

This center will receive \$12 million to investigate the mechanisms by which traffic-related air pollution causes heart attacks and other cardiovascular diseases, integrating a diverse set of research approaches. Key faculty in this endeavor are Joel Kaufman, Sverre Vedal, Michael Rosenfeld, Terrance Kavanagh, Elizabeth Sheppard, and Dan Luchtel.

The other large-scale project is the National Children's study, conducted at 22 centers across the US. This \$3.2 billion nationwide effort will track approximately 100,000 children from gestation through age 21, with the goal of providing new information about determinants of health and development, including genetic and environmental factors.

The initial five-year, \$1-million-per-year UW component will be led by Professor Elaine Faustman and also will involve Professor Thomas Burbacher, and Epidemiology Professor Shirley Beresford, with collaborators from Fred Hutchinson Cancer Research Center, PHSKC, and the UW. In the 2007– 2009 biennium, subject recruitment and data collection for the King County portion will begin. Additional counties in eastern Washington and Oregon may be added in 2008.

We also received renewal funding for the PNASH Center through 2011. Continued efforts by this center will focus on prevention of and intervention in agricultural injuries and illnesses throughout our Northwest region.

#### **Continuing Education**

We have formed new partnerships for worker training and educational outreach with universities in California and Arizona, and with a number of private-sector training organizations. This has enhanced our ability to identify and respond to educational needs in health and safety for populations not well served by existing training opportunities (see story on page 21).

A related outreach effort, led by Hecker and Darren Linker, manager of our School to Work program, is a middleand high-school curriculum package "Health and Safety Awareness for Working Teens." At the end of the 2003–2005 biennium, this program completed a 15-minute video: "Teen workers: Real jobs, real risks." During the 2005–2007 biennium, the curriculum materials and DVD were shared widely among Washington school districts, and the DVD has been adopted by National Institute for Occupational Safety and Health (NIOSH) as the model for a new video message to be aimed at a teen worker audience. Partners in this effort and in future plans to raise awareness of the materials and the topic include Mary Miller from the Washington State Department of Labor and Industries (L&I), and leaders from the Washington Governor's Industrial Safety and Health Advisory Board.

Our Occupational Safety and Health Administration (OSHA) Education Center has become the fifth largest in the country in terms of number of courses offered and contact hours, and seventh for number of students trained. A major expansion of course offerings in Portland could well drive these numbers higher.

Physicians in our Occupational and Environmental Medicine Clinic use research findings in their clinical practice Jennifer Gill The Northwest Center for Occupational Health and Safety is extending the reach of its continuing education programs through ongoing partnerships. Partner programs developed in 2005–2007 include:

- Annual offerings of the Certified Hazardous Materials Manager review course in cooperation with the Institute of Hazardous Materials Management
- Collaboration with the Washington Safe Patient Handling Steering Committee in planning a statewide conference following the 2006 passage of Washington's safe patient handling legislation
- Development of an aging workforce curriculum and workshop led by Clinical Professor Michael Silverstein with the participation of L&I ergonomics and education staff and regional employer and labor organizations

#### **Field Group**

Our Field Research and Consultation Group (Field Group), which provides workplace health and safety consultation services, was particularly productive. The staff of Certified Industrial Hygienists conducted more than 140 service requests and several field-based research projects. Company assistance included evaluation of exposures to and control of noise, hexavalent chrome, welding fumes, wood dust, and solvent exposures.

The Field Group worked on projects to characterize hazardous exposures to artists (see page 22) and in brake-relining activities, to evaluate musculoskeletal risks to grocery checkers, and to develop training tools for workers exposed to silica dust (see page 19). The team has also mentored graduate students, using their connections with Washington state companies and agencies to find productive student internships.

The Field Group has been very fortunate to engage some of the leading occupational health and safety practitioners in the Pacific Northwest to work with our client companies to find and fix workplace problems. Retirements and new career opportunities led to some staff turnover. In 2006, Venetia Runnion, recently from a private sector consulting firm, brought new skills and enthusiasm to the team. She was named as 2007's Distinguished Industrial Hygienist by the Pacific Northwest Section of the American Industrial Hygiene Association.

#### Looking Ahead

We are in the early phases of several long-term developments that will have significance for our department. Internally, we are beginning to ramp up for new multi-investigator, multi-year research projects, and anticipate the conclusion of others. Some of our longest-running centers, including the Superfund Basic Research Program and the Center for Children's Environmental Health Risks, face an uncertain future. On the whole, I think it is safe to predict both continued research success and changes in how we achieve that success.

Our service and outreach efforts will continue and, in the 2007–2009 biennium, I anticipate new energy and new partnerships. The workshop developed by Michael Silverstein on creating age-friendly workplaces will be made available to employers in the state, many of whom have helped pilot it and are eager to put it to use. Our Field Group seems likely to experience rising interest from employers and worker groups, continuing a trend from the 2005–2007 biennium. Likewise, I expect our academic programs to continue to develop and to remain strong.

The launch of a new Department of Global Health (operated jointly by the School of Public Health and Community Medicine and the School of Medicine) in the 2005–2007 biennium, means the 2007–2009 biennium will see the roll-out of several key aspects of this new department, including curricula, student enrollment, and addition of key faculty. We look forward to representing the field of environmental and occupational health to this global health audience. The new department also will provide coursework, research opportunities, and new faculty expertise in global health for our students.

Two university-wide developments also have special importance to us over the 2007–2009 biennium. First, a state-level effort to anticipate and plan for public health effects of climate change is headed by UW faculty, including Richard Fenske and Catherine Karr from our department. Environmental health aspects will be one specific category of impact that we will need to help understand and address.

Another important initiative is the proposed College of the Environment at the UW. This university-wide effort to plan and implement a major organizational change is still in its early phases, but will likely involve our department and our school as affiliated units. Provost Phyllis Wise anticipates that the new college will spur collaborations and open research and teaching enterprises. Our department is extraordinarily well positioned to participate.

It looks to be a dynamic and interesting biennium ahead; join us for the fun!

—Dave Kalman



# INDUSTRIAL HYGIENE AND SAFETY **INDUSTRIAL**

### CYNTHIA L. ROGERS Health, Environmental & Safety Advisor, Chevron Global Upstream

## Standards for Health and Safety

The rate of occupational injuries and illnesses is about five times higher in the oil and gas sectors than in private industry as a whole. Cynthia Rogers is part of an occupational health team that is trying to reduce that injury toll.

Her job is to develop standardized processes for workplace health and safety and to help implement them in Chevron's global upstream strategic business units. "Upstream" refers to exploration and drilling, rather than refining and delivery. Chevron is the world's fifth largest global energy company, created by the merger of Chevron and Texaco.

Houston-based Rogers leads several teams that develop Chevron's standards for corporate occupational hygiene and fitness for duty. She provides advice, interprets standard processes, and leads workshops for the strategic business units.

She also mentors new hires and interns and plans to recruit on the UW campus in the fall. The oil industry hasn't been hiring for about 20 years, she says, but expected retirements are opening positions for well-educated health, environment, and safety graduates.

She likes the variety of her job. "Every day is a different challenge. I like the fact that I know so many of my co-workers—from roustabouts to vice presidents—because I work on so many projects that have company-wide impact. I like having the

background illustration: ©2008 www.photos.com

freedom to evaluate health and safety needs and decide the best approaches to resolving the issues."

Her latest project involves residual mercury left in equipment, tanks, and pipes that have been used for hydrocarbons. She is working on a multidisciplinary team to interpret data and make determinations as to when a vessel is "clean."

While she was in our Master of Science program, she interned with an oil company in her native Alaska. The industry was in a downturn when she graduated, so she went to work for a consulting firm and worked in other industries. One day Unocal's industrial hygiene manager called to encourage her to apply for a job in the company's Kenai operations in southern Alaska.

She later moved to the Gulf region of Louisiana and Texas. On her tenth anniversary, Unocal was bought by Chevron and she became a Chevron employee. She has worked in Singapore and other locales, noting, "I've had to have extra pages added to my passport from all the international travel."

Her master's thesis was on ventilation, but she says her graduate education provided her with a well-rounded industrial hygiene and safety background that "enabled me to develop workplace safety and health programs that were recognized as best practices." She says the most valuable thing she learned in our program was teamwork.

Three of our PhD graduates (I to r), Yupeng Wang, Wayne Turnberg, William Polk, 2006

Chuck Treser

alumni profile

# **MEASURES...** of accomplishment



# HONORS AND AWARDS

#### **STUDENTS**

Jason Allen, MPH student, Environmental and Occupational Medicine National Research Service Award postdoctoral fellowship, 2005

**Quynh Ngoc Bui,** undergraduate student department's Outstanding Undergraduate Student Award, 2007

**Christopher Carlsten,** MPH student, Environmental and Occupational Medicine *department's Outstanding Graduate Student Award*, 2006

**Eric Coker,** undergraduate student department's Outstanding Undergraduate Student Award, 2006

**Christopher Diangco,** undergraduate student *Jack Hatlen Scholarship winner, 2007* 

**Clarita Lefthand,** PhD student, Environmental and Occupational Hygiene *student travel award, American Society of Microbiology, 2007* 

**Tingting Li,** PhD student, Toxicology NIEHS Superfund/EPA scholarship to attend the Environmental Health Entrepreneurship Academy, 2007

Isaac Mohar, PhD student, Toxicology NIEHS Superfund/EPA scholarship to attend the Environmental Health Entrepreneurship Academy, 2007

Nadia Moore, PhD student, Toxicology *travel award, Research Society on Alcoholism, 2007* 

**Rick Neitzel,** PhD student, Environmental and Occupational Hygiene *3M scholarship, 2006* 

**Yolanda Sanchez,** MS student, Environmental Health SPHCM's Martin Luther King Award, 2006

Joseph (Jay) Smith III, MS student, Environmental Health SPHCM's Gilbert S. Omenn Award for Academic Excellence for master's student, 2006 **Sean Sweeney,** undergraduate student department's Outstanding Undergraduate Student Award, 2006

Leah Tivoli, MPH student, Environmental and Occupational Health student travel award, American Society of Microbiology, 2007

**Lisa Tolbert,** MS student, Environmental Health *department's Outstanding Graduate Student Award, 2007* 

Joyce Tseng, MPH student, Environmental and Occupational Health SPHCM Student Community Service Award, 2007

Victor Van Hee, MPH student, Environmental and Occupational Medicine SPHCM's Gilbert S. Omenn Award for Academic Excellence for master's student, 2007

### ALUMNI

**Steve Cant** (MS, Public Health, 1973) named director of Division of Occupational Safety and Health, Washington Department of Labor and Industries, 2006

Alex Lu (PhD, Environmental and Occupational Hygiene, 1996)

Joan Daisey Young Investigator Award, 2005

Wayne Martin (MS, Radiological Sciences, 1990) Science Spectrum's Trailblazer Top Minorities in Research Science award, 2006; Black Engineer of the Year for Community Service, 2007

**Hugh McLoone** (MS, Industrial Hygiene, 1990) *Human Factors and Ergonomics Society, User Centered Design Award, 2007* 

**Carl Osaki** (MS, Public Health, 1973) recognized as one of 15 leaders who are steering us into the future by the Journal of Environmental Health, 2007

**Robert Rogers,** (BS, 1977) elected president of the Chicago Medical School National Alumni Association, 2006

## FACULTY & STAFF

#### Janice Camp

outstanding faculty mentor of the year, 2006 Fellowship US Senate HELP Committee, Senator Patty Murray, 2007

#### Harvey Checkoway

International Agency for Research on Cancer visiting scientist fellowship in Lyon, France, 2006

**Bill Daniell** *outstanding faculty mentor of the year, 2007* 

#### **Elaine Faustman**

Humane Society of the United States, Proctor & Gamble Alternatives Award for Methods and Research in Toxicology Resulting in Reduced Animal Use, 2007

#### **Richard Fenske**

NIOSH Director's Award for Scientific Achievement in Occupational Safety and Health, 2006; Jerome Wesolowski Award from the International Society for Exposure Analysis, 2007

#### Kathy Hall

Best of Show award, Print Publications, Puget Sound Chapter, Society for Technical Communication, for 2007 DEOHS calendar

Marcy Harrington department's Distinguished Staff Award, 2006

#### Jack Hatlen

Western Region National Association of Medical Minority Educators Trailblazer, 2006

Matthew Keifer SPHCM Faculty Community Service Award, 2007

#### **Collen Marquist**

Excellence award, Print Publications, Puget Sound Chapter, Society for Technical Communication, for The Clearest Skies: A History of Seattle's Air Pollution Control Efforts, 2007

**Michael Morgan** *UW Distinguished Teaching Award nominee, 2007* 

#### **Rory Murphy**

*departmental nominee for the UW Diversity Award for Community Building, 2007* 

> Christopher Diangco with Jack Hatlen Kathy Hall

#### Becky Rooney

departmental nominee for the UW Distinguished Staff Award, 2007

Venetia Runnion

Distinguished Industrial Hygienist from the Pacific Northwest section of the American Industrial Hygiene Association, 2007

**Rosie Schaffer** department's Distinguished Staff Award, 2007

#### Cathy Schwartz

Best of Show award, Print Publications, Puget Sound Chapter, Society for Technical Communication, for 2007 DEOHS calendar

#### Elizabeth (Lianne) Sheppard

elected as a fellow of the American Statistical Association, 2006

#### Fred Tilton

NIEHS Superfund/EPA scholarship to attend the Environmental Health Entrepreneurship Academy, 2007

#### Charles (Chuck) Treser

Diplomate in the American Academy of Sanitarians, 2006; John P. Nordin Outstanding Sanitarian Award, 2007

### **GROUP AWARD**

Northwest Pediatric Environmental Health Specialty Unit EPA's Children's Environmental Health Excellence Award, 2007



# **DEGREES** BACHELOR'S MASTER'S DOCTORAL

### **UNDERGRADUATE**

#### Autumn 2005

Helen The-hui Mu

#### Spring 2006

Jessica Ang **Evan John Francis Brestar** Amandeep Chawla **Christine Hayun Kim Brianna Sheppard** Sean Sweeney **Terral Wilson Jihae Yi** 

#### Summer 2006

Eric Coker

#### Autumn 2006

**Ruth Famurewa** Brenda Wertman

### **Bachelor's degree** recipients at a rainy UW commencement, 2007

#### Spring 2007

**Cheng Arrowsmith** Henry Buu Doan **Gerard Paul De Leon** Andrea Lynn Finley **Candice Suping Huang** Li Ming Leung Rebecca MahLien Michelle M. Matias Christine Thao Nguyen **Christine Rohlik** Jana Rone Joy Rowe Steven Weber Jenna Will **Derrick You** 

#### Summer 2007

Quynh Ngoc Bui Trieu Hai Dang Cheryl Kalealani DeAguiar Joseph Gardener Nelson Kim Uyen Nguyen **Cristine Santiago Jackelin** Tran

## GRADUATE

Degrees: Master of Science (MS), Master of Public Health (MPH), and Doctor of Philosophy (PhD) **Graduate Programs:** Industrial Hygiene and Safety (IH&S), Environmental Health (EH), Environmental and Occupational Hygiene (EOH, PhD), Environmental and Occupational Health (EOH, MPH), Toxicology (Tox), Occupational and Environmental Medicine (OccMed) Faculty Preceptors (italics)

#### Summer 2005

Lynn Matthews Bekris, PhD (Tox) Glutathione related enzyme gene polymorphisms and Type 1 Diabetes (Elaine Faustman)

Amber K. Govert, MS (IH&S) Development of an analytical method for the determination of 3-Nitrotyrosine in human samples by HPLC-MS/MS (Christopher Simpson)

Yi-Nien Lin, MS (IH&S) The effects of high frequency stimulation on fatigue and twitch potentiation (Peter Johnson)

Karen Chiyono Takatani, MS (EH) Persistence of E. coli O157:H7, S. typhimurium, and Coliphage MS2 in a model home water system after ultraviolet (UV) disinfection treatment (John Scott Meschke)

Betsy Jill Walter, MS (Tox) Acute organophosphate insecticide toxicity in developing humanized paraoxonase (hPON1<sub>Q192R</sub>) transgenic mice (*Lucio Costa*)



#### Autumn 2005

Janet M. Blackstone, MS (IH&S) Physical exposure differences between children and adults on different-sized computer input devices (*Peter Johnson*)

Elizabeth J. Gribble, PhD (Tox) Cell cycle inhibition as a mode of abnormal development: The role of cell cycle checkpoint proteins and cyclin dependent kinase inhibitors in neurodevelopmental toxicant defense (*Elaine Faustman*)

**Douglas O. Johns, PhD** (EOH) The effect of ethanol consumption on the biotransformation of 1,1,1-Trichloro-ethane in human volunteers (*Michael Morgan*)

**Elizabeth W. Spalt, MS** (EH) Dermal absorption of contaminants from soil: IA review of current literature and investigations with DEET (*John Kissel*)

#### Winter 2006

**Samir N. Kelada, PhD** (Tox) 5' and 3' region variability in the dopamine transporter gene (SLC6A3) and Parkinson's disease (*Lucio Costa*)

#### Spring 2006

James Christopher Ballew, MS (IH&S) An intervention aiding in the reduction of organophosphorus pesticides from take-home pathways (*Richard Fenske*)

**Parveen Bhatti, PhD** (EOH) DNA double strand break repair polymorphisms, ionizing radiation exposure and breast cancer risk (*Michael Yost*)

**Christopher R. Carlsten, MPH** (OccMed) Cell markers, cytokines and immune parameters in cement mason apprentices (*Joel Kaufman*)

Heidi Michelle Curtiss, MPH/MPA (EOH) Response to diesel exhaust inhalation among healthy subjects: Symptom, perception, and physiologic measures (*Joel Kaufman*)

#### Alfredo T. Fernandez, Jr., MPH

(OccMed) An evaluation of a tabletop exercise designed to test existing organizational bioterrorism response plans of first responder and supporting agencies in the Tukwila and Seattle-King County areas of Washington State (*William Daniell*)

**Elizabeth Ann Gray, MS** (IH&S) Exposure assessment and exhaled breath analysis of solvent exposed workers at a wood-finishing plant (*Michael Morgan*)

**Cheng Han, MS** (IH&S) The development of testing software to measure and characterize differences in computer mouse use performance: Comparison of adults and children (*Peter Johnson*)

**Hieu V. Hoang, MPH** (OccMed) Is personal motivation associated with retention in the Army among soldiers with a medical disability? (*William Daniell*)

Elizabeth K. Hom, MPH (EOH) Analysis of environmental and occupational health concerns in key informant interviews with community advisory board (CAB) members of *El Proyecto Bienestar* (*Matthew Keifer*)

**Sinang H. Lee, MPH** (EOH) Translation of the fluorescent tracer technique from a research dermal exposure assessment method to a pesticide safety educational tool (*Richard Fenske*)

**Laura A. McLaughlin, MS** (EH) Chlorine and UV-disinfection as drinking water treatment options for rural areas of less developed countries (*John Scott Meschke*)

**Gabrielle Morris, MPH** (OccMed) Juvenile decompression illness: A case series (*Matthew Keifer*)

**Son Hong Phan, MPH** (OccMed) A study on silicosis risk in Vietnamese refractory brick workers (*Matthew Keifer*) **Dung Tri Phung, MPH** (OccMed) The patterns of at work injuries in community in Vietnam (*Matthew Keifer*)

**McKinley Rainey, MPH** (EOH) Evaluating training improvement and assessment tools in hands-on pesticide handler training (*Richard Fenske*)

**Troy Wayne Ross, MPH** (OccMed) Hazards to hearing and threshold shifts: The results of deployment to a combat environment (*William Daniell*)

John E. Shultz, MS (EH) Prevalence of pathogenic and multi-drug resistant organisms in Seattle area grocery store purchased food products (*John Scott Meschke*)

**Satish Subramaniam, MPH** (OccMed) Baseline characteristics and predictors of occurrence of mesothelioma among asbestos exposed occupations in the beta-carotene and retinol efficacy trial (CARET) (*Harvey Checkoway*)

**Phayong Thepaksorn, MPH** (OccMed) Occupational accidents and injuries in Thailand (*Matthew Keifer*)

**Maggie A. Trabeau, MS** (IH&S) An evaluation of "train-the-trainer" vs. expert training modalities for hearing protection use in construction (*Noah Seixas*)

Mary Martha Trute, MS (Tox) Characterization of hepatic glutathione *S-transferases* in Coho salmon (*Oncorhynchus kisutch*) (*Evan Gallagher*)

Whitney L. Webber, MS (EH) How much on-bus air pollution comes from the bus itself? A pilot study of diesel school buses (*L.-J. Sally Liu*)

**Jason A. Woodruff, MS** (IH&S) Validation of task-based noise exposure predictions in the construction trades (*Noah Seixas*)

**Jennifer A. Young, MS** (IH&S) Hearing protection device use and attenuation among construction workers (*Noah Seixas*)

#### Summer 2006

**Michael Robert Garry, PhD** (Tox) Differential response and susceptibility to oxidative stress in mouse lung fibroblasts heterozygous for phospholipid hydroperoxide glutathione peroxidase (GPx4) (*Elaine Faustman*)

**Peter Isaiah Cross Lang, MS** (IH&S) Comparing predictions of steady-state permeation rate derived from mass-loss data to measured permeation rate in four combinations of two polymeric glove materials and two common solvents (*Michael Morgan*)

**Spencer Olsen, MPH** (OccMed) Fine particulate air pollution and all-cause mortality in a sample of older US veterans (*Joel Kaufman*)

Joseph A. Smith III, MS (EH) Reconciliation of aggregate probabilistic exposure model predictions with observed biomarkers: A case study using data from the CTEPP child cohorts (*John Kissel*)

**Ami Tsuchiya, MS** (Tox) Fish consumption and mercury exposure among Japanese women living in the Puget Sound area (*Thomas Burbacher*)

**Xun Zhang, PhD** (Tox) Genetic and genomic approaches to the study of progression in mammary carcinogenesis (*Helmut Zarbl*)

#### Autumn 2006

**Kyung-Hoon Kim, MS** (Tox) Identification of chromosomal aberrations in DMBA/TPA-induced skin tumorigenesis in p19ARF- and p53-deficient mice using microarray-based comparative genome hybridization (*Christopher Kemp*)

William W. Polk, PhD (Tox) Role of protein Kinase C Zeta in lipopolysaccharide-mediated nuclear factor Kappa β activation and transcriptional activity in kidney epithelial cells (*James Woods*) **Susan Sheldon, MPH** (OccMed) Can hand hygiene and sanitation effectively be taught to children and adults? (*William Daniell*)

**Amy Elizabeth Sly, MS** (IH&S) Optimization of polyurethane foam (PUF) as a pre-filter for an aerodynamic lens aerosol concentrator (ALAC) in the collection of bioaerosols (*John Scott Meschke*)

Wayne Lawrence Turnberg, PhD

(EOH) Respiratory infection control practices among healthcare workers in primary and emergency care settings (*William Daniell*)

#### Winter 2007

Jason Allen, MPH (OccMed) Antioxidant and oxidative stress responses to diesel exhaust in humans with metabolic syndrome: A randomized, blinded, cross-over experiment (*Joel Kaufman*)

#### Spring 2007

**Douglas Badzik, MPH** (OccMed) Hearing loss in US Army aviators, comparing 2005 to 2001 (*William Daniell*)

**Stephanie Griffin, MS** (IH&S) Indicators of hearing protection use: Self report and researcher observation (*Noah Seixas*)

Victor Van Hee, MPH (OccMed) Air pollution exposure and left ventricular mass and function: The multi-ethnic study of atherosclerosis (*Joel Kaufman*)

**Christopher Jacomme, MS** (IH&S) Evaluation of a two-zone model used to predict workplace air contaminant concentrations (*Michael Morgan*)

Xue Feng Ren, PhD (Tox) Multiple genetic factors contribute to the differential genetic susceptibility of Copenhagen and Fischer 344 rats to mammary carcinogenesis (*Helmut Zarbl*) **Yolanda Sanchez, MS/MPA** (EH) Temporal patterns of asthma hospitalizations in the Yakima Valley community of Washington (*Matthew Keifer*)

Michael Sigmon, MPH (OccMed) Where there's smoke, is there disease? A study of environmental airborne exposures in soldiers returning from Iraq (*William Daniell*)

**Brian D. Smith, MPH** (EOH) The effect of surface charge, negative and bipolar ionization on the deposition of airborne bacteria (*John Scott Meschke*)

**Michelle Sommargren, MPH** (EOH) Reducing childhood pesticide exposure by targeting the clinician pesticide training gap: The design, implementation, and evaluation of an online curriculum (*Richard Fenske*)

Lisa Tolbert, MS (EH) Ambient concentrations of organophosphorus pesticides caused by volatilization during seasonal application (*Michael Yost*)

**Joyce Tseng, MPH** (EOH) An impact evaluation of a farm worker environmental and occupational health community-based participatory research course in the Yakima Valley, Washington (*Matthew Keifer*)

Yupeng Wang, PhD (Tox) Regulation and function of BDNF-activated ERK5 and ERK\_ MAP Kinases in CNS neurons (*Zhengui Xia*)

#### IN MEMORIAM

**Brian D. Smith, MPH**, 2007, Captain US Army, left a lasting legacy with his research on preventing hospital-borne infections, some of it to be published posthumously. Captain Smith was born in 1969 in San Bernadino, California, and grew up in Chehalis, Washington. He died in March 2008 at Fort Hood, Texas.

# MS 1998 TOXICOLOGY

### MARC L. STIFELMAN

Health Risk Assessor US Environmental Protection Agency Region 10, Risk Evaluation Unit



## **Risk and Pollution**

Marc Stifelman designs and reviews studies to estimate people's risks from pollutants in the environment. Mostly, he does this by measuring contaminants in soil, sediment, water, or fish. Sometimes, however, he surveys people to understand how they become exposed.

In his latest project at the Environmental Protection Agency's (EPA) Region 10, he is applying nutritional epidemiological methods to a tribal exposure assessment. One of his favorite parts of the job is the opportunity to learn from different perspectives. Lately, he has been learning about dietary assessment methodology from staff of the National Cancer Institute and the Fred Hutchinson Cancer Research Center.

Success stories provide job satisfaction. "Ultimately, it's rewarding to see things get cleaned up," he said. "It takes a few years, but it does happen."

Stifelman entered Professor Dave Eaton's lab with several years of experience in the workforce and a desire to advance his career. "I was lucky to be hired half-time when I was still in the MS program. I had finished my classes and had my thesis under control." He had no problem finding a job with his new degree.

He is glad he chose the UW for graduate school and feels very connected to our department. "I rely on critical reviews by the National Academy of Sciences. Many of these studies—including dioxins, methylmercury, and arsenic in drinking water—were chaired or authored by DEOHS faculty or alumni."

As a regulator, he tries to understand the perspective of the private sector. "I find that the public and private sectors complement each other. I spend a lot of time working with companies responsible for releases of chemicals into the environment. Much of the work on behalf of both EPA and the polluters is done by private sector consultants," he said.

His advice for students is, "It's never too early to be looking for a job by interning or volunteering." He adds, "It's a very exciting time for global health in Seattle. I see the Bill & Melinda Gates Foundation and the UW's new Global Health Department as huge catalysts for creating opportunities, locally and around the world."

alumni profile

# FACULTY FULL-TIME AUXILIARY



**Scott Barnhart, MD, MPH,** is a professor in the Occupational and Environmental Medicine program (primary appointment in the School of Medicine) and from 1999 to 2008 was the medical director of Harborview Medical Center.

One area of his research is the natural history of asbestos-related lung disease, including possible protective effects of vitamin A and beta-carotene. A second project is control of silicosis in developing nations. A third area of investigation is use of a public health approach to reduce occupational hazards on Department of Energy sites.



Thomas M. Burbacher, PhD, is a

professor in the Toxicology program and deputy director of the department's Center for Child Environmental Health Risks Research. His research focuses on the effects of prenatal or early post-

natal exposure to environmental pollutants on central nervous system development. His projects include studies aimed at examining the cognitive and sensory effects of prenatal methylmercury exposure in aged monkeys; the effects of prenatal exposure to methanol on sensory and cognitive development; and the effects of early pesticide exposure on brain development in rodents.



Janice E. Camp, MSN, MSPH, is a senior lecturer in the Exposure Sciences program, director of the Field Research and Consultation Group, and our department's director of external outreach. Her research interests include occupational exposure assessment

and occupational health and safety policy. A certified industrial hygienist and certified occupational health nurse, she is past president of the Pacific Northwest Section of the American Industrial Hygiene Association and the Washington State Association of Occupational Health Nurses.



Harvey Checkoway, PhD, is a professor in the Occupational and Environmental Medicine program, with a joint appointment in Epidemiology. His research interests include occupational and environmental risk factors for cancer, dust-related lung diseases,

and neurological disorders. Increasingly, his research has incorporated biomarkers of exposure, response, and genetic susceptibility. Projects include a study of silica, silicosis, and lung cancer among diatomite industry workers; semen quality among lead smelter workers; environmental exposures and genetic variations in Parkinson's disease; and cancer risks among textile workers.

> Some of our faculty gathers for a photo at Staff Appreciation Day, 2007

> > Kathy Sauber





**Lucio G. Costa, PhD,** is a professor in the Toxicology program. His area of research is neurotoxicology, particularly the study of the cellular, biochemical, and molecular mechanisms involved when toxicants affect the nervous system. His laboratory uses *in vivo*, *in vitro*, and

cell culture systems, as well as biochemical, molecular, and imaging techniques. Research projects include the effects of alcohol and pesticides on brain cells, and studies on genetic predisposition to neurotoxicity. He has published more than 200 articles in peer-reviewed journals and contributed dozens of book chapters and other publications.



William E. Daniell, MD, MPH, is an associate professor in the Occupational and Environmental Medicine program and is graduate program coordinator. His research interests have primarily involved noise-induced hearing loss and the utility of workers' compensation

data for research and intervention. However, his interests are increasingly shifting to environmental and occupational health problems in Southeast Asia, particularly Cambodia. Past research includes neuropsychological consequences of occupational chemical exposures, particularly organic solvents, carpal tunnel syndrome, and multiple chemical sensitivity syndrome.



**David L. Eaton, PhD,** is a professor in the Toxicology program and associate vice provost for research for the UW. He has published more than 100 research papers, contributed to 30 books, and written a dozen articles explaining toxicological principles to the general

public. His research specialty is chemical carcinogenesis, focusing on how enzymes in the liver activate and detoxify carcinogenic chemicals and how components of the diet modify cancer risk. He directs the Center for Ecogenetics and Environmental Health, which brings together more than 50 UW investigators to study how small differences in human genes can influence susceptibility to toxic substances in the environment.



Elaine M. Faustman, PhD, is a professor in the Toxicology program and director of the Institute for Risk Analysis and Risk Communication and the Center for Child Environmental Health Risks Research. Her long-range aim is to identify biochemical and molecular mechanisms of developmental and reproductive toxicity. Because 70% of human birth defects have an unknown cause, she wants to identify preventable causes. Recently, she chaired a National Academy of Sciences panel that developed approaches for incorporating new genomic, molecular, and developmental biological findings into risk assessment. She is an elected fellow of the American Association for the Advancement of Science and the Society of Risk Analysis. She has published more than 100 papers in peer-reviewed journals and 25 book chapters and other publications.



**Richard A. Fenske, PhD, MPH,** is associate chair of the department and a professor in Exposure Sciences. He has directed the NIOSH-supported Pacific Northwest Agricultural Safety and Health (PNASH) center since 1996. His current research includes studies of

pesticide handler exposures, new biomonitoring techniques, pesticide spray drift, and pesticide exposures of children in rural communities. He is the lead investigator for the Climate and Human Health sector of the UW's state-supported Climate Impacts Assessment.



Jordan A. Firestone, PhD, MD, MPH, is an adjunct assistant professor in our Occupational and Environmental Medicine Program and an assistant professor in the Department of Medicine. His research interests include patient-oriented studies of the environmental

and occupational causes of neurological disorders, focusing on clinical toxicology, epidemiology, worker safety, and environmental health. He directs our Occupational and Environmental Medicine clinic at Harborview Medical Center.



Gary M. Franklin, MD, MPH, is a research professor in the Occupational and Environmental Medicine program and in the Department of Neurology, and is the medical director of the Washington State Department of Labor and Industries. His research interests include

the epidemiology and outcomes of treatment for occupational injury, occupational and environmental diseases of the nervous system, health services research, and health policy.



**Evan P. Gallagher, PhD,** is an associate professor in Toxicology and holds the Sheldon D. Murphy Chair in Toxicology and Environmental Health. Gallagher earned his Master of Environmental Management in Ecotoxicology and his PhD in Biochemical Toxicology from Duke

University. His areas of research are in molecular environmental toxicology, mechanisms of chemical olfactory injury in salmonids, and oceans and human health interactions. His human health studies focus on the role of exposures to environmental chemicals such as polybrominated diphenyl ethers during pregnancy and human cell injury *in utero*. He teaches courses in molecular toxicology, biochemical aquatic toxicology, and introductory toxicology.



**Richard J. Gleason, MPH,** is a lecturer in the Exposure Sciences program. He worked for Federal OSHA and State WISHA as an inspector for 13 years and has been teaching for the past 12 years. He teaches graduate-level courses in occupational safety and health, and is class

coordinator and instructor for five courses in the UW OSHA Training center. He is a frequent speaker at conferences and for professional organizations.



Jack B. Hatlen, MS, is an associate professor emeritus in the Environmental Health program. His research specialties include environmental sanitation practices in public health agencies, food safety, and workforce education and development. Another interest

is the collection, treatment, and disposal of community wastewaters.



**Steven F. Hecker, MSPH,** is a senior lecturer in the Exposure Sciences program and director of Educational Outreach. Hecker came to the UW in 2006 from the University of Oregon Labor Education and Research Center where he was associate professor and director of

occupational safety and health programs. His research interests include safety and health training effectiveness and the impact of globalization on working conditions in developing and industrialized countries. He was lead editor of *Designing for Safety and Health in Construction* (UO Press 2004).



**Peter W. Johnson, PhD,** is an associate professor in the Exposure Sciences program, specializing in ergonomics. He earned his doctorate in Bioengineering from the University of California-Berkeley and has worked as a researcher at the national institutes of occupational health

in the United States, Sweden, and Denmark. In cooperation with Harvard University, he has developed and validated an exposure assessment system for measuring multiple physical risk factors during computer work. He has worked on two large-scale studies in Sweden to measure and characterize office workers' exposure to upper-extremity hazards, and is evaluating ways to reduce whole-body vibration in bus drivers and forklift operators.



**David A. Kalman, PhD,** is the department chair and a professor in the Environmental Health program. His research focuses on chemical issues, such as hazardous properties of materials, environmental fate and transport, environmental quality assessment, hazard management,

and occupational and community exposure assessment, especially using biomarkers of exposure. Active research areas include assessment of exposures to atmospheric particulates, including wood smoke, and exposures and effects of arsenic in drinking water, diet, and soil.



**Catherine Karr, PhD, MD,** is an adjunct assistant professor in the Occupational and Environmental Medicine program and an acting assistant professor in Pediatrics. She is a board-certified pediatrician with a doctoral degree in Epidemiology. Her research involves

large epidemiological studies of the impact of ambient air pollution on infant and child respiratory health. She directs our Pediatric Environmental Health Specialty Unit.



Joel Kaufman, MD, MPH, is professor and director of the Occupational and Environmental Medicine program, with joint appointments in Internal Medicine and Epidemiology. His research activities fall into three areas: occupational and environmental factors in

cardiovascular disease; epidemiology of occupational and environmental asthma; and surveillance and prevention of occupational illnesses and injuries. He is past president of the Northwest Association of Occupational and Environmental Medicine. He directs a major EPA-funded epidemiological study of cardiovascular disease and air pollution, an NIHfunded research center on cardiovascular effects of trafficrelated air pollution, and a specialized facility for studying health effects of diesel exhaust inhalation.



**Terrance J. Kavanagh, PhD,** is a professor in the Toxicology program. His research interests include free radical biology and oxidative stress, and the effects of chemicals on diseases of aging, including cancer, atherosclerosis, lung diseases, liver diseases, Parkinson's disease, and

Alzheimer's disease. His laboratory assesses the role of the free radical scavenger glutathione and the enzymes involved in its synthesis in preventing free radical injury. Other research interests include assessing the role of genetics in free-radical-mediated diseases, nanotoxicology, and developing *in vitro* and analytical cytology methods for toxicology research.



Matthew C. Keifer, MD, MPH, is an associate professor, director of the MPH in Environmental and Occupational Health program, and associate director of the Occupational and Environmental Medicine residency program. He holds a joint appointment with General

Internal Medicine. He joined the faculty after serving as project epidemiologist for CARE in Nicaragua, where he supervised health surveillance and development activities related to pesticide exposures and biological monitoring. His activities pertain to studies of agricultural and international occupational and environmental health and safety. He is co-director of the PNASH Center. He is also director of the Collaborative Center for Healthy Work and Environment.



John Kissel, PhD, is a professor and director of the Environmental Health program. He holds a doctorate in Civil/Environmental Engineering from Stanford University and is a registered professional engineer. His interests involve human exposure assessment, with emphasis on

exposures related to waste management practice, agricultural use of pesticides, and consumer products. He is a former president of the International Society of Exposure Analysis. His recent research activities have been funded by US EPA, NIOSH and the Washington State departments of Ecology and Health.



Jane Q. Koenig, PhD, is a professor in the Toxicology program. Her research interests are the respiratory health effects of air pollution, especially the responses of susceptible individuals, such as those with asthma or other chronic respiratory diseases. She is involved in three

general areas of research: controlled laboratory studies using human subjects, field or epidemiological studies evaluating respiratory health in populations exposed to fine particulate matter from wood smoke or other sources in their neighborhoods, and assessment of physical or chemical changes in cultured human epithelial cells after air pollutant exposure. She has published more than 100 peer-reviewed journal articles.



Joellen Lewtas, PhD, is a research professor in the Environmental Health program. She retired from the EPA's Office of Research & Development, where she was affiliated with both the National Exposure Research Laboratory and

National Health and Environmental Effects Lab. A biochemist, her research interests are in air pollution and combustion emissions. Her research includes human exposure, biomarkers, dosimetry, and toxicology of these complex mixtures and their constituents. She has served on the faculty of the European School of Oncology and was formerly an adjunct faculty member in the School of Medicine at Duke University and later in the School of Public Health, University of North Carolina, Chapel Hill.



**L.-J. Sally Liu, ScD,** is a research associate professor in the Environmental Health program. She earned her doctorate in 1994 from Harvard University's School of Public Health and has published more than 50 papers in peer-

reviewed journals and several book chapters. Her research interests include air pollution exposure assessment in susceptible populations, risk assessment, and air pollution epidemiology. She is the principal investigator of several exposure and health assessment projects focusing on assessing hazardous air pollutants exposure and health effects among general and high-risk subpopulations in the Northwestern United States and Europe.



**Daniel L. Luchtel, PhD,** is a professor in the Toxicology program. His research projects include the effects of gaseous air pollutants (ozone, nitrogen dioxide, and sulfur dioxide) on cultured human nasal epithelial cells and primate bronchial epithelial cells; toxicology of carbon/ graphite fibers used in advanced composite materials by the aerospace industry; and mucociliary clearance as a defense mechanism in the lung. He has developed new ways of preserving and fixing mucous cells with ultrarapid freezing and freeze-substitution. He is also interested in the applications and techniques of microscopy. He has published more than 50 papers in peer-reviewed journals.



John Scott Meschke, PhD, JD, is an assistant professor in the Environmental Health program, specializing in pathogens in the environment. He earned his doctorate in environmental microbiology from the University of North Carolina-Chapel Hill. His

research focuses on environmentally transmitted pathogens, sampling and analysis methods, environmental fate and transport, quantitative microbial risk assessment, and engineered controls. He is involved in studies on the recovery and disinfection of a variety of Noroviruses on surfaces and the development of microarray-based methods for characterization of viruses.



Lee Monteith, MS, is a senior lecturer emeritus in the Exposure Sciences program. He is a certified industrial hygienist, a member of the Air Sampling Instruments Committee of the American Conference of Governmental Industrial Hygienists (ACGIH) and the Gas

and Vapor Detection Systems Committee of the American Industrial Hygiene Association, and a liaison between the two committees. He is a Diplomate member of the American Academy of Industrial Hygiene. His research interests include the adsorption process in passive dosimeter badges, methods for the measurements of glove permeation, and methods for the detection and measurement of trace compounds in the environment. He is author of two chapters in *Air Sampling Instruments for Evaluation of Atmospheric Contaminants.* 



Michael S. Morgan, ScD, is a professor in the Exposure Sciences program and holds an adjunct appointment in Civil Engineering. He is a certified industrial hygienist. His main academic interest is in respiratory physiology and inhalation toxicology. He measures and

models the pharmacokinetics of industrial solvent exposures, and studies the performance of personal protective equipment used with solvents. He is a member and past Chair of the Biological Exposure Indices Committee of the ACGIH, responsible for setting guidelines for biomonitoring in industry. He has published more than 60 papers in peer-reviewed journals and currently serves as editor-in-chief of the *Journal* of Occupational and Environmental Hygiene.



Marilyn C. Roberts, PhD, is a professor in the Environmental Health program. She has a doctorate in Microbiology and Immunology and has published more than 170 research papers and 30 book chapters on antibiotic-resistance genes, gene exchange between ecosystems,

and their associated mobile elements. Her research interests include characterizing antibiotic resistance genes found in environmental bacteria, determining if they may act as reservoirs for these genes, and determining if antibiotic resistant bacteria include those which have the potential to infect people in the community. Other research interests include the impact that topical and dietary supplements have on reducing dental caries by modifying the oral microflora.



Michael E. Rosenfeld, PhD, is a professor in the Toxicology program with a joint appointment in Pathology, and is core faculty in the interdisciplinary graduate program in Nutritional Sciences. His research focuses on cardiovascular disease, and in particular, modeling the

advanced stages of atherosclerosis. Projects include studies of the effects of diesel exhaust exposure and respiratory infection on progression of atherosclerosis, and studies of the effects of increases and decreases in the capacity to produce glutathione on macrophage death in response to oxidized lipids, and the role of macrophage death in atherosclerosis.



Noah S. Seixas, PhD, is a professor in the Exposure Sciences program. He is a certified industrial hygienist and a member of the editorial board of the *American Industrial Hygiene Association Journal*. His interests are in the quantification of exposure for occupational

epidemiology, and development of biologically relevant exposure metrics. His research includes a prospective study of noise-induced hearing damage among construction workers, assessment of irritant gas exposures during aluminum smelting, and methods of controlling exposure to dust during construction tasks. Seixas also works closely with the local construction community evaluating the effectiveness of educational and organizational programs.



#### Elizabeth (Lianne) Sheppard, PhD, is a

research professor in the Occupational and Environmental Medicine program with a primary appointment in Biostatistics. Her applied work focuses on air pollution health effects and occupational epidemiologic studies. Her bio-

statistical research interests emphasize estimation of health effects from environmental and occupational exposures, and incorporating group information in epidemiologic studies.



**Gwy-Am Shin, PhD,** is an assistant professor in the Environmental Health program. In 2004, he came from the University of North Carolina at Chapel Hill, where he was a research assistant professor. He earned his PhD in Environmental Microbiology at UNC, and his

bachelor's and master's degrees in Microbiology at Seoul National University in Korea. His major research interests are the removal and inactivation of waterborne microorganisms by water and wastewater treatment processes, and development of molecular biological methods for treatment.



**Dennis Shusterman, MD, MPH,** was a professor in Occupational and Environmental Medicine until 2007, with a primary appoint-

ment in Medicine, and director of the Occupational and Environmental Medicine Residency training program. His research

interests include latex allergy, vocal cord dysfunction, and the effects of irritants on the upper airway. He has studied workplace hazards and has published more than 60 research papers in peer-reviewed journals. He earned his MD degree at the University of California, Davis, and his MPH at the University of California, Berkeley.



**Christopher Simpson, PhD,** is an assistant professor of Exposure Sciences. His research interests involve the application of analytical chemistry to the development and application of methods for assessment of human exposure to toxic chemicals in the workplace and the

environment. Active research areas include development of biomarkers of exposure to wood smoke, diesel exhaust, and pesticides; use of organic molecular tracers for measurement and source apportionment of particulate air pollution; and measurement of biomarkers for reactive oxygen and reactive nitrogen species associated with exposure to particulate air pollution.



Michael A. Silverstein, MD, MPH, is a clinical professor in the Occupational and Environmental Medicine Program. He has taught in our department since 2005. Before that he was the assistant director for Industrial Safety and Health with the Washington State Department

of Labor and Industries. Silverstein originally came to Washington in 1990 as State Health Officer and State Epidemiologist. He then spent two years in Washington, DC as director of policy for the Occupational Safety and Health Administration. Before, that, he worked in the Occupational Health and Safety Department of the United Automobile Workers.



Kate A. Stewart, MS, is a lecturer in the Exposure Sciences program. She studies ergonomics in the construction, wood products, shipyard, and manufacturing industries, plus office ergonomics. She teaches in both our graduate and continuing education programs. Stewart

has been awarded a Fulbright Scholars Grant to teach and work in ergonomics projects in Nicaragua from October 2008 through March 2009 (see page 20).



**Charles D. (Chuck) Treser, MPH,** is a senior lecturer in the Environmental Health program. His interests include administrative law and process applied to environmental health, and vector control and housing. He works with the Northwest Center for Public Health Practice

to develop a regional network of public health agencies and academic institutions focused on public health workforce development. Treser serves on the Board (president 2000– 2001, 2008–2009) of the Association of Environmental Health Academic Programs (AEHAP), and is the principal investigator on a cooperative agreement between AEHAP and the Centers for Disease Control, designed to improve environmental health practice through promoting and strengthening environmental health academic programs.



**Gerald van Belle, PhD,** professor emeritus in the Environmental Health program (joint with Biostatistics), was department chair from 1990 to 1998. His research specialties include design of experiments, data characterization, and analysis with emphasis to neurodegenerative

diseases and environmental studies. He also studies the effects of air pollution on health, particularly the link between daily fluctuations in air pollution levels and morbidity and mortality statistics. A current interest is the investigation of characteristics of cognitive tests in neurode-generative diseases by means of item response modeling. He is the author or coauthor of more than 100 papers and several books, including *Statistical Rules of Thumb* (2002).



**Sverre Vedal, MD, MSc,** is a professor in the Occupational and Environmental Medicine program and holds an adjunct appointment in the Department of Medicine. He is an epidemiologist and a pulmonary physician. His research interests are in the health effects of air pollution

and in occupational lung disease. He is currently investigating the role of specific chemical constituents and sources of particulate air pollution in contributing to cardiovascular and respiratory illness and disease, and genetic factors causing heightened susceptibility to air pollution. Vedal sees patients in the Harborview Occupational and Environmental Medicine Clinic and is a NIOSH-certified chest x-ray B-reader. He continues to serve on NIH study sections and sits on EPA Clean Air Scientific Advisory Committee panels.



James S. Woods, PhD, MPH, is a research professor and director of the Toxicology program. His research focuses on the molecular mechanisms of toxicity of heavy metals such as mercury, arsenic, and lead, with additional interest in changes in metabolism of porphyrins as

biomarkers of metal exposure and toxicity. He also conducts epidemiological studies of metal toxicity in human populations, including the potential health risks to children of dental amalgam fillings containing mercury. He is past president of the American Board of Toxicology and is founding president of the Pacific Northwest Association of Toxicologists. He has served on numerous advisory committees to evaluate human health risks from metal exposures. He has published more than 100 papers in peer-reviewed journals in addition to numerous book chapters and review articles.



**Zhengui Xia, PhD,** is a professor in the Toxicology program. Her laboratory studies mechanisms regulating apoptosis, a form of programmed cell death. Apoptosis is important for development and homeostasis in adults. Abnormal apoptosis has been implicated in

various diseases, such as Parkinson's disease. Xia studies the role of chemical toxins such as sodium arsenite and pesticides

(rotenone, chlorpyrifos, and paraquat) on neuronal apoptosis with an emphasis on Parkinson's disease. Xia's research has been supported by the Sheldon Murphy Endowment and NIH grants. She is also a recipient of the Burroughs Wellcome new investigator award.



Michael G. Yost, PhD, is a professor and director of the Exposure Sciences program. His research interests include optical remote sensing of chemicals in the environment, and physical agents in the workplace such as noise, vibration, and electromagnetic radiation. Yost is a member of the Bio-

electromagnetics Society and the ACGIH. He is developing new tools for exposure assessment, such as Optical Remote Sensing (ORS) methods that use electromagnetic radiation (lasers and ultraviolet, visible, or infrared light) to rapidly identify and measure contaminants. He founded and directs the ORS lab, which is engaged in several research projects that apply these tools to environmental monitoring problems (see page 16).

#### FACULTY EMERITI

*Emeritus: an appointment given to a retiring faculty member whose scholarly, teaching, or service record has been meritorious. Usually at least 10 years prior service on the faculty.* 

Peter Breysse, MPH, Associate Professor Emeritus Theus L. (Lee) Doolittle, PhD, Associate Professor Emeritus Stanley H. Freeman, MS, Senior Lecturer Emeritus Jack B. Hatlen, MS, Associate Professor Emeritus Richard Hibbard, Lecturer Emeritus Kenneth Jackson, PhD, Professor Emeritus Goldy D. Kleinman, MA, Lecturer Emeritus Lee Monteith, MS, Senior Lecturer Emeritus Sharon L. Morris, Senior Lecturer Emeritus N. Karle Mottet, MD, Professor Emeritus Maurice Robkin, PhD, Professor Emeritus Gerald van Belle, PhD, Professor Emeritus John T. Wilson, MD, ScD, Professor Emeritus

#### AUXILIARY FACULTY

**Adjunct Faculty:** a courtesy title extended to faculty member who holds a primary appointment in another department

*Clinical Faculty:* a courtesy title usually conferred to someone with a primary appointment in an outside agency or nonacademic unit of the UW, or in private practice

*Affiliate Faculty:* appointments that recognize the professional contributions of those whose principal employment responsibilities lie outside of the UW

Leonard Altman, MD, Clinical Professor UW Medicine (primary appointment), Oral Biology

**Harriet Ammann, PhD,** *Affiliate Associate Professor Retired, Washington State Department of Health, Office of Environmental Assessment Services* 

**Stephen Bao, PhD,** Affiliate Assistant Professor SHARP, Washington State Department of Labor and Industries

**David Bonauto, MD, MPH,** *Clinical Instructor SHARP, Washington State Department of Labor and Industries* 

**Carl A. (Drew) Brodkin, MD, MPH,** *Clinical Associate Professor, Occupational and Environmental Medicine Physician* 

Tania M. Busch, MPH, REHS, Affiliate Instructor Consultant

Jeanine Bussiere, PhD, Affiliate Associate Professor Director, Pharmacology and Toxicology, Immunex

Stephen Cant, MSPH, CIH, Affiliate Assistant Professor Assistant Director, Division of Safety & Health Services, Washington State Department of Labor and Industries

**Patricia Cirone, PhD,** Affiliate Associate Professor Chief of Risk Evaluation Unit, US EPA Region 10

**Stanley Curtis, PhD,** *Affiliate Professor Fred Hutchinson Cancer Research Center* 

**Paul Darby, MD, PhD, MPH,** *Clinical Instructor Family Medicine (primary appointment), Medical Director, Tacoma Port Clinic* 

**Anneclaire J. DeRoos, PhD,** Adjunct Assistant Professor UW Department of Epidemiology

**Foppe de Walle, PhD,** *Affiliate Professor Delft, The Netherlands* 

Research Professor James Woods and Affiliate Professor Donald Malins at our 60th anniversary celebration

Karen Hanson

**Charles D. Easterberg, MS,** *Part-time Lecturer UW Environmental Health and Safety* 

**Diana Echeverria, PhD,** *Affiliate Assistant Professor Battelle Human Affairs Research Centers* 

**Alan Fantel, PhD,** *Adjunct Research Professor UW Department of Pediatrics* 

Jordan A. Firestone, MD, PhD, MPH Adjunct Assistant Professor, Neurology, UW Department of Medicine

**Romesh Gautom, PhD,** *Affiliate Professor Washington State Department of Health Laboratories* 

**Steven Gilbert, PhD,** *Affiliate Associate Professor Director, Institute of Neurotoxicology and Neurological Disorders* 

**Timothy Gilmore, MD,** *Clinical Associate Professor Group Health Cooperative* 

**Pamela Girres, MD, MPH,** *Clinical Assistant Professor Group Health Permanente, Tacoma* 

**Angelika Grossmann, DVM,** *Affiliate Associate Professor ZymoGenetics, Inc.* 

John Holland, MD, MPH, Clinical Assistant Professor Joint with Orthopaedics (primary appointment), UW

**Catherine Karr, MD, PhD,** *Adjunct Assistant Professor UW Department of Pediatrics* 

**Christopher Kemp, PhD,** *Affiliate Associate Professor Fred Hutchinson Cancer Research Center* 

**Philip Landrigan, MD,** *Clinical Professor Director, Division of Environmental and Occupational Medicine, Mt. Sinai Medical Center, New York* 





**Timothy V. Larson, PhD,** Adjunct Professor UW Department of Civil & Environmental Engineering

**Brian Leroux, PhD,** *Adjunct Associate Professor UW Department of Biostatistics* 

**Tom Lewandowski , PhD, MPH,** Affiliate Assistant Professor Gradient Corporation

**Roseanne Lorenzana, PhD,** Affiliate Assistant Professor US EPA, Region 10

**Donald Malins, PhD,** *Affiliate Professor Pacific Northwest Research Foundation* 

Therese Mar, PhD, Affiliate Instructor

**Thomas G. Martin, MD, MPH,** *Adjunct Associate Professor Toxicology Services, Emergency Medicine, UW* 

**Karen Morris-Fine, PhD,** *Affiliate Assistant Professor The Boeing Company* 

Michael Muhm, MD, MPH, Clinical Professor The Boeing Company

**Gilbert Omenn, MD, PhD,** *Affiliate Professor Professor, Internal Medicine, Human Genetics, and Public Health, University of Michigan* 

**Curt Omiecinski, PhD,** *Affiliate Professor Veterinary Science, Pennsylvania State University* 

**Carl S. Osaki, MSPH,** Clinical Associate Professor Retired, Public Health-Seattle & King County

**Stanley Pier, PhD,** *Affiliate Associate Professor Consultant* 

Janet Ploss, MD, MS, Clinical Assistant Professor Occupational Medicine Physician

**Rafael Ponce, PhD,** *Affiliate Assistant Professor Director of Safety Assessment, Preclinical Development, ZymoGenetics, Inc.* 

**Bradley Prezant, MSPH,** *Affiliate Instructor President and CEO, Prezant and Associates* 

**Walt Rostykus, MSPH,** *Affiliate Instructor Vice President, Humantech Inc.* 

**Nathaniel Scholz, PhD,** *Affiliate Associate Professor* NOAA Northwest Fisheries Science Center

**Ruth Sechena, MD,** *Clinical Assistant Professor Occupational Medicine Consultant* 

**Barbara Silverstein, PhD, MPH,** Affiliate Associate Professor SHARP, Washington State Department of Labor and Industries

**Michael Silverstein, PhD, MPH,** *Clinical Professor* (*Joint with Health Services*)

Former Assistant Director for Industrial Safety and Health, Washington State Department of Labor and Industries

**Patricia Sparks, MD,** *Clinical Assistant Professor Consultant, Occupational and Environmental Medicine and Clinical Toxicology* 

**Peregrin Spielholz, PhD,** *Affiliate Assistant Professor SHARP, Washington State Department of Labor and Industries* 

John Stein, PhD, Affiliate Professor

**Henry Stockbridge, MD,** *Clinical Assistant Professor Associate Medical Director, Washington State Department of Labor and Industries* 

**Timothy Takaro, MD, MPH,** Clinical Assistant Professor Simon Fraser University Faculty of Health Sciences

**Wayne Turnberg, PhD, MSPH,** *Affiliate Instructor Washington State Department of Ecology* 

**Jude Van Buren, PhD,** Clinical Assistant Professor Washington State Department of Health

**Steve Whittaker, PhD,** *Affiliate Assistant Professor SHARP, Washington State Department of Labor and Industries* 

**Paul Williams, MD,** Clinical Professor Northwest Asthma and Allergy Center

Michael Weiss, MD, MPH, Clinical Assistant Professor St. Luke's Regional Medical Center, Boise, Idaho

**Chang-Fu Wu, PhD,** Affiliate Assistant Professor Department of Public Health, Taiwan University

Helmut Zarbl, PhD, Affiliate Professor Fred Hutchinson Cancer Research Center

#### POSTDOCTORAL FELLOWS

Sara Adar Dubowsky Jason Allen Ryan Allen Sandra Chang Hyungung Choi Won-Seok Choi Ingeborg Cox Giordano Gennaro Sham Jurati Shih-ling Hsuan Takayuki Kameda Sun-Young Kim Lidong Liu Gretchen Onstad Alon Peretz Rachel Roisman Jing Shao Fred Tilton Susan Tilton Brian Thompson Akira Toriba Victor Van Hee Yupeng Wang

# ENVIRONMENTAL BS 1984

# ANTHONY A. (TONY) GOMEZ

Section Manager Chronic Diseases and Injury Prevention, Public Health–Seattle & King County



## Preventing Chronic Disease, Injury, and Violence

Chronic diseases may be the biggest killers in the US, but if we measure years of potential life lost, all of the terrible ways that young people die would top the list. Children and youth drown and get hit by cars; they can be abused or become victims of violence.

In King County, Washington, Tony Gomez is a lead on the team for preventing these tragedies. As section manager for Chronic Diseases and Injury Prevention in Public Health-Seattle & King County (PHSKC), he helps oversee several programs: tobacco prevention, injury and violence prevention, STEPS to a Healthier USA, the King County Asthma Program, Women's Health, and Chronic Diseases and Healthy Aging.

He also co-chairs a statewide drowning prevention network that includes Seattle's Children's Hospital and Regional Medical Center and serves as the project director for the King County Traffic Safety Coalition.

These programs are all geared toward preventing death and disability, and the work is never boring. Every day his staff is introduced to a new challenge and works with what he calls "outstanding folks in the community" to address it.

Gomez studied with faculty Jack Hatlen and Chuck Treser. As Gomez was finishing his studies, Treser helped place him in an internship with the agency now known as Public Health-Seattle & King County. He never left.

An early task was to draft the first local public health regulations dealing with water parks. This project had both an injury prevention and a water quality component. "The class work related to both those topics at the UW prepared me well for this next step," he says. In his 24 years with the health department, Gomez has supervised environmental health programs with food facilities, chemical and physical hazards, swimming pools, and schools. In 1997, when former Director Alonzo Plough created an injury and violence prevention unit in the Prevention Division, Gomez jumped with cautious optimism—at the chance to start an important program.

At one point he served as the acting director for the Prevention Division, which includes the laboratory, medical examiner's office, communicable diseases, and epidemiology, in addition to his current programs. That made him responsible for 13 programs, \$40 million in budget, and 220 employees. "That was quite the learning experience," he recalls. He learned to "explain complex scientific processes to elected officials and the community. That is critical if we are to have chance at success." He measures success by engaging the community, as well as meeting measurable public health goals of reducing disease, death, or injury.

Public health is an evolving field, encompassing policy work, built-environment issues, injury and violence prevention, the environmental and social indicators of health, and chronic disease prevention. This wide range of subjects all come into play when the agency hires staff and managers, he says.

"Chronic disease and injury prevention will most certainly grow as public health agencies, the community, and health care industries come to appreciate these leading causes of deaths and disability and the fact that much of it is preventable," he says.

# SELECTED PUBLICATIONS

JULY 2005-JUNE 2007

This list includes books, book chapters, articles, and reviews in professional journals. It excludes letters. technical reports, or conference presentations.

**Departmental** investigators are bold-faced.

- Adams JC, Dills RL, Morgan MS, Kalman DA, Pierce CH. A physiologically based toxicokinetic model of inhalation exposure to xylenes in Caucasian men. Regul Toxicol Pharmacol 2005; 43(2):203-214. Adar SD, Adamkiewicz G, Gold DR, Schwartz J, Coull BA, Suh H. Ambient and microenvironmental particles and exhaled nitric oxide before and after
  - a group bus trip. Environ Health Perspect 2007; 115(4):507-512.
- Aliyu OA, Cullen MR, Barnett MJ, Balmes JR, Cartmel B, Redlich CA, Brodkin CA, Barnhart S, Rosenstock L, Israel L, Goodman GE, Thornquist MD, Omenn GS. Evidence for excess colorectal cancer incidence among asbestos-exposed men in the Beta-Carotene and Retinol Efficacy Trial. Am J Epidemiol 2005; 162(9):868-878.

Aschner M, Costa LG, eds. The Role of Glia in Neurotoxicity, 2nd ed. CRC Press, Boca Raton, FL, 2005.

Astrakianakis G, Seixas N, Camp J, Smith TJ, Bartlett K, Checkoway H. Cotton dust and endotoxin levels in three Shanghai textile factories: A comparison of samplers. J Occup Environ Hyg 2006; 3(8):418-427.

Astrakianakis G, Seixas NS, Camp JE, Christiani DC, Feng Z, Thomas DB, Checkoway H. Modeling, estimation and validation of cotton dust and endotoxin exposures in Chinese textile operations. Ann Occup Hyg 2006; 50(6):573-582.

Astrakianakis G, Seixas NS, Ray R, Camp JE, Gao DL, Feng Z, Li W, Wernli KJ, Fitzgibbons ED, Thomas DB, Checkoway H. Lung cancer risk among female textile workers exposed to endotoxin. J Natl Cancer Inst 2007; 99(5):357-364.

Balduini W, Cattabeni F, Costa LG, Tita B, eds. Tossicologia (Italian edition of Cassarett and Doull's Toxicology: The Basic Science of Poisons.) EMSI, Roma, 2006.

Bammler TK, Farin FM, Beyer RP. Tools of ecogenetics. IN: Gene-Environment Interactions: Fundamentals of Ecogenetics. LG Costa, DL Eaton, eds. Wiley-Liss, Hoboken, NJ, 2006; 17-50.

Bayer-Oglesby L, Schindler C, Hazenkamp-von Arx ME, Braun-Fahrländer C, Keidel D, Rapp R, Künzli N, Braendli O, Burdet L, Liu LJS, Leuenberger P,

Ackermann-Liebrich U: SAPALDIA Team. Living near main streets and respiratory symptoms in adults: The Swiss Cohort Study on Air Pollution and Lung Diseases in Adults. Am J Epidemiol 2006; 164(12):1190-1198.

- Bea F, Kreuzer J, Preusch M, Schaab S, Isermann B, Rosenfeld ME, Katus H, Blessing E. Melagatran reduces advanced atherosclerotic lesion size and may promote plaque stability in apolipoprotein E-deficient mice. Arterioscler Thromb Vasc Biol 2006; 26(12):2787-2792.
- Bekris LM, Kavanagh TJ, Lernmark A. Targeting type 1 diabetes before and at the clinical onset of disease. Endocr Metab Immune Disord Drug Targets 2006; 6(1):103-124.
- Bekris LM, Shephard C, Peterson M, Hoehna J, Van Yserloo B, Rutledge E, Farin F, Kavanagh TJ, Lernmark A. Glutathione-s-transferase M1 and T1 polymorphisms and associations with type 1 diabetes age-at-onset. Autoimmunity 2005; 38(8):567-575.
- Bekris LM, Viernes HM, Farin FM, Maier LA, Kavanagh TJ, Takaro TK. Chronic beryllium disease and glutathione biosynthesis genes. J Occup Environ Med 2006; 48(6):599-606.
- Bennett BJ, Scatena M, Kirk EA, Rattazzi M, Varon RM, Averill M, Schwartz SM, Giachelli CM, Rosenfeld ME. Osteoprotegerin inactivation accelerates advanced atherosclerotic lesion progression and calcification in older ApoE-/- mice. Arterioscler Thromb Vasc Biol 2006; 26(9):2117-2124.
- Bernard S, Luchtel DL, Polissar N, Hlastala MP, Lakshminarayan S. Structure and size of bronchopulmonary anastomoses in sheep lung. Anat Rec A Discov Mol Cell Evol Biol 2005; 286(1):804-813.
- Böhme T, Simpson CD, Müllen K, Rabe JP. Currentvoltage characteristics of a homologous series of polycyclic aromatic hydrocarbons. Chemistry 2007; 13(26):7349-7357.
- Boiko P, Katon W, Guerra JC, Mazzoni S. An audiotaped mental health evaluation tool for Hispanic immigrants with a range of literacy levels. J Immigr Health 2005; (1): 33-36.

Botta D, Shi S, White CC, Dabrowski MJ, Keener CL, Srinouanprachanh SL, Farin FM, Ware CB, Ladigies WC, Pierce RH, Fausto N, Kavanagh TJ. Acetaminophen-induced liver injury is attenuated in male glutamate-cysteine ligase transgenic mice. J Biol Chem 2006; 281(39):28865-28875.

Burbacher TM, Grant KS, Mayfield DB, Gilbert SG, Rice DC. Prenatal methylmercury exposure affects spatial vision in adult monkeys. *Toxicol Appl Pharmacol* 2005; 208(1):21-28.

Burbacher TM, Shen DD, Liberato N, Grant KS, Cernichiari E, Clarkson T. Comparison of blood and brain mercury levels in infant monkeys exposed to methylmercury or vaccines containing thimerosal. *Environ Health Perspect* 2005; 113(8):1015-1021.

Burch JB, Clark M, **Yost MG**, Fitzpatrick CT, Bachand AM, **Ramaprasad J**, Reif JS. Radio frequency nonionizing radiation in a community exposed to radio and television broadcasting. *Environ Health Perspect* 2006; 114(2):248-253.

Burch JB, Yost MG, Johnson W, Allen E. Melatonin, sleep and shift work adaptation. J Occup Environ Med 2005; 47(9):893-901.

Burch JB, Clark M, **Yost MG,** Fitzpatrick CT, Bachand AM, Ramaprasad J, Reif JS. Radio frequency nonionizing radiation in a community exposed to radio and television broadcasting. *Environ Health Perspect* 2006; 114 (2):248-253.

Cai B, **Chang SH**, Becker EB, Bonni A, **Xia Z**. MAP kinase mediates apoptosis through posphorylation of BimEL at Ser-65. *J Biol Chem* 2006; 281(35):25215-25222.

Carlsten C, Kaufman JD, Peretz A, Trenga CA, Sheppard L, Sullivan JH. Coagulation markers in healthy human subjects exposed to diesel exhaust. *Thromb Res* 2007; 120(6):849-855.

Carvan MJ 3rd, **Gallagher EP**, Goksøyr A, Hahn ME, Larsson DG. Fish models in toxicology. *Zebrafish* 2007; 4(1):9-20.

Chang CK, **Astrakianakis G**, Thomas DB, **Seixas NS**, **Camp JE**, Ray RM, Gao DL, Wernli KJ, Li W, Fitzgibbons ED, Vaughan TL, **Checkoway H.** Risks of biliary tract cancer and occupational exposures among Shanghai women textile workers: A case-cohort study. *Am J Ind Med* 2006; 49(8):690-698.

- Chang CK, Astrakianakis G, Thomas DB, Seixas NS, Ray RM, Gao DL, Wernli KJ, Fitzgibbons ED, Vaughan TL, Checkoway H. Occupational exposures and risks of liver cancer among Shanghai female textile workers— A case-cohort study. Int J Epidemiol 2006; 35(2):361-369.
- Chang CH, Amick BC 3rd, Menendez CC, Katz JN, Johnson PW, Robertson, M, Dennerleing JT. Daily computer usage correlated with undergraduate students' musculoskeletal symptoms. *Am J Ind Med.* 2007; 50(6):481-488.

Chattopadhyay S, Feldgarden M, Weissman SJ, Dykuizen DE, **van Belle G**, Sokurenko EV. Haplotype diversity in "sourcesink" dynamics of *Escherichia coli* urovirulence. *J Mol Evol* 2007; 64(2): 204-214.

Checkoway H, Bohatti P, De Roos A. Epidemiologic approaches. IN: Gene-Environment Interactions: Fundamentals of Ecogenetics. LG Costa, DL Eaton, eds. Wiley-Liss, Hoboken, NJ, 2006; 51-71.

Chow JC, Watson JG, Mauderly JL, Costa DL, Wyzga RE, **Vedal S**, *et al.* Health effects of fine particulate air pollution: Lines that connect. *J Air Waste Manag Assoc* 2006; 56(10):1368-1380.

Clark M, **Paulsen M**, Smith KR, Canuz E, **Simpson CD**. Urinary methoxyphenol biomarkers and woodsmoke exposure: comparisons in rural Guatemala with personal CO and kitchen CO, levoglucosan, and PM2.5. *Environ Sci Technol* 2007; 41(10):3481-3487.

Cole TB, Walter BJ, Shih DM, Tward AD, Lusis AJ, Timchalk C, Richter RJ, **Costa LG**, Furlong CE. Toxicity of chlorpyrifos and chlorpyrifos oxon in a transgenic mouse model of the human paraoxonase (PON1) Q192R polymorphism.*Pharmacogenet Genomics* 2005; 15(8):589-598.

**Corey LM, Baker C, Luchtel DL**. Heartrate variability in the apolipoprotein E knockout transgenic mouse following exposure to Seattle particulate matter. *J Toxicol Environ Health* A 2006; 69(10):953-965.

- Coronado GD, **Vigoren EM**, Thompson B, **Griffith WC**, **Faustman EM**. Organophosphate pesticide exposure and work in pome fruit: Evidence for the takehome pesticide pathway. *Environ Health Perspect* 2006; 114(7):999-1006.
- Costa LG, Eaton DL, eds. Gene-Environment Interactions: Fundamentals of Ecogenetics. Wiley-Liss, Hoboken, NJ, 2006.
- **Costa LG**. Receptors and ion channels. IN: *Gene-Environment Interactions: Fundamentals of Ecogenetics*. LG Costa, DL Eaton, eds. Wiley-Liss, Hoboken, NJ, 2006; 197-212.
- Costa LG, Cole TB, Geiss GK, Furlong CE. Paraoxonase, butyrylcholinesterase and epoxide hydrolase. IN: *Gene-Environment Interactions: Fundamentals* of Ecogenetics. LG Costa, DL Eaton, eds. Wiley-Liss, Hoboken, NJ, 2006; 159-177.
- **Costa LG**. Toxic effects of pesticides. IN: *Casarett and Doulls Toxicology: The Basic Science of Poisons,* 7th ed. CD Klaassen, ed. McGraw-Hill, New York, 2007.
- **Costa LG**, Cole TB, Vitalone A, Furlong CE. Paraoxonase polymorphisms and toxicity of organophosphates. IN: *Toxicology of Organophosphate and Carbamate Compounds*. RC Gupta, ed. Elsevier, Boston, 2006; 247-256.
- **Costa LG**. Current issues in organophosphate toxicology. *Clin Chim Acta* 2006; 366(1-2):1-13.
- Costa-Mallen P, Costa LG, Checkoway H. Genotype combinations for monoamine oxidase-B intron 13 polymorphism and dopamine D2 receptor TaqIB polymorphism are associated with eversmoking status among men. *Neurosci Lett* 2005; 385(2):158-162.
- Costa-Mallen P, Kelada SN, Costa LG, Checkoway H. Characterization of the *in vitro* transcriptional activity of polymorphic alleles of the human monoamine oxidase-B gene. *Neurosci Lett* 2005; 383(1-2):171-175.
- Crane PK, Gibbons LE, Jolley L, **van Belle G**, Selleri R, Dalmonte E, De Ronchi D. Differential item functioning related to education and age in the Italian version

of the Mini-mental State Examination. *Int Psychogeriatr* 2006; 18(3):505-515.

- Cude K, Wang Y, Choi HJ, Hsuan SL, Zhang H, Wang CY, **Xia Z**. Regulation of the G2-M cell cycle progression by the ERK5-NFkappaB signaling pathway. *J Cell Biol* 2007; 177(2):253-264.
- Dabrowski MJ, Maeda D, Zebala J, Lu WD, Mahajan S, **Kavanagh TJ**, Atkins WM. Glutathione S-transferase P1-1 expression modulates sensitivity of human kidney 293 cells to photodynamic therapy with hypericin. *Arch Biochem Biophys* 2006; 449(1-2):94-103.
- Daniell WE, Fulton-Kehoe D, Chiou LA, Franklin GM. Work-related carpal tunnel syndrome in Washington State workers' compensation: Temporal trends, clinical practices, and disability. *Am J Ind Med* 2005; 48(4):259-269.
- Daniell WE, Swan SS, McDaniel MM, Camp JE, Cohen MA, Stebbins JG. Noise exposure and hearing loss prevention programmes after 20 years of regulations in the United States. *Occup Environ Med* 2006; 63(5):343-351.
- De Roos AJ, Ray RM, Gao DL, Wernli KJ, Fitzgibbons ED, Ziding F, **Astrakianakis G**, Thomas DB, **Checkoway H**. Colorectal cancer incidence among female textile workers in Shanghai, China: A case-cohort analysis of occupational exposures. *Cancer Causes Control* 2005; 16(10):1177-1188.
- Dennerlein JT, **Johnson PW.** Different computer tasks affect the exposure of the upper extremity to biomechanical risk factors. *Ergonomics* 2006; 49(14):1456-1469.
- Dennerlein JT, **Johnson PW.** Changes in upper extremity biomechanics across different mouse positions in a computer workstation. *Ergonomics* 2006; 49(14):1456-1469.
- DeRouen TA, Martin MD, Leroux BG, Townes BD, **Woods JS**, Leitao J, Castro-Caldas A, Luis H, Bernardo M, Rosenbaum G, Martins IP. Neurobehavioral effects of dental amalgam in children: A randomized clinical trial. *JAMA* 2006;295(15): 1784-1792.

- Dills RL, Paulsen M, Ahmad J, Kalman DA, Elias FN, Simpson CD. Evaluation of urinary methoxyphenols as biomarkers of woodsmoke exposure. *Environ Sci Technol* 2006; 40(7):2163-2170.
- **Eaton DL.** Glutathione S-transferases as putative host susceptibility genes for cancer risk in agricultural workers. *J Biochem Mol Toxicol* 2005; 19(3):187-189.
- Eaton DL. Gilbert SG. Principles of Toxicology. IN: Casarett and Doull's Toxicology: The basic sciences of poisons, Klaaseen CD, ed. New York: McGraw-Hill, 2007;
- Echeverria D, Woods JS, Heyer NJ, Rohlman D, Farin FM, Li T, Garabedian CE.
  The association between a genetic polymorphism of coproporphyrinogen oxidase, dental mercury exposure and neurobehavioral response in humans. *Neurotoxicol Teratol* 2006; 28(1):39-48.
- Echeverria D, Woods JS, Heyer NJ, Rohlman DS, Farin FM, Bittner AC Jr, Li T, Garabedian C. Chronic low-level mercury exposure, BDNF polymorphism, and associations with cognitive and motor function. *Neurotoxicol Teratol* 2005; 27(6): 781-796.
- Elgethun K, Yost MG, Fitzpatrick CT, Nyerges TL, Fenske RA. Comparison of global positioning system (GPS) tracking and parent-report diaries to characterize children's time-location patterns. J Expo Sci Environ Epidemiol 2007; 17(2):196-206.
- Eskenazi B, Gladstone EA, Berkowitz G, Drew CH, Faustman EM, et al. Methodolgic and logistic issues in conducting longitudinal birth cohort studies: Lessons learned from the Centers for Children's Environmental Health and Disease Prevention Research. *Environ Health Perspect* 2005; 113 (10): 1419-1429.
- Falk E, Schwartz SM, Galis ZS, **Rosenfeld ME.** Putative murine models of plaque rupture. *Arterioscler Thromb Vasc Biol* 2007; 27(4):969-972.
- Faustman EM, Omenn GS. Risk assessment and the impact of ecogenetics. IN: *Gene-Environment Interactions: Fundamentals of Ecogenetics*. LG Costa,

DL Eaton, eds. Wiley-Liss, Hoboken, NJ, 2006; 427-449.

- Fenske RA, Bradman A, Whyatt RM, Wolff MS, Barr DB. Lessons learned for the assessment of children's pesticide exposure: Critical sampling and analytical issues for future studies. *Environ Health Perspect* 2005; 113(10):1455-1462.
- Fenske RA, Lu C, Curl CL, Shirai JH, Kissel JC. Biologic monitoring to characterize organophosphorus pesticide exposure among children and workers: An analysis of recent studies in Washington State. *Environ Health Perspect* 2005; 113(11):1651-1657.
- Fenske RA. State-of-the-art measurement of agricultural pesticide exposures. *Scand J Work Environ Health* 2005; (31 Suppl) 1:67-73; discussion 63-65.
- Franklin GM, Mai J, Wickizer T, Turner JA, Fulton-Kehoe D, Grant L. Opioid dosing trends and mortality in Washington State workers' compensation, 1996-2002. Am J Ind Med 2005; 48(2):91-99.
- Fulton-Kehoe D, Gluck J, Wu R, Mootz R, Wickizer TM, Franklin GM. Measuring work disability: What can administrative data tell us about patient outcomes? *J Occup Environ Med* 2007; 49(6): 651-658.
- Furlong CE, Cole TB, Jarvik GP, Pettan-Brewer C, Geiss GK, Richter RJ, Shih DM, Tward AD, Lusis AJ, Costa LG. Role of paraoxonase (PON1) status in pesticide sensitivity: Genetic and temporal determinants. *Neurotoxicology* 2005; 26(4):651-659.
- Furlong CE, Cole TB, Walter BJ, Shih DM, Tward A, Lusis AJ, Timchalk C, Richter RJ, Costa LG. Paraoxonase 1 (PON1) status and risk of insecticide exposure. *J Biochem Mol Toxicol* 2005; 19(3): 182-183.
- **Gallagher EP**, Gardner JL, Barber DS. Several glutathione S-transferase isozymes that protect against oxidative injury are expressed in human liver mitochondria. *Biochem Pharmacol* 2006; 71(11):1619-1628.
- **Gallagher EP.** Using salmonid microarrays to understand the dietary modulation of

carcinogenesis in rainbow trout. *Toxicol Sci* 2006; 90(1):1-4.

- George CM, Smith AH, **Kalman DA**, Steinmaus CM. Reverse osmosis filter use and high arsenic levels in private well water. *Arch Environ Occup Health* 2006; 61(4):171-175.
- Gershon RRM, **Neitzel R**, Barrera MA, Akram M. Pilot survey of subway and bus stop noise levels. *J of Urban Health-Bulletin of the New York Academy of Medicine* 2006; 83 (5): 802-812.
- Gharib SA, **Luchtel DL**, Madtes DK, Glenny RW. Global gene annotation analysis and transcriptional profiling identify key biological modules in hypoxic pulmonary hypertension. *Physiol Genomics* 2005; 22(1):14-23.

Giordano G, Afsharinejad Z, Guizzetti M, Vitalone A, Kavanagh TJ, Costa LG. Organophosphorus insecticides chlorpyrifos and diazinon and oxidative stress in neuronal cells in a genetic model of glutathione deficiency. *Toxicol Appl Pharmacol* 2007; 219(2-3):181-189.

Giordano G, Sanchez-Perez AM, Montoliu C, Berezney R, Malyavantham K, Costa LG, Calvete JJ, Felipo V. Activation of NMDA receptors induces protein kinase A-mediated phosphorylation and degradation of matrin 3. Blocking these effects prevents NMDA-induced neuronal death. J Neurochem 2005; 94(3):808-818.

#### Giordano G, White CC, McConnachie

LA, Fernandez C, Kavanagh TJ, Costa LG. Neurotoxicity of domoic acid in cerebellar granule neurons in a genetic model of glutathione deficiency. *Mol Pharmacol* 2006; 70(6):2116-2126.

- Giordano G, Afsharinejad Z, Guizzetti M, Vitalone A, Kavanagh TJ, Costa LG. Organophosphorus insecticides chlorpyrifos and diazinon and oxidative stress in neuronal cells in a genetic model of glutathione deficiency. *Toxicol Appl Pharmacol* 2007; 219(2-3):181-189.
- Glenny RW, Bernard SL, **Luchtel DL**, Neradilek B, Polissar NL. The spatialtemporal redistribution of pulmonary blood flow with postnatal growth. *J Appl Physiol* 2007; 102(3):1281-1288.



#### Gohlke JM, Griffith WC, Faustman EM. A systems-based computational model for dose-response comparisons of two

- mode of action hypotheses for ethanolinduced neurodevelopmental toxicity. *Toxicol Sci* 2005; 86 (2): 470-484.
- Gold LS, De Roos AJ, Ray RM, Wernli K, Fitzgibbons ED, Gao DL, Astrakianakis
  G, Feng Z, Thomas D, Checkoway
  H. Brain tumors and occupational exposures in a cohort of female textile workers in Shanghai, China. *Scand J Work Environ Health* 2006; 32(3):178-184.
- Goldman B, Sheppard L, Kujawa SG, Seixas
  NS. Modeling distortion product otoacoustic emission input/output functions using segmented regression. *J Acoust Soc Am* 2006; 120(5 Pt 1): 2764-2776.
- Guizzetti M, Pathak S, Giordano G, Costa LG. Effect of organophosphorus insecticides and their metabolites on astroglial cell proliferation. *Toxicology* 2005; 215(3):182-190.
- Guizzetti M, Chen J, Oram JF, Tsuji R, Dao K, Möller T, Costa LG. Ethanol induces cholesterol efflux and up-regulates ATPbinding cassette cholesterol transporters in fetal astrocytes. *J Biol Chem* 2007; 282(26):18740-18749.
- **Guizzetti M, Costa LG.** Disruption of cholesterol homeostasis in the developing brain as a potential mechanism contributing to the developmental neurotoxicity of ethanol:

An hypothesis. *Med Hypotheses* 2005; 64(3):563-567.

- Guo Y, Breeden LL, Fan W, Zhao LP, **Eaton DL, Zarbl H.** Analysis of cellular responses to aflatoxin B(1) in yeast expressing human cytochrome P450 1A2 using cDNA microarrays. *Mutat Res* 2006; 593(1-2):121-142.
- Guo Y, Breeden LL, **Zarbl H**, Preston BD, **Eaton DL**. Expression of a human cytochrome p450 in yeast permits analysis of pathways for response to and repair of aflatoxin-induced DNA damage. *Mol Cell Biol* 2005; 25(14):5823-5833.
- Heyer NJ, Bittner AC Jr, Echeverria
  D, Woods JS. A cascade analysis
  of the interaction of mercury and
  coproporphyrinogen oxidase (CPOX)
  polymorphism on the heme biosynthetic
  pathway and porphyrin production. *Toxicol Lett* 2006; 161(2):159-166.
- Ho HK, White CC, Fernandez C, Fausto N, Kavanagh TJ, Nelson SD, Bruschi SA. RNrf2 activation involves an oxidative-stress independent pathway in tetrafluoroethylcysteine-induced cytotoxicity. *Toxicol Sci* 2005; 86(2):354-364.
- Hofmann J, Guardado J, Keifer M, Wesseling C. Mortality among a cohort of banana plantation workers in Costa Rica. *Int J Occup Environ Health* 2006; 12(4):321-328.
- Hofmann J, Snyder K, Keifer M. A descriptive study of workers' compensation

claims in Washington State orchards. *Occup Med* 2006; 56 (4): 251-257.

- Hopke PK, Ito K, **Mar T,** Christensen WF, Eatough DJ, Henry RC, Kim E, Laden F, Lall R, **Larson TV**, *et al.* PM source apportionment and health effects: 1. Intercomparison of source apportionment results. *J Expo Sci Environ Epidemiol* 2006; 16(3):275-286.
- Hsuan SL, **Klintworth HM, Xia Z.** Basic fibroblast growth factor protects against rotenone-induced dopaminergic cell death through activation of extracellular signal-regulated kinases 1/2 and phosphatidylinositol-3 kinase pathways. *J Neurosci* 2006; 26(17):4481-4491.
- Ito K, Christensen WF, Eatough DJ, Henry RC, Kim E. Laden F, Lall R, **Larson TV**, Neas L, Hopke PK, Thurston GD. PM source apportionment and health effects: an investigation of intermethod variability in associations between source-apportioned fine particle mass and daily mortality in Washington, DC. *J Expo Sci Environ Epidemiol* 2006; 16(4): 300-310.
- Janes H, **Sheppard L**, Lumley T. Casecrossover analyses of air pollution exposure data: Referent selection strategies and their implications for bias. *Epidemiology* 2005; 16(6):717-726.
- Jansen KL, Larson TV, Koenig JQ, Mar TF, Fields C, Stewart J, Lippmann M. Associations between health effects and particulate matter and black carbon in subjects with respiratory disease. *Environ Health Perspect* 2005; 113(12):1741-1746.
- Jeebay M, Robtin T, **Seixas N**, Baatjies R, George DA, Rusford E, Lehrer SB, Lopata AL. Environmental exposure characterization of fish processing workers. *Ann Occup Hyg* 2005; 49:423-437.
- Jimenez J, **Wu C-F**, Claiborn C, **Gould T**, **Simpson C**, **Larson T**, **Liu LJS**. Agricultural burning smoke in Eastern Washington: Part I, atmospheric characterization. *Atmos Environ* 2006; 40(4):639-650.
- Johns DO, Daniell WE, Shen DD, Kalman DA, Dills RL, Morgan MS. Ethanol-

induced increase in the metabolic clearance of 1,1,1-trichloroethane in human volunteers. *Toxicol Sci* 2006; 92(1):61-70.

- Jonsson P, **Johnson PW**, Hagberg M. Accuracy and feasibility of using an electrogoniometer for measuring simple thumb movements. *Ergonomics* 2007; 50(5):647-659.
- Judd NL, Drew CH, Acharya C, Mitchell TA, Donatuto JL, Burns GW, Burbacher TM, Faustman EM. Marine resources for future generations. Framing scientific analyses for risk management of environmental hazards by communities: Case studies with seafood safety issues. *Environ Health Perspect* 2005; 113(11):1502-1508.
- Juul SE, Aylward E, Richards T, McPherson RJ, Kuratani J, **Burbacher TM.** Prenatal cord clamping in newborn *Macaca nemestrina*: A model of perinatal asphyxia. *Dev Neurosci* 2007; 29(4-5):311-320.
- Kamimura M, Viedt C, Dalpke A, **Rosenfeld ME**, *et al.* Interleukin-10 suppresses tissue factor expression in lipopolysaccharide-stimulated macrophages via inhibition of Egr-1 and a serum response element/MEK-ERK1/2 pathway. *Circ Res* 2005; 97(4):305-313.
- Karr C, Lumley T, Shepherd K, Davis R,
  Larson T, Ritz B, Kaufman J. A casecrossover study of wintertime ambient air pollution and infant bronchiolitis.
  Environ Health Perspect 2006; 114(2):277-281.
- Keifer MC, Firestone J. Neurotoxicity of pesticides. J Agromedicine 2007; 12(1):17-25.
- Kelada SN, Checkoway H, Costa LG. Neurodegenerative diseases. IN: Gene-Environment Interactions: Fundamentals of Ecogenetics. LG Costa, DL Eaton eds. Wiley-Liss, Hoboken, NJ, 2006; 253-269.
- Kelada SN, Checkoway H, Kardia SL, Carlson CS, Costa-Mallen P, Eaton DL, Firestone J, Powers KM, Swanson PD,
  Franklin GM, Longstreth WT Jr, Weller TS, Afsharinejad Z, Costa LG. 5' and 3' region variability in the dopamine transporter gene (SLC6A3), pesticide

exposure and Parkinson's Disease risk: A hypothesis generating study. *Hum Mol Genet* 2006; 15(20):3055-3062.

- Kelada SN, Costa-Mallen P, Checkoway H, Carlson CS, Weller TS, Swanson PD, Franklin GM, Longstreth WT Jr, Afsharinejad Z, Costa LG. Dopamine transporter (SLC6A3) 5' region haplotypes significantly affect transcriptional activity *in vitro* but are not associated with Parkinson's disease. *Pharmacogenet Genomics* 2005; 15(9):659-668.
- Klintworth H, Newhouse K, Li T, Choi WS, Faigle R, Xia Z. Activation of c-Jun N-terminal protein kinase is a common mechanism underlying paraquat- and rotenone-induced dopaminergic cell apoptosis. *Toxicol Sci* 2007; 97(1):149–162.
- Knoll N, Ruhe C, Veeriah S, Sauer J, Glei M, Gallagher EP, Pool-Zobel BL.
  Genotoxicity of 4-hydroxy-2-nonenal in human colon tumor cells is associated with cellular levels of glutathione and the modulation of glutathione S-transferase A4 expression by butyrate. *Toxicol Sci* 2005; 86(1):27-35.
- Kramer CB, Cullen AC, Faustman EM. Policy implications of genetic information on regulation under the Clean Air Act: The case of particulate matter and asthmatics. *Environ Health Perspect* 2006; 114 (3): 313-319.
- Lewtas J. Combustion emissions: contribution to air pollution, human exposure, cancer, reproductive effects, and cardiovascular disease. IN: *Air Pollutants and the Respiratory Tract*, 2nd ed. WM Foster, D Costa, eds. CRC Press, Boca Raton, FL, 2005.
- Li W, Ray RM, Gao DL, Fitzgibbons ED, **Seixas NS, Camp JE**, Wernli KJ, **Astrakianakis G**, Feng Z, Thomas DB, **Checkoway H.** Occupational risk factors for nasopharyngeal cancer among female textile workers in Shanghai, China. *Occup Environ Med* 2006; 63(1):39-44.
- Linker D, Miller M, Freeman K, Burbacher T. Health and safety awareness for working teens: Developing a successful, statewide program for educating teen

workers. Family Community Health 2005; 28:224-237.

- Liu L, Cundiff P, Abel G, Wang Y, Faigle R, Sakagami H, Xu M, **Xia Z**. Extracellular signal-regulated kinase (ERK) 5 is necessary and sufficient to specify cortical neuronal fate. *Proc Natl Acad Sci* USA 2006; 103(25):9697-9702.
- Longstreth WT Jr, Koepsell TD, Ton TG, Hendrickson AF, **van Belle G.** The epidemiology of narcolepsy. *Sleep* 2007; 30(1):13-26.
- Lu C, Rodriguez T, Funez A, Irish RS, Fenske RA. The assessment of occupational exposure to diazinon in Nicaraguan plantation workers using saliva biomonitoring. *Ann NY Acad Sci* 2006; 1076:355-365.
- Lu C, Toepel K, Irish R, Fenske RA, Barr DB, Bravo R. Organic diets significantly lower children's dietary exposure to organophosphorus pesticides. *Environ Health Perspect* 2006; 114(2):260-263.
- Luo T, Xia Z. A small dose of hydrogen peroxide enhances tumor necrosis factor-alpha toxicity in inducing human vascular endothelial cell apoptosis: reversal with propofol. *Anesth Analg* 2006; 103(1):110-116.
- MacDougall ED, Kramer F, Polinsky P, Barnhart S, Askari B, Johansson F, Varon R, Rosenfeld ME, Oka K, Chan L, Schwartz SM, Bornfeldt KE. Aggressive very low-density lipoprotein (VLDL) and LDL lowering by gene transfer of the VLDL receptor combined with a low-fat diet regimen induces regression and reduces macrophage content in advanced atherosclerotic lesions in LDL receptor-deficient mice. *Am J Pathol* 2006; 168(6):2064-2073.
- Maghout Jurati S, **Franklin GM**, Mirza SK, Wickizer TM, **Fulton-Kehoe D**. Lumbar fusion outcomes in Washington State workers' compensation. *Spine* 2006; 31(23):2715-2723.
- Mar TF, Ito K, Koenig JQ, Larson TV, Eatough DJ, Henry RC, Kim E, Laden F, Lall R, Neas L, Stolzel M, Paatero P, Hopke PK, Thurston GD. PM source apportionment and health effects. 3. Investigation of inter-method variations

in associations between estimated source contributions of PM2.5 and daily mortality in Phoenix, AZ. J Expo Sci Environ Epidemiol 2006; (16(4):311-320.

- Mar TF, Jansen K, Shepherd K, Lumley T, Larson TV, Koenig JQ. Exhaled nitric oxide in children with asthma and short-term PM2.5 exposure in Seattle. *Environ Health Perspect* 2005; 113(12):1791-1794.
- Mar TF, Koenig JQ, Jansen K, Sullivan J, Kaufman J, Trenga CA, Siahpush SH, Liu LJ, Neas L. Fine particulate air pollution and cardiorespiratory effects in the elderly. *Epidemiology* 2005; 16(5):681-687.
- Maraganore DM, de Andrade M, Elbaz A, Farrer MJ, Ioannidis JP, Kruger R, Rocca WA, Schneider NK, Lesnick TG, Lincoln SJ, Hulihan MM, Aasly JO, Ashizawa T, Chartier-Harlin MC, **Checkoway H**, *et al:* Genetic Epidemiology of Parkinson's Disease (GEO-PD) Consortium. Collaborative analysis of alpha-synuclein gene promoter variability and Parkinson disease. *JAMA* 2006; 296(6):661-670.
- Martin MD, Benton T, Bernardo M, **Woods** JS, *et al.* The association of dental caries with blood lead in children when adjusted for IQ and neurobehavioral performance. *Sci Total Environ* 2007; 15:377(2-3):159-164.
- Martin MD, **Woods JS**. The safety of dental amalgam in children. *Expert Opin Drug Saf* 2006; 5(6):773-781.
- Mayer, AS, Stoler JK, **Vedal S**, *et al*. Risk factors for symptom onset in PI\*Z alpha-1 antitrypsin deficiency. *Int J Chron Obstruct Pulmon Dis* 2006; 1(4):485-92.
- McCauley LA, Anger WK, **Keifer M**, Langley R, Robson MG, Rohlman D. Studying health outcomes in farmworker populations exposed to pesticides. *Environ Health Perspect* 2006; 114 (6): 953-960.
- McKone EF, Shao J, Frangolias DD, Keener CL, Shephard CA, Farin FM, Tonelli MR, Pare PD, Sandford AJ, Aitken ML, Kavanagh TJ. Variants in the glutamatecysteine-ligase gene are associated with cystic fibrosis lung disease. Am J Respir Crit Care Med 2006; 174(4):415-419.

- Miller KA, Siscovick DA, **Sheppard L,** Shepherd K, Sullivan JH, Anderson GL, **Kaufman JD.** Long-term exposure to air pollution and incidence of cardiovascular events in women. *N Engl J Med* 2007; 356(5):447-458.
- Moneypenny CG, Shao J, Song Y, Gallagher EP. MLL rearrangements are induced by low doses of etoposide in human fetal hematopoietic stem cells. *Carcinogenesis* 2006; 27(4):874-881.
- Naeher LP, Brauer M, Lipsett M, Zelikoff JT, **Simpson CD, Koenig JQ**, Smith KR. Woodsmoke health effects: a review. *Inhal Toxicol* 2007; 19(1):67-106.
- Naidoo RN, Robins TG, **Seixas NS**, Lalloo U, Becklake M. Differential respirable dust related lung function effects in current and former South African coal miners. *Int Arch Occup Environ Health* 2005; 78:293-302.
- Naidoo RN, **Seixas NS**, Robins TG. Estimation of respirable dust exposure among South African coal miners. *J Occup Environ Hyg* 2006; 3:293-300.
- Neitzel R, Somers S, Seixas N. Variability of real world hearing protection measurements. *Annals of Occup Hyg* 2006; 50(7):679-691.
- Neitzel RL, Berna BE, Seixas NS. Noise exposures aboard catcher/processor fishing vessels. *Am J Ind Med* 2006; 49(8):624-633.
- Nielsen SS, Mueller BA, De Roos AJ, Viernes HMA, Farin FM, Checkoway H. Risk of brain tumors in children and susceptibility to organophosphorus insecticides: The potential role of paraoxonase (PON1). *Environ Health Perspect* 2005; 113(7):9-13.
- Omen GS, Motulsky AG. Ecogenetics: Historical perspectives. IN: *Gene-Environment Interactions: Fundamentals of Ecogenetics*. LG Costa, DL Eaton, eds. Wiley-Liss, Hoboken, NJ, 2006; 7-16.
- Park RM, Schulte PA, Bowman JD, Walker JT, Bondy SC, **Yost MG, Touchstone JA,** Dosemeci M. Potential occupational risks for neurodegenerative diseases. *Am J Ind Med* 2005; 48(1):63-77.
- **Peretz A, Checkoway H, Kaufman JD,** Trajber I, Lerman Y. Silica, silicosis,



and lung cancer. *Isr Med Assoc J* 2006; 8(2):114-118.

- Peretz C, Alexander BH, Nagahama SI, Domino KB, Checkoway H. Parkinson's disease mortality among male anesthesiologists and internists. *Mov Disord* 2005; 20(12):1614-1617.
- Peterson S, Lampe JW, **Bammler TK, Gross-**Steinmeyer K, Eaton DL. Apiaceous vegetable constituents inhibit human cytochrome P-450 1A2 (hCYP1A2) activity and hCYP1A2-mediated mutagenicity of aflatoxin B1. *Food Chem Toxicol* 2006; 44(9):1474-1484.
- **Ponce RA,** Visich JE, Heffernan JK, *et al.* Preclinical safety and pharmacokinetics of recombinant human factor XIII. *Toxicol Pathol* 2005; 3(4):495-506.
- Powers KM, Smith-Weller T, Franklin GM, Longstreth WT Jr, Swanson PD, Checkoway H. Diabetes, smoking, and other medical conditions in relation to Parkinson's disease risk. *Parkinsonism Relat Disord* 2006; 12(3):185-189.
- Rattazzi M, Bennett BJ, Bea F, Kirk EA, Ricks JL, Speer M, Schwartz SM, Giachelli CM, **Rosenfeld ME**. Calcification of advanced atherosclerotic lesions in the innominate arteries of ApoE-deficient mice: potential role of chondrocyte-like cells. *Arterioscler Thromb Vasc Biol* 2005; 25(7):1420-1425.
- Ray RM, Gao DL, Li W, Wernli KJ, Astrakianakis G, Seixas NS, Camp JE, Fitzgibbons ED, Feng Z, Thomas DB, Checkoway H. Occupational exposures

and breast cancer among women textile workers in Shanghai. *Epidemiology* 2007; 18(3):383-392.

- Regalado J, Perez-Padilla R, Sansores R, Paramo-Ramirez JI, Brauer M, Pare P, Vedal S. The effect of biomass burning on respiratory symptoms and lung function in rural Mexican women. *Am J Respir Crit Care Med* 2006; 174(8):901-905.
- Robinson RK, **Franklin GM**, Tinney CH, Crow SM, Hartman SJ. Sexual harassment in the workplace: Guidelines for educating healthcare managers. *J Health Hum Serv Adm* 2005; 27(4):501-530.

Rodriguez T, Younglove L, Lu C, Funez
A, Weppner S, Barr DB, Fenske RA.
Biological monitoring of pesticide
exposures among applicators and their
children in Nicaragua. *Int J Occup Environ Health* 2006; 12(4):312-320.

Russell SJ, Winnemuller L, Camp JE, Johnson PW. Comparing the results of five lifting analysis tools. *Appl Ergon* 2007; 38(1):91-97.

Salazar MK, **Keifer M**, **Negrete M**, **Estrada F**, **Snyder K**. Occupational risk among orchard workers—a descriptive study. *Fam Community Health* 2005; 28(3):239-252.

Sathyanarayana S, Beaudet N, Omri K, Karr C. Predicting children's blood lead levels from exposure to school drinking water in Seattle, Washington, USA. *Ambul Pediatr* 2006; 6(5):288-292.

Schildcrout JS, Sheppard L, Lumley T,

Slaughter JC, **Koenig JQ**, Shapiro GG. Ambient air pollution and asthma exacerbations in children: an eightcity analysis. *Am J Epidemiol* 2006; 164(6):505-517.

- Schreuder AB, **Larson TV, Sheppard L**, Claiborn CS. Ambient woodsmoke and associated respiratory emergency department visits in Spokane, Washington. *Int J Occup Environ Health* 2006; 12(2):147-153.
- Schwartz SM, Galis ZS, **Rosenfeld ME**, Falk E. Plaque rupture in humans and mice. *Arterioscler Thromb Vasc Biol* 2007; 27(4):705-713.
- Seixas NS, Goldman B, Sheppard L, Neitzel R, Norton S, Kujawa SG. Prospective noise induced changes to hearing among construction industry apprentices. *Occup Environ Med* 2005; 62:309-317.
- Seixas NS, Neitzel R, Sheppard L, Goldman B. Alternative metrics for noise exposure among construction workers. *Ann Occup Hyg* 2005; 49:493-502.
- Shao J, Stapleton PL, Lin YS, Gallagher EP. Cytochrome p450 and glutathione s-transferase mRNA expression in human fetal liver hematopoietic stem cells. *Drug Metab Dispos* 2007; 35(1):168-175.
- Sheppard L. Acute air pollution effects: Consequences of exposure distribution and measurements. *J Toxicol Environ Health A* 2005; 68(13-14):1127-1135.
- Sheppard L, Slaughter JC, Schildcrout J, Liu LJ, Lumley T. Exposure and measurement contributions to estimates of acute air pollution effects. *J Expo Anal Environ Epidemiol* 2005; 15(4):366-376.
- Shin GG, Faubert K, Linden G, Sobsey MD. Inactivation of *G. lamblia* cysts in real field waters. *J Water and Environ Tech* 2005; 3(1):41-45.
- Shoaf MB, Shirai JH, Kedan G, Schaum J, Kissel JC. Child dermal sediment loads following play in a tide flat. J Expo Anal Environ Epidemiol 2005; 15(5):407-412.
- Shoaf MB, Shirai SH, Kedan G, Schaum J, Kissel JC. Adult dermal sediment loads following clam digging in tide flats. Soil & Sediment Contamination 2005; 14(5): 463-470.

Shusterman D, Matovinovic E, Salmon A. Does Haber's Law apply to human sensory irritation? *Inhal Toxicol* 2006; 18(7):457-471.

- Shusterman D. Environmental nonallergic rhinitis. *Clin Allergy Immunol* 2007; 19:249-266.
- **Shusterman D.** Trigeminally-mediated health effects of air pollutants: sources of inter-individual variability. *Hum Exp Toxicol* 2007; 26(3):149-157.
- Sidhu JS, Ponce RA, Vredevoogd MA, Yu X, Gribble E, Hong SW, Schneider E, Faustman EM, Cell cycle inhibition by sodium arsenite in primary embryonic rate midbrain neuroepithelial cells. *Toxicol Sci* 2006; 89(2):475-484

Silverstein M. Ergonomics and regulatory politics: the Washington State case. *Am J Ind Med* 2007; 50(5):391-401.

Sieh W, Edwards KL, Fitzpatrick AL, Srinouanprachanh SL, Farin FM, Monks SA, Kronmal RA, Eaton DL. Genetic susceptibility to prostate cancer: Prostate-specific antigen and its interaction with the androgen receptor (United States). *Cancer Causes Control* 2006; 17(2):187-197.

Simon GE, Von Korff M, Saunders K, Miglioretti DL, Crane PK, **van Belle G**, Kessler RC. Association between obesity and psychiatric disorders in the US adult population. *Arch Gen Psychiatry* 2006; 63(7):824-830.

Simpson CD, Paulsen M, Dills RL, Liu LJ-S, Kalman DA. Determination of methoxyphenols in ambient atmospheric particulate: Tracers for wood combustion. *Environ Sci Technol* 2005; 39(2):631-637.

- Slikker W, Young JF, Corley RA, Dorman DC, Conolly RB, Knudsen TB, Erstad BL, Luecke RH, Faustman EM, Timchalk C, Mattison DR. Improving predictive modeling in pediatric drug development: Pharmacokinetics, pharmacodynamics, and mechanistic modeling. Ann NY Acad Sci 2005; 1053: 505-518.
- Smith HE, Eaton DL, Bammler TK. Polymorphisms in xenobiotic conjugation. IN: *Gene-Environment Interactions:*

*Fundamentals of Ecogenetics*. LG Costa, DL Eaton, eds. Wiley-Liss, Hoboken, NJ, 2006; 197-212.

- **Soge OO,** Adeniyi BA, **Roberts MC.** New antibiotic resistance genes associated with CTX-M plasmids from uropathogenic Nigerian *Klebsiella pneumoniae*. *J Antimicrob Chemother* 2006; 58(5):1048-1053.
- Spielmann H, Seiler A, Bremer S, Hareng L, Hartung T, Ahr H, Faustman E, et al. The practical application of three validated *in vitro* embryotoxicity tests. The report and recommendations of an ECVAM/ZEBET workshop (ECVAM workshop 57). Altern Lab Anim 2006; 34(5):527-538.
- Steiner C, Peters WH, Gallagher EP, Magee P, Rowland I, Pool-Zobel BL. Genistein protects human mammary epithelial cells from benzo(a)pyrene-7,8-dihydrodiol-9,10-epoxide and 4-hydroxy-2-nonenal genotoxicity by modulating the glutathione/glutathione S-transferase system. *Carcinogenesis* 2007; 28(3):738-748.
- Steinmaus C, Carrigan K, Kalman D, Atallah R, Yuan Y, Smith AH. Dietary intake and arsenic methylation in a US population. *Environ Health Perspect* 2005; 113:1153-1159.
- Steinmaus CM, George CM, Kalman DA, Smith AH. Evaluation of two new arsenic field test kits capable of detecting arsenic water concentrations close to 10 microg/L. *Environ Sci Technol* 2006; 40(10):3362-3366.
- Stover BD, Turner A, Franklin G, Gluck JV, Fulton-Kehoe D, Sheppard L, Wickizer TM, Kaufman J, Egan K. Factors associated with early opioid prescription among workers with low back injuries. *J Pain* 2006 Oct; 7(10):718-725.
- Svec MA, Ward MH, Dosemeci M, Checkoway H, De Roos AJ. Risk of lymphatic or haematopoietic cancer mortality with occupational exposure to animals or the public. Occup Environ Med 2005; 62(10):726-735.
- Tang X, Wang X, Gong X, Tong M, Park D, **Xia Z**, Mao Z. Cyclin-dependent kinase 5 mediates neurotoxin-induced

degradation of the transcription factor myocyte enhancer factor 2. *J Neurosci* 2005: 25(19):4823-4834.

- Thetkathuek A, **Keifer M**, Fungladda W, Kaewkungwal J, Padungtod C, Wilson B, Mankhetkorn S. Spectrophotometric determination of plasma and red blood cell cholinesterase activity of 53 fruit farm workers pre- and postexposed chlorpyrifos for one fruit crop. *Chem Pharm Bull* (Tokyo) 2005; 53(4):422-424.
- Thurston GD, Ito K, Mar T, Christensen WF, Eatough DJ, Henry RC, Kim E, Laden F, Lall R, Larson TV, et al.
  Workgroup report: Workshop on source apportionment of particulate matter health effects—intercomparison of results and implications. Environ Health Perspect 2005; 113(12):1768-1774.
- Tilton SC, Givan SA, Pereira CB, Bailey GS, Williams DE. Toxicogenomic profiling of the hepatic tumor promoters indole-3-carbinol, 17beta-estradiol and betanaphthoflavone in rainbow trout. *Toxicol Sci* 2006; 90(1):61-72.
- Tilton SC, Gerwick LG, Hendricks D, Rosato CS, Corley-Smith G, Givan SA, Bailey GS, Bayne CH, Williams DE. Use of a rainbow trout oligonucleotide microarray to determine transcriptional patterns in aflatoxin B1-induced hepatocellular carcinoma compared to adjacent liver. *Toxicol Sci* 2005; 88(2):319-330.
- Ton TG, Heckbert SR, Longstreth WT Jr, Rossing MA, Kukull WA, **Franklin GM**, Swanson PD, **Smith-Weller T**, **Checkoway H**. Nonsteroidal antiinflammatory drugs and risk of Parkinson's disease. *Mov Disord* 2006; 21(7):964-969.
- Ton TG, Heckbert SR, Longstreth WT Jr. Rossing MA, Kukull WA, Franklin GM, Swanson PD, Smith-Weller
  T, Checkoway H. Calcium channel blockers and beta-blockers in relation to Parkinson's disease. *Parkinsonism Relat Disord* 2007; 13(3):165-169.
- Trenga CA, Sullivan JH, Schildcrout JS, Shepherd KP, Shapiro GG, Liu LJ, Kaufman JD, Koenig JQ. Effect of

particulate air pollution on lung function in adult and pediatric subjects in a Seattle panel study. *Chest* 2006; 129(6):1614-1622.

- Trute M, Gallis B, Doneanu C, Shaffer S, Goodlett D, Gallagher EP. Characterization of hepatic glutathione S-transferases in coho salmon (*Oncorhynchus kisutch*). Aquat Toxicol 2007; 81(2):126-136.
- Turner JA, **Franklin G, Fulton-Kehoe D,** Sheppard L, Wickizer TM, Wu R, Gluck JV, Egan K. Worker recovery expectations and fear-avoidance predict work disability in a population-based workers' compensation back pain sample. *Spine* 2006; 31(6):682-689.
- **Vedal S**, Dutton SJ. Wildfire air pollution and daily mortality in a large urban area. *Environ Res* 2006; 102(1):29-35.
- Vedal S. Where there's fire, there's smoke. Am J Respir Crit Care Med 2006; 174(11):1168-1169.
- Wang Y, Su B, Xia Z. Brain-derived neurotrophic factor activates ERK5 in cortical neurons via a Rap1-MEKK2 signaling cascade. J Biol Chem 2006; 281(47):35965-35974.
- Wang L, Larson EB, Bowen JD, van Belle G. Performance-based physical function and future dementia in older people. Arch Intern Med 2006; 166(10):1115-1120.

Weinstein MG, Hecker SF, Hess JA, Kinck L. A roadmap to diffuse ergonomic innovations in the construction industry: There is nothing so practical as a good theory. *Int J Occup Environ Health* 2007; 13(1):46-55.

- Weppner S, Elgethun K, Lu C, Hebert V, Yost MG, Fenske RA. The Washington aerial spray drift study: Children's exposure to methamidophos in an agricultural community following fixedwing aircraft applications. J Expo Sci Environ Epidemiol 2006; 16(5):387-396.
- Wernli KJ, Astrakianakis G, Camp JE, Ray RM, Chang CK, Li GD, Thomas DB, Checkoway H, Seixas NS. Development of a job exposure matrix (JEM) for the textile industry in Shanghai, China. J Occup Environ Hyg 2006; 3(10):521-529.
- Wernli KJ, Fitzgibbons ED, Ray RM, Gao DL, Li W, Seixas NS, Camp JE, Astrakianakis G, Feng Z, Thomas DB, Checkoway H. Occupational risk factors for esophageal and stomach cancers among female textile workers in Shanghai, China. Am J Epidemiol 2006; 163(8):717-725.
- Wernli KJ, Ray RM, Gao DL, De Roos AJ, Checkoway H, Thomas DB. Menstrual and reproductive factors in relation to risk of endometrial cancer in Chinese women. *Cancer Causes Control* 2006; 17(7):949-955.
- Wong EY, Ray R, Gao DL, Wernli KJ, Li W, Fitzgibbons ED, Feng Z, Thomas DB, Checkoway H. Reproductive history, occupational exposures, and thyroid cancer risk among women textile workers in Shanghai, China. *Int Arch Occup Environ Health* 2006; 79(3):251-258.

- Woods JS, Echeverria D, Heyer NJ,
  Simmonds PL, Wilkerson J, Farin
  FM. The association between genetic polymorphisms of coproporphyrinogen oxidase and an atypical porphyrinogenic response to mercury exposure in humans. *Toxicol Appl Pharmacol* 2005; 206(2):113-120.
- Yaraei K, Campbell LA, Zhu X, Liles WC, Kuo CC, Rosenfeld ME. Effect of *Chlamydia pneumoniae* on cellular ATP content in mouse macrophages: role of toll-like receptor 2. *Infect Immun* 2005; 73(7):4323-4326.
- Yaraei K, Campbell LA, Zhu X, Liles WC, Kuo CC, **Rosenfeld ME.** *Chlamydia pneumoniae* augments the oxidized low-density lipoprotein-induced death of mouse macrophages by a caspaseindependent pathway. *Infect Immun* 2005; 73(7):4315-4322.
- Yu XZ, Griffith WC, Hanspers K, Dillman JF, Ong H, Vredevoogd MA, Faustman EM. A system-based approach to interpret dose- and time-dependent microarray data: Quantitative integration of gene ontology analysis for risk assessment. *Toxicol Sci* 2006; 92 (2): 560-577.
- Zhou C, **Poulton EJ,** Grun F, **Bammler TK,** Blumberg B, Thummel KE, **Eaton DL.** The dietary isothiocyanate sulforaphane is an antagonist of the human steroid and xenobiotic nuclear receptor. *Mol Pharmacol* 2007; 71(1):220-229.

Chuck Treser (second from left) with undergraduates at UW commencement, 2006

Chuck Easterberg

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Financial support, not only from federal and state funds, but also from private sources such as Wallace Research Foundation, Microsoft, and International Truck & Engine Corporation has been vital to our growth.

This publication is online at http://depts.washington.edu/envhlth

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