

DEPARTMENT OF ENVIRONMENTAL HEALTH

ENVIRONMENTAL HEALTH

N EWS

SCHOOL OF PUBLIC HEALTH AND COMMUNITY MEDICINE • UNIVERSITY OF WASHINGTON • SPRING-SUMMER 2001

CHEMICALS IN OUR BODIES

This spring, the federal Centers for Disease Control and Prevention (CDC) released the long-awaited National Report on Human Exposure to Environmental Chemicals, which measured the exposure of the US population to 27 environmental chemicals.

Department of Environmental Health researchers have long experience with biomonitoring and chemical exposures, health effects, and the complex interaction of genetics and environmental exposure. This issue of Environmental Health News describes our work with several of these substances: lead, beryllium, mercury, phthalates, and pesticides.



Findings contained some good news about childhood lead exposure and secondhand cigarette smoke. Other measures gave cause for concern.

After years of living, breathing, eating, and drinking, we all acquire a body burden of chemicals. The Centers for Disease Control and Prevention (CDC) has issued a report that, for the first time in a general US population sample, uses biomonitoring in a comprehensive way to measure actual levels of chemicals in the body. Biomonitoring is the analysis of blood, urine, and tissues to measure chemical exposure in humans. Previous studies had estimated population exposures from air, water, or soil samples.

The report measured the exposure of the US population to 27 environmental chemicals, including metals such as lead and mercury; phthalates (plasticizers); pesticides; and tobacco smoke. Levels of environmental chemicals were measured in blood and urine samples collected from participants in CDC's National Health and Nutrition Examination Survey (NHANES), a long-term national

health survey of the US population. This is the first time that national exposure levels were calculated for 24 of these 27 chemicals.

Findings contained some good news about childhood lead levels and the exposure of nonsmokers to secondhand cigarette smoke. Other measures gave cause for concern.

The CDC described its first National Report on Human Exposure to Environmental Chemicals as an important research tool. "This new resource is a significant development in the field of environmental health," said Health and Human Services Secretary Tommy G. Thompson. "It will help us to better track the exposures of Americans to chemicals in the environment and to measure the effectiveness of our public health efforts."

The CDC notes that just because people have an environmental chemical in their blood or urine does not mean that the chemical causes disease. Researchers at the

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University of Washington and other governmental and educational institutions are working to determine which levels of a chemical may cause disease and which levels are of negligible health concern. For some chemicals, such as lead, much is known about the health risks at various blood levels. For most of the other environmental chemicals, more research is needed to determine whether exposure to the chemical at levels found in the study is a cause for health concern.

Biomonitoring can identify previously unknown pollution sources, said Dave Kalman, chair of the Department of Environmental Health. For example, until an earlier phase of the NHANES study found high blood lead levels among urban, lower-income children, nobody was looking for lead paint in older public housing projects. "This was an exposure that wasn't anticipated," he said.

CDC plans to expand the report to provide information about 100 chemicals in the next few years, while continuing to monitor the 27 original substances. In the future, CDC expects to be able to report exposure levels for specific population groups, such as children, minority populations, or women of childbearing age.

METALS

Lead, mercury, cadmium, cobalt, antimony, barium, beryllium, cesium, molybdenum, platinum, thallium, tungsten, and uranium

The CDC has monitored children's blood lead levels since 1976. Results for 1999 show that average lead levels for children aged 1-5 years have decreased since 1991-1994. These findings highlight the success of public health efforts to decrease the exposure of children to lead and remove lead from automobile gasoline. Nevertheless, special populations of children at high risk for lead exposure, such as those living in homes containing lead-based paint or lead-contaminated dust, remain a public health concern.

The report provides new data on levels of mercury in blood of children 1 to 5 years old and among women of childbearing age (16-49 years old). Blood mercury levels among children were about 25% of the average of blood mercury levels among women of childbearing age. Compared with an adult, the fetus and child are usually more vulnerable to the effects of metals, and public health officials are particularly careful to protect them. Scientists will use these new data to better estimate health risks for the fetus, children, and women of childbearing age from potential sources of mercury exposure.

TOBACCO SMOKE

Cotinine is a metabolite of nicotine that tracks exposure to environmental tobacco smoke among nonsmokers. Environmental, or second-hand, smoke has been identified as a human carcinogen. Results from the 1999 report showed that the median (50th percentile) cotinine level among nonsmokers aged 3 years and older has decreased more than 75% from levels measured between 1988 and 1991. This reduction documents a dramatic reduction in exposure of the general US population to environmental tobacco smoke; however, since more than half of American youth are still exposed, environmental tobacco smoke remains a major public health concern.

ORGANOPHOSPHATE PESTICIDES

Organophosphate insecticides have largely replaced the more persistent pesticides such as DDT. Some of the more widely used have been chlorpyrifos, diazinon, and malathion. Whether the urine levels of metabolites reported in the CDC study are a cause for health concern is not yet known. The CDC's data provide physicians with a reference range against which to compare a patient's exposure. These data will also assist scientists in planning and conducting research about organophosphate pesticide exposure and health effects.

PHTHALATES

Phthalates are compounds commonly used in such consumer products as soap, shampoo, hair spray, and many types of nail polish. Some phthalates are used in plastic medical devices such as blood bags and tubing. Animal research has focused on the reproductive effects of phthalates. The CDC study found widespread and unexpectedly high levels of metabolites from two phthalate compounds associated with consumer products. These new data have prompted CDC to conduct additional studies to examine the pathways by which phthalates get into people's bodies.

FOR FURTHER READING

The report, <http://www.cdc.gov/nceh/dls/report/>

Agency for Toxic Substances and Disease Registry ToxFAQs, <http://www.atsdr.cdc.gov/toxfaq.html>

National Health and Nutrition Examination Survey (NHANES), <http://www.cdc.gov/nchs/nhanes.htm>

R ESEARCHERS STUDY HUMAN EFFECTS

Department of Environmental Health investigators for decades have researched the human health effects of several of the target chemicals and have pioneered biomonitoring techniques.

"The department's strong toxicology research components allow us to look beyond the exposures to the human significance," department chair Dave Kalman said.

LEAD

For the past century, children were exposed to lead by breathing automobile exhaust and eating chipped paint. Even low-level lead exposure can affect children's neurological development, resulting in lowered IQ and attention deficit disorder. A number of departmental research teams have looked into various aspects of lead's effects.

Graduate student Hailing Lu in Lucio Costa's laboratory studied how lead affects signal transduction pathways in the brain. Lynne Simmonds, in James Woods' laboratory, searched for biomarkers of low-level lead exposure that could serve as a non-invasive means of testing for lead exposure. In the end, she concluded that direct blood lead measurement remains the best test.

Parents' occupational exposures to lead can also affect their children. A team that included Harvey Checkoway, Joel Kaufman, and Elaine Faustman has studied the reproductive effects of lead exposure in smelter workers. They found that the risk of a stillbirth or birth defect was elevated for pre-conception employment in a high-lead-exposure job compared with a low-lead-exposure job.

BERYLLIUM

Tim Takaro is investigating worker risk from beryllium at the Hanford Nuclear Reservation in eastern Washington. Beryllium is a strong, lightweight metallic element used not only in

weaponry, but also in the aerospace industry and in consumer goods ranging from golf clubs to bicycle frames.

The vast majority of people who are exposed to beryllium do not become sensitized. However, some people's lungs mount a strong immune reaction to beryllium particles. One known genetic biomarker, Glu-69, has shown a high correlation with incidence of chronic beryllium disease development. Departmental researchers are working to identify other genetic factors involved in the disease.

MERCURY

Associate Professor Thomas Burbacher served on the National Academy of Sciences committee that last year reaffirmed

the Environmental Protection Agency's standards for methylmercury exposure. He has spent 20 years researching the toxic effects of methylmercury on infant development.

Women who consume large amounts of fish and seafood during pregnancy are at particular risk; their children can suffer blindness, deafness, and cerebral palsy. The National

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Dorothea Lange, Farm Security Administration, 1937

HUMAN EFFECTS

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Academy's review confirmed more subtle mental deficiencies found at lower doses, which can affect attention, fine-motor function, language, drawing abilities, and verbal memory.

PHTHALATES

Elaine Faustman serves on the Phthalates Expert Panel for the National Toxicology Program's Center for the Evaluation of Risks to Human Reproduction, convened to provide scientifically based assessments of the evidence for reproductive and developmental toxicity of environmental chemicals. The panel assigned a relatively low concern to five phthalates and a higher concern for one, di (2-ethylhexyl) phthalate, or DEHP, which is used in building products, food packaging, children's products, and medical devices. The most serious concern was for the high exposure that might be associated with intensive medical procedures for critically ill infants. Such heavy exposures affect the developing reproductive tract of male infants. There also was concern that pregnant women exposed at allowable levels of DEHP might be adversely affected in the development of their offspring.

PESTICIDES

The metabolites that CDC measured are the same ones Richard Fenske and his team have been measuring in its studies of children's exposure to pesticides. The department did pioneering work in this area, he said, and collaborated with the CDC in developing its methodology. "Our choice of the dialkylphosphate metabolites in 1995 was novel at the time, and contributed to the CDC decision to develop a method to analyze for these compounds," Fenske said.

Suggested further reading is on page 6

Did lead poison the Roman Empire?



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Lead's discovery dates back to 3500 BC. Lead artifacts have been found throughout the ancient world, and some researchers have suggested that lead poisoning was a major factor in the downfall of the Roman Empire.

Well-to-do Romans painted their walls a rich Pompeian red, which owed its color to a salt of lead or mercury. Lead was used for water pipes, cups, toys, statues, cosmetics, coffins, and roofs, but the most significant source may have been the wine of the wealthy class.

S. Columba Gilfillan proposed a theory for Roman decay in 1965 that involved "poisons esteemed as delicious by the ancient well-to-do." Spoilage was a problem in ancient Rome, and vintners discovered that wine tasted better and lasted longer if it was mixed with a concentrated grape syrup called *sapa*. The best *sapa* was boiled in lead pots, allowing lead to leach into the syrup. When *sapa* was mixed with wine, it sweetened it and also poisoned the microorganisms that cause fermentation and souring. *Sapa* was also used in fruit and honey drinks, and as a food preservative.

Josef Eisinger estimated a Roman consuming a liter of wine a day would ingest about 20 mg of lead per day, which he said was more than enough to produce chronic lead poisoning.

A cultural shift at the height of the Roman Empire made it socially acceptable for wives to drink wine, to which Gilfillan attributed a declining birth rate and a low rate of surviving children among the wealthy. Today, the reproductive effects of lead are well established, as are the effects on childhood development and learning disabilities.

Gilfillan hypothesized that the diet of the poor was not so badly poisoned as that of the rich. Although they drank the same water, they lacked the luxuries of cosmetics, lead paint, wine, fruit and honey drinks, or preserved foods.

What role did lead play in decline of the Roman Empire? We may never know for certain, but the evidence is intriguing.

FOR FURTHER READING

Eisinger J. Lead and wine: Eberhard Gockel and the "Colica Pictonum." *Medical History*, 26(1982):278-302.

Gilfillan SC. Lead Poisoning and the fall of Rome. *Journal of Occupational Medicine*, 1(1965):53-60.

Waldron HA. Lead poisoning in the ancient world. *Med. Hist. (Lond)* 17(1973):391-399.

Steve Muhlberger, an associate professor of Medieval History at Nipissing University in Ontario, has compiled a bibliography:
<http://www.unipissing.ca/departement/history/muhlberger/orb/lead.htm>

STUDENT RESEARCH DAY, 2001

The department used a new format for this year's Student Research Day, May 24. Four graduate students—one from each program—were invited to present their research in an hour-long seminar in Hogness Auditorium. The remaining students presented their work in a poster session that followed (see page 6). Some of the posters can be viewed online at http://depts.washington.edu/envhlth/acad_programs/posters01.html. Abstracts are online at <http://depts.washington.edu/envhlth/news/researchday01.html>. The four featured presentations were:

PESTICIDES & LEARNING

Anne Caughlan, an MS candidate in Toxicology, investigated mechanisms by which pesticide exposure *in utero* may interfere with cognitive development. Her team from the Child Health Center is studying how the organophosphate pesticide chlorpyrifos might interfere with development of the brain and nervous system. Caughlan studied apoptosis—or programmed cell death—a complex process critical to the development of the central nervous system. She used an *in vitro* culture system to model neuron development, and showed that chlorpyrifos and its active metabolite induce apoptosis in postnatal and embryonic rat cortical neurons. She also found impairment of mitochondrial function, which may serve as a biomarker of effect.

SUPERVISORS & ERGONOMICS

Lori Winnemuller, an MS candidate in Industrial Hygiene and Safety, worked with the Washington State Department of Labor & Industries to evaluate supervisor assessments of ergonomic risks. Hazard identification tasks often are assigned to supervisors. Winnemuller surveyed 37 supervisors in five industries, asking them to assess the jobs they oversee for posture, force, repetition, impact, lifting, and vibration. Their assessments were compared with an ergonomist's job analysis. Every supervisor identified at least one risk factor, though overall they overestimated levels of risk. The highest agreement was on heavy lifting and the lowest on repetition, with levels of agreement ranging from 59% to 89%. Winnemuller concluded that use of supervisors to assess ergonomic risk appeared promising.

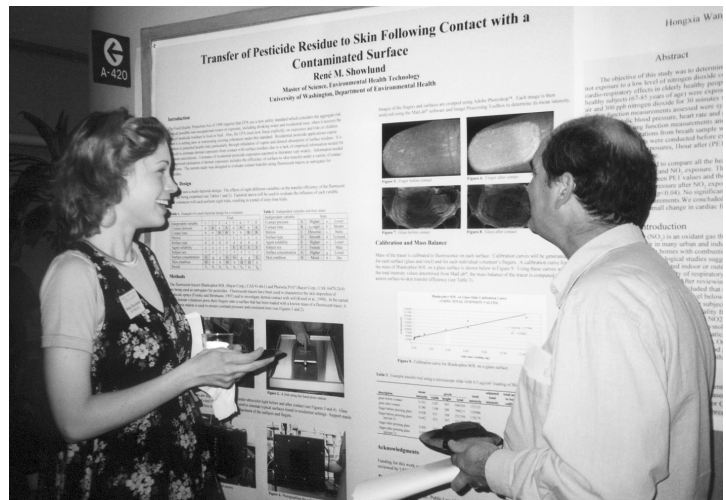
MAPPING AIR MONITORING SITES

Recent federal standards for small airborne particles ($PM_{2.5}$) have prompted the question of where to locate monitoring stations. Emily Goswami, an MS candidate in the Environmental Health Technology program, mapped optimal sites in the Seattle area. She collected data from 40 outdoor sites and analyzed them to produce a computer model of the city. By

overlaying Geographic Information Systems (GIS) maps for elevation, distance from the nearest arterial road, and high population density of elderly persons—those most at risk—she mapped areas that meet all three criteria. The composite map showed five optimal monitoring locations: Capitol Hill, Crown Hill, West Seattle, Maple Leaf, and Greenwood.

OCCUPATION & PARKINSON'S

Jordan Firestone, an MPH candidate in Occupational and Environmental Medicine, studied whether particular environmental exposures and genetic factors increase the risk for Parkinson's disease. In a population-based, case-control study, he found modest increases in risk among farmers from pesticide application, crop farming, orchard growing, and exposure to insecticides. Animal farming, landscaping, and exposure to herbicides seemed to present a decreased risk. In industrial occupations, he found increased risk from copper smelting (arsenic or copper exposures), lead smelting, and mining, but not from manganese, solvents, iron smelting, foundry work, welding, or exposures to lead, nickel, magnesium, or chromate.



Rene Showlund describes her work on skin absorption of pesticides to Terry Kavanagh at the poster session at Student Research Day.

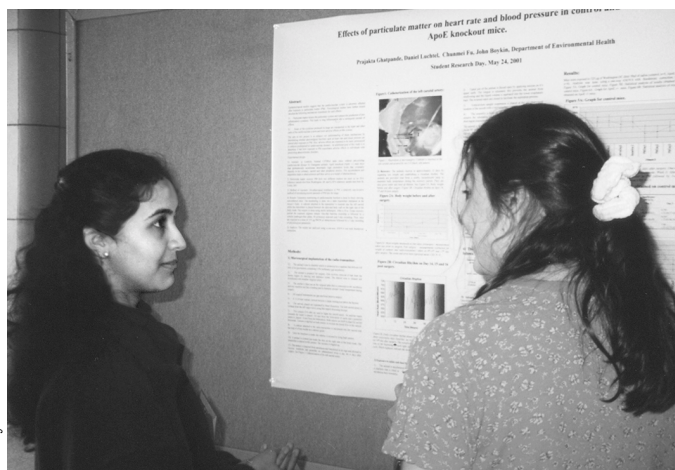
Kathy Hall

Student poster session

- Emily Goswami.** Spatial characteristics of fine particulate matter and nitrogen dioxide in Seattle: identifying representative monitoring sites (*Tech, Liu*)
- Rene Showlund.** Transfer of pesticide residues to skin following contact with a contaminated surface (*Tech, Kissel*)
- Hongxia Wang.** The cardiopulmonary effects of 300 ppb NO₂ on healthy subjects (*Tech, Koenig*)
- Sarah Weppner.** Farm exposures to deposited arsenic and lead on Vashon/Maury Island (*Tech, Kissel*)
- Milton Eng.** Evaluation of hearing conservation awareness within high noise industries within Washington state (*IHS, Daniell*)
- Robert Leo.** Evaluation of a hearing protection task observation protocol in two high noise industries (*IHS, Daniell*)
- Maria Majar.** Respirable dust and silica exposure assessment in construction task (*IHS, Seixas*)
- Hossein Siahpush.** Longitudinal study of asthma-like symptoms in aluminum smelter work (*IHS, Kaufman*)
- Carolyn Whitaker.** Accuracy of construction worker recall of tasks for epidemiological exposure assessment to noise (*IHS, Seixas*)
- Lori Winnemuller.** The validity of supervisor assessments in identifying ergonomic risk factors (*IHS, Kaufman*)
- Tanongsak Yingratanasuk.** An assessment of lung disease and silica exposure in a stone carving company in Chonburi province, Thailand (*IHS, Seixas*)
- Nilo Arnaiz.** Genetic factors in the development of an asthma-like condition while employed in the aluminum smelter potroom (*OccMed, Kaufman*)
- Jordan Firestone.** Occupational risk factors for Parkinson's disease (*OccMed, Checkoway*)
- Kimquy Kieu.** Demographics of hoarders in Seattle (*OccMed, Treser*)
- Gabrielle Morris.** Decompression illness in children: A comparison of children and adults (*OccMed, Brodtkin*)
- Christine Bellas.** Identification and characterization of a human glutathione S-transferase M2 variant (*Tox, Eaton*)
- Lynn Bekris.** Glutamate-cysteine ligase levels in human peripheral blood lymphocytes: Improved flow cytometry based method for evaluating immune and antioxidant relationships (*Tox, Kavanagh*)
- Mark Burry.** Neurodevelopmental toxicity of toluene (*Tox, Costa*)
- Anne Caughlan.** Apoptosis: A novel endpoint for chlorpyrifos-induced neurotoxicity (*Tox, Xia*)
- Julia Hoeft.** A biologically based dose-response model for ethanol-induced developmental neurotoxicity (*Tox, Faustman*)
- Susan Leaman.** Investigation of p21 as a mechanism for the inhibitory effects of ethanol on the proliferation of astrocytoma cells (*Tox, Costa*)
- Prajakta Ghatpande.** Effects of particulate matter on heart rate and blood pressure of control and ApoE knockout mice (*Tox, Luchtel*)

Graduate Programs: Industrial Hygiene and Safety (*IHS*); Environmental Health Technology (*Tech*); Toxicology (*Tox*); Occupational Medicine (*OccMed*). Preceptors also are in parentheses.

Kathy Hall



Prajakta Ghatpande (left) describes her research on cardiovascular effects of particulate air pollution at the poster session.

HUMAN EFFECTS, FURTHER READING

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Alexander BH, Checkoway H, Van Netten C, Kaufman JD, Vaughan TL, Mueller BA, Faustman EM. Paternal occupational lead exposure and pregnancy outcome. *Int J Occup Environ Health* 1996 Oct;2(4):280-285.

Bartell SM, Takaro TK, Ponce RA, Hill JP, Faustman EM, and Omenn GS. Risk assessment and screening strategies for beryllium exposure. *Technology* 7:241-249, 2000.

CDC's childhood lead web site, www.cdc.gov/nceh/lead/lead.htm

Fenske RA, Kissel JC, Lu C, Kalman DA, Simcox NJ, Allen EH, Keifer MC. Biologically based pesticide dose estimates for children in an agricultural community. *Environ Health Perspect* 2000 Jun;108(6):515-520. <http://ehpnet1.niehs.nih.gov/docs/2000/108p515-520fenske/abstract.html>

Health Care Without Harm recommendations on alternatives to PVC medical products: <http://www.noharm.org/hcwh/issues/pvc.html>

Loewenherz C, Fenske RA, Simcox NJ, Bellamy G, Kalman D. Biological monitoring of organophosphorus pesticide exposure among children of agricultural workers in central Washington state. *Environ Health Perspect* 1997 Dec;105(12):1344-1353.

Lu C, Knutson DE, Fisker-Anderson J, Fenske RA. Biological monitoring survey of organophosphorus pesticide exposure among preschool children in Seattle metropolitan area. *Environ Health Perspect* 2001;109:299-303.

Lu H, Guizzetti M, Costa LG. Inorganic lead increases the proliferation of human astrocytoma cells: possible role of protein kinase C. *Toxicol Sci* 1998; 42 (1S): 198.

National Academy of Sciences. EPA's methylmercury guideline is scientifically justifiable for protecting most Americans, but some may be at risk. <http://www.nap.edu/books/0309071402/html/>



CONTINUING EDUCATION

To confirm this schedule or find more information about these courses, call (206) 543-1069, or visit the Continuing Education Web site at <http://depts.washington.edu/ehce.html>. Courses are in Seattle unless noted.

NW Center for Occupational Health & Safety

July 23-27 Hazardous Substance Summer Institute

July 23-24 Process Safety Management

July 25 Annual Hazardous Waste Refresher

July 26 Supervising Hazardous Waste Operations

July 27 Emergency Response Operations Refresher

Aug 27-31 Comprehensive Review of Industrial Hygiene (*Vancouver, BC*)

Sept 26-27 Governor's Safety & Health Conference

Sept 25 Successful Ergonomics Programs: From Awareness Education to Zero Lifting

Oct 1-3 Managing Hazardous Materials Incidents: Improving Interagency Response (*Yakima*)

Oct 11-12 Northwest Occupational Health Conference (*Seaside, OR*)

Oct 10 Occupational Dermatitis: Symptoms, Causes, and Controls

Oct 17 A Small Dose of Toxicology: How Chemicals Affect Your Health, Basic Course

Oct 18 A Larger Dose of Toxicology: How Chemicals Affect Your Health, Advanced Course

Nov 5-7 Nonionizing Radiation Protection: An Overview

Dec 10-11 International Mountain Logging & 11th Pacific Northwest Skyline Symposium

Dec 12 Forest Worker Safety Training

OSHA Training Institute Education Center

July 9-12 & OSHA 600: Collateral Duty for Other Federal Agencies (*Portland*)

July 16-18 OSHA 226: Permit-Required Confined Space Entry

July 21-26 OSHA 225: Principles of Ergonomics (*Portland*)

July 30-Aug 2 OSHA 501: Trainer Course for General Industry (*Anchorage*)

Aug 6-9 OSHA 501: Trainer Course for General Industry

Aug 13-15 OSHA 222A: Respiratory Protection

Aug 20-23 OSHA 521: OSHA Guide to Industrial Hygiene

Aug 27-30 OSHA 510: OSHA Standards for Construction (*Portland*)

Sept 10-12 OSHA 503: General Industry Outreach Trainer Update

Sept 17-20 OSHA 204A: Machinery & Machine Guarding Standards (*Portland*)

Sept 24-26 OSHA 502: Construction Industry Trainer Update

Oct 1-4 OSHA 301: Excavation, Trenching & Soil Mechanics (*Richland*)

Oct 15-18 OSHA 500: Trainer Course for the Construction Industry (*Portland*)

Oct 29-Nov 1 OSHA 311: Fall Arrest Systems (*Richland*)

Nov 5-7 OSHA 225: Principles of Ergonomics

Nov 13-16 OSHA 501: Trainer Course for General Industry (*Portland*)

Nov 27-29 OSHA 226: Permit-Required Confined Space Entry (*Anchorage*)

Dec 3-6 OSHA 510: OSHA Standards for Construction

Dec 10-13 OSHA 521: OSHA Guide to Industrial Hygiene



Graduate students **Doug Johns** and **George Astrakianakis** each won \$2,000 in this year's Stockhausen competition. **Astrakianakis** also won a \$6,000 TSI Inc./Arthur J. Abrams Endowed Scholarship from the American Industrial Hygiene Foundation. He is a first year PhD student in the industrial hygiene program.

Adrienne Hidy, manager of the Pacific Northwest Agricultural Safety and Health Center, received the Department's Distinguished Staff Service Award and was honored at the School of Public Health convocation. Other nominees for the distinguished staff award were: **Russell Dills**, research scientist; **Jennifer Grant**, assistant to the chair; **Bill Griffith**, research manager; **Shannon Kirkpatrick**, graduate program coordinator; **Joel Levin**, computer specialist; **Dianne Neil**, research scientist; **Rebecca Rooney**, fiscal supervisor; and **Jeffrey Shirai**, research scientist. **Neil** was the department's nominee for the UW Distinguished Staff Award.

The department's 2000-2001 outreach awards went to **Kathy Hall**, staff, and **Matt Keifer**, faculty. Each received \$1,000 for travel or equipment. The department's Outreach Committee presented the awards at the annual staff appreciation brunch. Hall was recognized for transforming the department's ability to communicate with external and internal audiences through publications and web sites. Keifer was recognized for his work with a farmworker clinic in the Yakima Valley.

Keifer presented a keynote speech at the National Occupational Health Conference in Hanoi, Vietnam, in May. While in Southeast Asia, he met with the faculty of Burapha University, a partner in the International Scholars for Occupational Medicine program.

Hall, **Kris Freeman**, and **Adrienne Hidy** presented a panel on communicating risks to nontraditional audiences at the Society for Technical Communication in Chicago in May. Hall and Hidy also presented a paper on communicating with migrant agricultural workers, and Hall chaired a panel on regulatory writing. Hall and **Donna Prisbrey** presented a session about involving migrant agricultural workers in health



Kathy Hall

Adrienne Hidy demonstrates PNASH outreach poster

promotion at the 10th annual conference of the International Association for Public Participation in Vancouver, BC, in May.

John Kissel has been elected president of the International Society of Exposure Analysis (ISEA). **Sally Liu** was elected as a councilor of ISEA.

Harvey Checkoway presented a paper on environmental and genetic factors in Parkinson's disease at a workshop on Department of Defense-sponsored research in Potomac, Maryland, in March. He presented papers on Parkinson's disease and silica exposure at the Symposium on Environmental Health and Occupational Risk Assessment in Beijing, China, in June.

Jason Griffith gave a talk on ergonomic assessment strategies at the Puget Sound Chapter-American Society of Safety Engineers Professional Development Conference in May.

Gerald van Belle is an appointed member of the Peripheral and Central Nervous System Drugs Advisory Committee, Food and Drug Administration, which is considering whether mild cognitive impairment is an identifiable clinical syndrome.

Lucio Costa presented a paper at the International Neurotoxicology Association meeting in Estoril (Portugal) in June.

Elaine Faustman taught a course on reproductive and developmental toxicology in May at the International Union of Toxicology Continuing Education in Stellenbosch, South Africa. Faustman presented "Mechanisms underlying children's susceptibility to environmental toxicants" in May at the

Medical Research Council of South Africa/NIEHS Children's Workshop, also in Stellenbosch.

In April, **Dave Eaton** presented a lecture on Toxicology in the Courtroom as part of an American Law Institute/American Bar Association Continuing Education program on Scientific Evidence. In May, he participated in the first two meetings of a National Academy of Sciences/National Research Council panel appointed at the request of President Bush to review the scientific basis for EPA's proposal to lower the current drinking water standard for arsenic from the current level of 50 ppb to 10 ppb.

Mohamed Kamel, professor of Environmental and Occupational Medicine at the University of Alexandria, Egypt, was here as a visiting scientist. He and **Tom Burbacher** are working on a study on the exposure of children in Alexandria to lead.

Lianne Sheppard, Noah Seixas, Janice Camp, Peter Johnson, Mike Yost and **Richard Fenske** attended the X2001-Exposure Assessment in Epidemiology and Practice conference in Göteborg, Sweden, in June. The scientific conference was organized by the Department of Occupational Medicine of Göteborg, the Swedish National Institute for Working Life, and the Scientific Committee of Industrial Hygiene of the International Commission on Occupational Health.

Charles (Chuck) Treser, Carl Osaki and 11 undergraduate students attended the Washington State Environmental Health Association's Education Conference in April in Yakima. ■



Barb Brouner

Kathy Hall

DISTINGUISHED FACULTY

Genetics predict how we respond to toxicants

Curt Omiecinski uses new genetic tools to find answers to basic metabolic questions, such as why some people easily metabolize their medicines while others suffer adverse side effects. His research can also help explain why some people are more prone to pesticide poisoning than others.

Health Sciences Photography



Curt Omiecinski

Omiecinski, professor of Environmental Health and director of the Toxicology program, presented the spring quarter Distinguished Faculty Lecture for the School of Public Health and Community Medicine.

Omiecinski, whose background is in pharmacology, studies biotransformation enzymes that help the body detoxify or transform man-made or natural chemicals. Each person's ability to detoxify chemicals is affected by genetics, since each person is born with slightly different genes for biotransformation enzymes. Omiecinski's basic research into the biotransformation of xenobiotic chemicals (chemical compounds that are foreign to a living organism) may help scientists develop antidotes to poisons and better ways to adjust doses of prescription medicines. His speech was entitled: "Xenobiotic metabolism: Regulation, variation and toxicogenomics."

His work could lead to individualized dosing of medications. People who transform medications quickly—and flush them out of their bodies—might need higher doses that could cause side effects in others. Individualized dosing could be especially important for potent pharmaceuticals with side effects.

Omiecinski is a pioneer in toxicogenomics, which combines the emerging technologies of genomics and bioinformatics. The toxicogenomics approach grew out of the human genome project. Rather than using animals to study genetic susceptibility to illness, this technology probes human or animal genetic material densely printed on glass slides, called DNA arrays. Eventually, Omiecinski said, toxicogenomics could substitute for animal assays in toxicity testing. ■



Dave Eaton assumes presidency of Society

David Eaton presented his goals and vision as incoming president of the Society of Toxicology at its annual meeting in San Francisco in March. He also presented the "vice president's forum," where he challenged the Society's policy of accepting corporate sponsorships from tobacco companies, and provided an opportunity for other members to speak for and against the current policy.

UW photography



Dave Eaton

Elaine Faustman co-chaired a continuing education course, Improving Risk Assessment for Human Development Defects: The Promise of Recent Advances in Developmental Biology and Genomics. Her co-chair was Abigail Stack of the National Resource Council. Speakers included Daniel Nebert, University of Cincinnati, a member of the UW Center for Ecogenetics and Environmental Health Science Advisory Board.

Courtesy of E. Faustman



Elaine Faustman

An abstract from Faustman's lab won awards for best student presentation from both the Risk Assessment Specialty Division and the Biological Modeling Specialty Section:

Hoelt JM, Bartell SM, Wong EY, Lewandowski TA, Griffith WC, and Faustman EM. A biologically based dose-response model for ethanol development neurotoxicity

An abstract by **Hailing Lu**, a recently graduated PhD student from the laboratory of **Lucio Costa** won an award from the Metals Specialty Section. Lu also won the SOT Travel award to attend the meeting.

Lu H, Guizzetti M, and Costa LG. Inorganic lead activates the RAF-MEK-MAPK signaling pathway in human astrocytoma cells via a PCK-dependent mechanism

Other presentations by DEH-affiliated researchers included:

Bammler TK, Bellas C, Yang Z, Wong GK, Yu J, Adman ET, Checkoway H, Eaton DL. Identification and characterization of a human glutathione S-transferase M2 variant

Bekris LM, Jabbour AJ, Takaro TK, Kavanagh TK, Faustman EM. PHA stimulation induces elevated glutamate-L-cysteine ligase levels in human peripheral blood lymphocytes: improved flow cytometry based method for evaluating immune and antioxidant relationships

Botta D, White CC, Shi S, Ware CB, Ladiges WC, Fausto N, Tsai SY, O'Malley BW, Kavanagh TJ. Development of a transgenic mouse model for inducible overexpression of glutamate-cysteine ligase

Caughlan A, Namgung U, Xia Z. Arsenite and chlorpyrifos-induced apoptosis in cortical neurons is mediated by MAP kinases

Checkoway H. Environment, genes, and genomic markers in Parkinson's disease (invited platform presentation at a special session on Parkinson's disease)

Diaz-Lopez D, White CC, Keener CL, Farin FM, Kavanagh TJ. Tissue-dependent differential expression of glutamate-L-cysteine ligase subunits during mouse development

Dieguez-Acuna FJ, Ellis ME, Kushleika J, Woods JS. Mercuric ion (HG2+) attenuates nuclear factor κ B (NF- κ B) activation in kidney epithelial cells by impairing I κ B degradation, NF- κ B translocation and NF- κ B-DNA binding

Ellis ME, Corral J, Kushleika J, Simmonds PL, Dieguez-Acuna FJ, Woods JS. Mercuric ion (HG2+) induces nitric oxide synthetase (NOS) independently of NF- κ B activation in rat kidney (NRK52E) cells



Courtesy of E. Faustman

At the SOT meeting (l to r): Nancy Judd, recent graduate, and graduate students Lynn Bekris, Anne Caughlan, and Julia Hoelt

March 25–29, San Francisco

Evens C, DeRouen TA, **Woods JS**, Liang L, Luis HS, Simmonds PL, Leitao J, Bernado M, Redford M, Martin MD. Dietary methylmercury exposure in the Casa Pia dental amalgam study in children

Garry, MR, Lowney YW, Tsuji JS. A critical analysis of assumptions used when evaluating intake of metals from homegrown vegetables

Jabbour AJ, Ponce RA, Rosato MT, Kavanagh TJ, Newman LS, **Takaro TK, Faustman EM**. A flow cytometric assay for beryllium sensitization: screening and mechanistic applications

Judd NL, Faustman EM, Griffith WC, and **Kalman DA**. A value of information assessment for congener specific analytical techniques for PCBs: Do they meet risk assessment needs?

Lewandowski TA, Bartell SM, Ponce RA, and **Faustman EM**. Mechanism-based comparison of *in vitro* and *in vivo* data on methylmercury toxicity in developing rodents

Li WF, Costa LG, Richter RJ, Hagen T, Shih DM, Tward A, Lulis AJ, Furlong CE. Catalytic efficiency of substrate hydrolysis determines the *in vivo* detoxication of organophosphorus (OP) compounds by human paraoxonase (PON1)

Lu S, Kavanagh T, Faustman E. Effects of methylmercury on mitochondria in the developing brain

Pierce RH, **Krejsa CM, Diaz-Lopez D**, Campbell JS, Fausto N, **Kavanagh TJ**. Upregulation of glutamate-cysteine ligase in perinecrotic hepatocytes in mice exposed to carbon tetrachloride

Shao J, Keener CL, Farin FM, Tonelli MR, Aitken ML, **Kavanagh TJ**. Characterization of GLCL gene polymorphisms in cystic fibrosis

Shi S, Schriener SE, Ogburn CE, Martin GM, **Kavanagh TJ**. Levels of GPX, GRX, and G6PDH in catalase transgenic mice of different ages

Smith HE, Abel EL, Kelly EJ, Altman GB, Malins DC, **Eaton DL**. Expression of polymorphic enzymes of estradiol metabolism in human endometrium

White CC, Kavanagh TJ. A sensitive and specific fluorescence assay for glutathione in microtiter plates using 2,3-naphthalene-dicarboxyaldehyde

Xia Z, Namgung U. Kinase signaling pathways that regulate neuronal apoptosis

AMERICAN INDUSTRIAL HYGIENE

Conference & Exposition

June 2–7, New Orleans

Graduate student **Carolyn Reeb Whitaker** won two awards at the American Industrial Hygiene Association's annual conference and exposition for her poster, *Accuracy of construction worker recall of tasks for epidemiological exposure assessment to noise*. She won a \$250 award for "best student poster" from the Occupational Epidemiology Committee and "best student poster," awarded by the Graduate Student Poster Session Review Committee. Hers was selected from among the 30 submitted to the conference. The DEH's **Lynn Wilder** received this award last year. Carolyn's co-authors were **Noah Seixas, Lianne Sheppard**, and **Rick Neitzel**.

Seattle Post-Intelligencer reporters Andrew Schneider and Carol Smith won the AIHA Social Concerns Committee's award for the top investigative news story of the year on occupational safety and health issues. The *P-I* published a series of investigative articles called "Asbestos: The Forgotten Killer."

Conference presentations by Department of Environmental Health researchers included:

Carter S, Seixas N, Morgan M. Adaptation of existing electrochemical instruments for the real-time personal monitoring of hydrogen fluoride in the presence of sulfur dioxide

Croteau G, Flanagan M, Seixas N, Guffey S. The effect of local exhaust ventilation controls on dust exposures during masonry activities

Ertel K, **Takaro T, Stover B**. Use of risk density mapping to refine risk estimates for beryllium exposure at Hanford

Flanagan M, Loewenherz C, Kuhn G. Wet concrete saw cutting inside - How much water is enough?

Flanagan M, Loewenherz C, Camp. J. Control of silica exposure for concrete surface grinding—a case study

Hahne R, Nason J. Evaluation of total and removable levels of arsenic, mercury, and lead in natural history museum artifacts as a preface to preparing guidance for the handling of repatriated artifacts

Hahne R, Yu J. A side-by-side study of a replaceable sorbent passive monitor with a commonly used passive monitor for styrene and acetone

Monteith L, Wagner W. The status of industrial hygiene programs in China

Neitzel R, Seixas N, Kujawa S, Thomas K, Brower S. Baseline hearing levels and otoacoustic emissions in a cohort of construction apprentices and controls

Neitzel R, Seixas N, Brower S, Thomas K, **Sheppard L**. Noise exposure assessment methodology and year one results of a four-year prospective study of noise-induced hearing loss in construction apprentices

Swan S. Evaluation of hearing conservation practices in an industry with a high rate of workers' compensation claims for hearing loss

DEGREES

FALL 2000

Berhan Beraki, BS; Alma Cardenas, MS; Cecile Krejsa, PhD;
Thomas Lewandowski, PhD; Amy Scanlon, MS; Shengli Shi, MS;
Hongbin Xiao, MS

WINTER 2001

Vanessa J. Bussiere, BS; Hailing Lu, PhD; Jeffery Thompson, MPH

SPRING 2001

Nilo Arnaiz, MPH; Shireen Assaf, BS; Chester L. Baldwin III, BS;
Char'ryse Birge, BS; David Braungardt, BS; Anne Caughlan, MS;
Mark Ghezzi, BS; Emily Goswami, MS; Kimquy Kieu, MPH;
Wendy Kirchoff, BS; Maria Majar, MS; Christopher Miele, BS;
Hongxia Wang, MS; Carolyn Whitaker, MS; Lori Winnemuller, MS;
Kenton Wise, BS; Tanongsak Yingratanasuk, MS

SUMMER 2001 (*anticipated*)

Lynn Bekris, MS; Christine Bellas, MS; Mark Burry, MS; Dolo Diaz, PhD;
Milton Eng, MS; Jordan Firestone, MPH; Prajakta Ghatpande, MS;
Julia Hoeft, MS; Noel Hudson, PhD; Susan Leaman, MS; Robert Leo, MS;
Karen Masakane, BS; Gabrielle Morris, MPH; Rene Showlund, MS; Hossein
Siahpush, MS; Jeff Stewart, MS

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