LOHP Honored for Promoting Teen Health and Safety on the Job

The US Department of Labor has honored COEH’s Labor Occupational Health Program (LOHP) with an Award for Excellence in Leadership recognizing “outstanding efforts to provide a safe working environment for children through education and outreach to employers, community organizations, schools, parents, and media.”

With a three-year grant (1996-1998) from the National Institute for Occupational Safety and Health (NIOSH), Berkeley-based LOHP has been working with teachers, businesses, and community leaders in nearby Oakland to provide health and safety information and training to young people as they enter the workforce. LOHP is one of three programs nationwide to receive similar grants from NIOSH.

Assistant Secretary of Labor Bernard Anderson presented the Award for Excellence in Leadership during a visit to Oakland in May to help launch that city’s first annual “Safe Jobs for Youth Week,” one of the many projects LOHP has organized in the past year in collaboration with the Oakland Unified School District, the Mayor’s Office, private industry, and community groups.

More than 200,000 teenagers are injured on the job each year in the United States, and 70 die from work injuries. Studies suggest that teen job injury rates are higher than those of adults, even though teens are prohibited from working in the most hazardous occupations.

At the start of its Young Workers Project, LOHP surveyed 200 Oakland Technical High School students who were working or had worked. Half the students surveyed did not have a work permit at their current or last job. More than half could not correctly answer questions about work prohibited by child labor laws; ten percent had used powered food slicers on the job—a common child labor law violation; and 25 percent knew someone who had been injured on the job.

To help protect Oakland teens from health and safety hazards on the job, LOHP has:

• Developed a health and safety curriculum for English, Science, and US Government classes that has

Muscle Research Aims to Help Computer Users

Anyone who spends long hours at a computer keyboard experiences the occasional discomfort of an aching wrist—a reminder that one of the risks of the Information Age is a possible work-related injury to the muscles, tendons, and nerves of the hands and arms. Now, researchers in COEH’s Ergonomics Laboratory have made two discoveries that may help to prevent cumulative trauma disorders (CTDs) associated with computer use.

Visiting scholar Bernard Martin, associate professor of industrial and operations engineering at the University of Michigan, Ann Arbor, and David Rempel, director of the Ergonomics Laboratory, have identified the wrist and finger muscles that exert the highest force when computer users are typing at a keyboard or using a pointing device such as a mouse, trackball, touchpad, or pen. The researchers found that, for wrist motion, the extensor carpi ulnaris and the flexor carpi ulnaris are prime movers. These muscles are as active as the flexor carpi radialis and the extensor carpi radialis, which have long been associated with controlling wrist motion. They also identified the

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extensor indicus proprius as a prime mover for the index finger.

Additionally, the researchers have successfully shown that electrical signals from electrodes placed on the surface of the skin—surface electromyograms (EMGs)—reflect the force of these key wrist and finger muscles just as well as do EMGs from electrodes inserted into the muscles themselves.

By identifying the set of muscles that is critical for measuring the force exerted by computer users and by validating the effectiveness of surface EMGs, Martin’s and Rempel’s work paves the way for assessing muscle activity in the workplace, using a simple, non-invasive measuring technique to determine if a computer user is exerting too much force.

“If we can measure the muscle load, we can probably help people reduce the amount of force they are using,” Martin said. Options for reducing exertion include changing the keyboard, training people to use a different typing technique, and improving their posture, which affects muscle activity. Having a better description of the muscle load also makes it possible to provide more precise information to manufacturers of computer input devices.

Force is a key factor for CTD, but other critical factors include repetition, posture, vibration, and duration of task. To learn more about repetition, Martin and Rempel will next study whether or not muscle load increases with typing speed. Support for their research has been provided by the Johns Hopkins University through the Center for VDT and Health Research and gifts from the computer industry.

Martin and Rempel have collaborated on research projects throughout the ’90s. Their work will continue long-distance again, as Martin has returned to Ann Arbor’s Center for Ergonomics after a year’s sabbatical leave at the Ergonomics Laboratory in Richmond, California.

C OEH’s Labor Occupational Health Program (LOHP) has published Violence on the Job—A Guidebook for Labor and Management, a 108-page manual that helps employers and labor unions design effective violence prevention programs for the workplace.

Three workers die each day in the United States from violence in the workplace (usually during robberies). Homicide is the second leading cause of death on the job, after transportation accidents, and the leading cause of workplace death for women.

The message of the guidebook is that violence, like other safety hazards on the job, can be prevented. The manual, which details how labor and management can work together to set up a comprehensive prevention program, can be adapted to virtually any type of workplace. It includes:

• Statistics on workplace violence
• Components of a prevention program
• Case studies of actual incidents
• Checklists for identifying security problems and choosing preventive measures
• Surveys, forms, and other tools for designing an effective prevention program

John Howard, chief of Cal/OSHA, called the new guidebook “a valuable addition to the resources currently available to prevent workplace violence” and “a practical tool which employers and employees can use in developing strategies to prevent . . . workplace assaults.”

LOHP developed the guidebook with the help of a national review team of management, labor, and government representatives. The California Department of Health Services funded the project.

For more information or to order a guidebook at $15 (shipping included), call 510/642-5507.

Measuring muscle activity using a non-invasive technique can predict muscle force and be used to help people reduce the force they use during typing.
Researchers Explore Falls in Construction Work

There’s more to injuries from falls in construction work than might be expected, COEH researchers have recently found.

Assistant Professor Marion Gillen of COEH’s Occupational Health Nursing Program at San Francisco and her colleagues studied 255 construction workers who had been injured by falls on the job to evaluate the severity of their injuries and to learn what circumstances were associated with their falls.

Construction work is one of the highest risk occupations, with annual costs related to injuries estimated at $10 billion to $40 billion. Falls are the number one cause of death in the construction industry. Given the magnitude of this problem, studies of construction injuries are relatively rare.

Gillen’s team documented 518 injuries, including 61 extremity fractures, and four head injuries with five skull and facial fractures. Seventeen study participants (7%) were deemed permanently disabled and unable to continue working in construction. Another three percent did not return to construction work. The average height of a fall was nine feet, with a range of 35 feet.

The researchers found that the differences in the severity of the injuries among the workers could only be partially explained by the height of the fall and the surface on which a person landed. They also found that the increased severity of an injury correlated with a worker’s having non-union status or perceiving that the work climate was not safe—implying that non-union status or perceiving that the injury correlated with a worker’s having dangerous work practices, more likely to have received safety training when hired, more likely to have regular safety meetings, and less likely to perceive that taking risks was part of their job.

To measure the severity of the participating workers’ injuries, researchers used traditional injury scaling techniques, and they also measured how limited the workers were in their functioning after the fall. The highest injury scores were found in ironworkers and roofers, while the highest functional limitation scores were found in drywallers, lathers, and plasterers, followed by ironworkers. Drywallers and roofers lost the most time from work.

The measure of the workers’ limitations in functioning correlated moderately with days lost from work, indicating that this kind of measurement could prove useful to occupational health practitioners developing return to work programs.

Detailed descriptions of how the falls occurred suggested that relatively simple hazard control measures may have prevented some of the injuries.

Examples of such preventive measures include perimeter protection for roofs and floor edges, correct ladder placement and anchorage, guarding of floor openings, comprehensive housekeeping activities, inspection and maintenance of aerial lifts and ladders, proper scaffolding, and modified work practices.

“Why workers are injured and how physical hazards and behavior interact are not well understood,” Gillen said. “Multi-disciplinary research addressing engineering controls, education and training, product design, and human behavior offers the best chance of achieving meaningful and sustained injury prevention results for construction workers.”

Gillen is continuing her research into injury prevention in construction by developing a model safety and health program for small construction companies.

Besides Gillen, the research team included Julia Faucett, director of the Occupational Health Nursing Program, James Beaumont, associate professor of epidemiology at Davis, and Elizabeth McLaughlin, director of prevention, at the San Francisco Center for Injury Prevention and Research.

LOHP

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reached 400 students in four high schools to date.
• Launched a peer education program at Oakland Technical High School through which 11 specially trained juniors and seniors have provided workshops on workplace hazards, rights on the job, and techniques for addressing health and safety concerns. The peer educators reached over 200 students in the 1996-97 school year and more than 300 teens in summer work programs.
• Conducted workshops for parents at three high schools to raise awareness about health and safety issues for young workers.
• Asked employers to sign a “Letter of Commitment” stating their intent to provide health and safety training to young employees. More than two dozen employers have signed on.

In addition, LOHP has established a statewide study group to make policy recommendations and promote prevention strategies for protecting youth in the workplace. The study group is sponsored by the California Commission on Health and Safety and Workers’ Compensation. The results of the Oakland Young Workers Project and the two other NIOSH-funded projects will be disseminated nationally.
Lung Biologists Learn How Asbestos Injures Cells

COEH Scientists in the Lung Biology Center at UCSF have made three linked discoveries that help to explain how asbestos fibers damage cells and start them down a path that may eventually lead to cancer.

Courtney Broaddus, associate professor of medicine at UCSF, and her team in the Lung Biology Center at the San Francisco General Hospital, have been studying asbestos and other fibers to see how they interact with the cells that line the lungs and how they injure these cells.

Three years ago, Broaddus and her colleagues found that vitronectin, a protein in the body fluids, plays a direct role in causing cell damage from asbestos. The vitronectin coats the asbestos fibers. Then, by binding to integrins on the surface of cells, it causes the cells to gobble up quantities of the asbestos fibers. Integrins are receptors that signal the cell about its condition and its environment. The interaction with the vitronectin makes the cell eat more fibers than it normally would.

Suspecting that the ingested fibers were damaging the cells, the researchers next studied how the body might protect itself. They focused on a phenomenon called programmed cell death—or apoptosis (pronounced a-po-toh-sis)—by which a cell kills itself when harmed. At first, the cell stops its normal functioning and tries to repair the damage, but, if the damage is too great, it withers away; its DNA becomes chopped up; and its remains are eaten by surrounding cells. Apoptosis is a normal part of bodily function and development. It protects the larger organism by eliminating abnormal cells that are not critical, without causing inflammation or injury to surrounding cells.

“We discovered that, if you put asbestos fibers on mesothelial cells (cells that line the lungs) in a culture, 10 to 20 percent of those cells will undergo apoptosis in a 24-hour period, presumably because of the DNA damage induced by the asbestos,” Broaddus said. “The cells couldn’t repair the damage and turned off the lights—they committed suicide.” Having discovered that the asbestos fibers caused programmed cell death, the researchers turned to the next question: How does the vitronectin coating affect apoptosis?

“We fully expected that the vitronectin-coated fibers would kill the cells more—that the cells would take up the fibers more, and they would die,” Broaddus said.

Instead, to their surprise, the researchers found that the vitronectin inhibited the cells from dying.

By binding with the same integrin involved in increasing the number of toxic fibers going into the cell, the vitronectin was also blocking the invaded cell’s natural programming to destroy itself and signaling to the cell that it should continue to live.

With this evidence in hand, Broaddus and her colleagues are continuing their research with cells and laboratory animals to show that cells invaded by vitronectin-coated asbestos fibers accumulate DNA damage, develop more mutations, and start off on a multistep pathway that eventually leads to cancer. Their preliminary results point in this direction.

Broaddus is particularly interested in asbestos, but she has found that her research is relevant to other kinds of toxic injury, like cigarette smoking. Her work at the cellular level may eventually help to explain how deadly cancers like mesothelioma develop over several decades in people who have been exposed to large doses of asbestos. It may indicate how to block the negative effects of vitronectin. It may explain why some particles are more toxic than others, and it has relevance to decisions about the safety of fibers used in industry, manufacturing, and construction.

How Asbestos in the Air Becomes a Problem in the Lungs

When a person inhales an asbestos fiber, the fiber settles in the airway of the lung or deeper down in the air spaces, where it lands on the liquid in the lungs. Then, presumably, with every breath, the fiber works its way through to the cells lining the lungs. It’s like a little needle that works its way out to the pleural space, and it doesn’t take too long to do so—a week or two. The fiber is likely to be coated with vitronectin this whole time. Once a protein binds on, it’s hard to get it off, like egg on a plate. Inside the cell, the asbestos fiber is toxic.
Researchers Find High Particle Levels in Bangkok’s Air

Berkeley researchers have found that people who live and work in a busy Bangkok shopping district are exposed to relatively high levels of pollution from particles in the air.

In the first study of both indoor and outdoor exposure to particulate air pollution in Bangkok, the researchers measured air quality in a shopping district and a university campus, including households in the shopping district and a university dormitory. Their research is part of a study supported by the World Bank to assess the health effects of particulate matter (PM) in Bangkok’s air.

Almost all studies of air pollution to date have been carried out in developed countries. Feng Tsai, a doctoral student in environmental health sciences, and her research advisor, Kirk Smith, associate director of International Programs for COEH, were part of a team applying exposure assessment and epidemiological techniques to learn more about air quality and its health effects in the Thai capital.

Air pollution is typically measured outdoors, yet, throughout the world, people spend most of their time indoors. Consequently, to understand people’s total exposure to air pollutants, one must measure indoors as well. Furthermore, to understand the relationship between indoor and outdoor pollution, one must measure both environments simultaneously. Tsai and her Thai collaborators examined this relationship by gathering data for PM$_{10}$ and PM$_{2.5}$ from streetside monitoring stations as well as from measuring devices placed in households and in the university dormitory. PM$_{10}$ refers to particulate matter with diameters less than 10 microns (millionths of a meter), a size range believed to cause harm to the respiratory system. This size is currently the basis of the United States and Thai standard for outdoor air quality. In addition to this existing standard, the United States is proposing an additional standard for PM$_{2.5}$. Particulate matter of this smaller diameter penetrates the lungs more easily and is potentially even more hazardous to health.

The research showed that the total exposure for people in the shopping district over the six weeks of sampling averaged 180 micrograms per cubic meter of PM$_{10}$, which is 3.6 times the outdoor standard currently used by both the United States and Thailand (50 micrograms per cubic meter averaged over a year.)

Tsai and her colleagues found that the day-to-day fluctuations of the indoor PM levels correlated well with the day-to-day changes in the outdoor levels. Since epidemiological studies associate changes over time in outdoor PM concentration with changes over time in observed health effects, these results imply that it is appropriate to make such an association in Bangkok. The team found, however, that the outdoor monitors substantially underestimated actual indoor PM exposures. Consistent with previous studies, the research showed that smoking and use of charcoal stoves increased indoor PM levels.

Team members included Lauraine Chestnut of Hagler Bailly Services, Inc., Boulder, Colorado; Bart Ostro of the California Environmental Protection Agency; and Nuntavarn Vichit-Vadakan, Jitsiri Thanapatra, Adit Laixuthai, and Wichai Aekplakorn of the College of Public Health, Chulalongkorn University, Bangkok.

Ultimately, the researchers hope their work will help to explain and prevent health hazards associated with exposure to pollutants in the air.

COEH Director Honored

In recognition of COEH Director Robert Spear’s contributions to the schistosomiasis research program of the Sichuan Institute of Parasitic Disease, Director Yawei Chen awarded him an honorary professorship during a recent visit to China.
Alumni Profile

Mary Wampler—Paying Attention Pays Off

The University of Nebraska Medical Center had no occupational health program before it hired Mary Wampler as its medical director of Occupational Health Services. Employees injured on the job were referred outside for care. When Wampler arrived in the fall of 1995, she found herself almost immediately in charge of employee health services, and her responsibilities quickly grew to include treating hospital employees with workers’ compensation injuries. The program she developed has improved service and saved the hospital thousands of dollars.

“We didn’t do anything all that remarkable, except we started paying attention to what was happening, which made all the difference,” Wampler said. “We started doing case management, and we worked hard with other departments to get people back to work in modified duty positions so that they wouldn’t be missing so much work, which ends up being better for the injured employee as well as for the institution. Just those two things saved the hospital quite a lot of money.”

Specifically, in 1994, the last full year before Wampler’s position was created, the medical center paid an average of $61 per claim for lost wages. In 1996, the first full year in which Wampler’s department handled about 85 percent of the workers’ comp injuries, the average reimbursement for these cases dropped to $21 per claim, and lost time went to practically zero.

Wampler oversaw the cases herself for the first year, before hiring a case manager. The case manager orchestrates an injured employee’s experience from day one, manages all the information about the patient’s status, coordinates with everyone involved, answers questions, and generally smooths the path all along the way, so that care is provided efficiently and the employee knows that someone is interested.

Health Evaluations

Another part of the program that Wampler and her staff take very seriously is the health exam and evaluation they make when a new employee has been hired but has not yet started work. “These evaluations are routine in my field to make sure a person can do the job for which they’ve been hired without getting hurt. If someone is at high risk, we try to make very certain that the new job will be structured with restrictions that prevent injury, or we recommend that an employee be placed in a different position,” Wampler said. “I like to think that we’re keeping people from being injured and saving money by preventing injuries that are ready to happen.”

Case management, pre-placement evaluations, and on-going liaison with the departments are “all tried and true methods,” Wampler said. “We just paid attention to what was needed. Anyone could achieve good results by instituting these same methods. What we did was not rocket science. I’ve learned that these things really do work, which is nice, and I’ve learned the value of having a really good case manager on board. You have to be willing to spend money on staffing, but the program can pay for itself.”

She attributes knowing what was needed to her fellowship at San Francisco. “Having the specialty in occupational and environmental medicine made the difference,” she said.

Announcements

Bach Named Acting Director

Joel Bach, a member of the research faculty at UCSF, is serving as acting director of COEH’s Ergonomics Laboratory at the Richmond Field Station, while Director David Rempel is in Sweden on sabbatical leave for the academic year. Rempel is studying the cellular mechanisms of carpal tunnel syndrome. Bach may be reached at 510/231-5720.

New Home for LOHP

The Labor Occupational Health Program is moving on October 15 to new quarters on the fourth floor of the former UC Berkeley Extension building at 2223 Fulton Street. The move will bring LOHP physically closer to the rest of COEH and the School of Public Health, and will provide much needed space for their growing program. They have expanded from a staff of eight 20 years ago, to a staff of 21 today. Being closer to BART and across the street from a public parking lot will provide better public accessibility to their health and safety library. Their phone number remains the same (510/642-5507). Watch for news of an Open House in December.
Dear COEH,

I am currently enrolled in the Industrial Hygiene master’s program at Berkeley after having spent the last 15 years in the labor force of the emergency services. Many of these years were spent working in the labor movement as a rank-and-file organizer, staff representative, local union president, etc. Thus, my views and my interest in occupational safety and health come from fairly deep roots in the rank-and-file workforce.

I see two pressing areas that would help COEH meet the needs of our nation’s workforce:

• Implementation of a worker-friendly extension program
• Research, teaching, and advocacy around emerging and ongoing occupational safety and health problems internationally

I spent about five years trying to figure out how to attend the MPH program and still raise my family. I finally realized the only option available was to quit my job as a firefighter/paramedic and return to school full-time. This was only possible with the NIOSH funding, but, even with this, the strain on my family has been significant. The schedule is suitable only for full-time, non-commuting students with no family responsibilities. COEH needs to make public health education accessible to a broader range of people, particularly given that public health, and especially occupational health and safety, is often a second career for people. I see a deep need in the rank-and-file workforce for high-quality education in occupational health and safety (that is, more than a two-day course). Such training would offer a continuum from certification to an MPH. Workers need training in health and safety rights, regulations, toxicology, industrial safety, air quality, how to inspect the workplace, etc. Such a program could be offered through a series of weekend or evening courses.

The ever-accelerating pace of globalization means that COEH needs to begin taking seriously occupational safety and health concerns in developing countries. We are at a critical juncture historically in that many nations are at the early stages of industrial development and, as such, are repeating the same problems (and tragedies) experienced by industrial nations nearly 100 years ago. The lack of an international regulatory body requires that we follow and document emerging problems in places where businesses are locating production facilities. This information is needed before any steps can be taken to establish international standards for the work environment; i.e., we need to know if a problem exists.

—Michael Wilson

Call for Comments

As COEH plans for the future, we invite you to send us your observations and experience about changes affecting occupational and environmental health services so that we can adjust our educational, research, and service programs to meet the needs of our nation’s workforce. We will edit any letters or e-mail comments we publish to 250 words or less.

—Bob Spear
Director
C OEH is offering the following courses, made possible in part by funding from the National Institute for Occupational Safety and Health (NIOSH). CE credits are available to occupational safety and health professionals. Unless another reference is given, contact Annette Varela at 510/231-5645 for further information, including locations not listed. You may also obtain course information and register on-line by connecting to the COEH Continuing Education World Wide Web site: http://socrates.berkeley.edu/~coehce/

Bi-Weekly and Monthly
Grand Rounds: Current Topics in Occupational and Environmental Medicine
Sacramento contact: 916/752-3317.
San Francisco (2nd & 4th Thursdays of each month), Santa Clara and Berkeley (3rd Wednesdays of each month). Contact Deborah Silva: 415/206-8950 or e-mail: dsilva@sfghoem.ucsf.edu

Bi-Weekly
UC Agricultural Health and Safety Seminar Series
Contact Gala Crouch: 916/752-3627

October 22-24, 1997
Workplace Epidemiologic Surveillance, UCSF Millberry Conference Center, San Francisco

October 27-31, 1997
Fundamentals of Industrial Hygiene, Bay Bridge Holiday Inn, Emeryville

November 6-7, 1997
Essentials of Safety Management, Bay Bridge Holiday Inn, Emeryville

November 20, 1997
Pesticide Emergency Response, UC Berkeley Richmond Field Station, Bldg. 445

December 2, 1997
Industrial Hygiene Forum Series (cosponsor AIHA-NCS), UC Berkeley Richmond Field Station, Bldg. 445

December 4-5, 1997
Office Ergonomics (cosponsor Univ. of Michigan), Park Plaza, Burlingame

February 3, 1998
Industrial Hygiene Forum Series (cosponsor AIHA-NCS), UC Berkeley Richmond Field Station, Bldg. 454

March, 1998 TBA
Comprehensive Review of Industrial Hygiene, Honolulu, HI

March 16-17, 1998
Fundamentals of Workplace Safety

March 16-20, 1998
Fundamentals of Industrial Hygiene

March 16-20, 1998
Comprehensive Review of Industrial Hygiene

March 18, 1998
Functioning As An Expert Witness

March 18, 1998
Environmental Health and Safety Management

March 19-20, 1998
Fundamentals of Environmental Compliance

Center for Occupational and Environmental Health

Located on the Berkeley, San Francisco and Davis campuses of the University of California, COEH trains occupational and environmental health specialists in medicine, nursing, toxicology, epidemiology, policy, ergonomics and occupational hygiene. It also conducts research and facilitates exchange of information and experience among labor, industry, and the academic community to better serve the working population. In 1982, it was designated an Educational Resource Center (ERC) of the National Institute for Occupational Safety and Health (NIOSH). The COEH Newsletter is published quarterly and made available at no charge.

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