

Casting a Wider Net:

SOLVING ENVIRONMENTAL THREATS TO HEALTH HAS NEVER BEEN MORE COMPLEX – OR MORE IMPORTANT. THE NEW CEQH IS POISED TO MEET THE CHALLENGE.



Centers for Environmental Quality & Health Stress Teamwork

Air pollution, environmental toxins, and worker health and safety are among the many issues the CEQH is addressing through its research, training and community outreach.

For researchers seeking to identify and mitigate environmental threats to health, the challenges have never been more profound. Increasingly, pinpointing the dangers and developing solutions to these complex problems has become an impossible job for any one scientific discipline. With that in mind, the UCLA School of Public Health has marshaled the participation of a wide range of experts from across the UCLA campus and beyond.

The newly formed Centers for Environmental Quality and Health (CEQH) aims to expand the scientific knowledge base, provide top-notch training of graduate and undergraduate students to address these issues, and interact with Southern California communities and policy-makers in translating research findings into appropriate actions. “The CEQH strongly enhances our ability to conduct multi-disciplinary research, training and community outreach,” says Dr. John Froines, professor of environmental health sciences at the school and CEQH director.

Researchers in an individual discipline can learn something about a problem, but moving toward a solution requires broader expertise, Froines explains. This type of team effort has already taken hold in many of the CEQH’s centers. For example, the Southern California Particle Center and Supersite (SCPCS) links exposure measures and characterization of the responsible particles and chemicals with epidemiology, toxicology, and human clinical studies. The CEQH will make such efforts easier, and Froines believes it will facilitate additional steps. “One of

our priorities will be to link with people in fields such as economics, law, business management, and work organization, because when you get down to addressing problems, it's not just the scientists who are central – it's also the legal/policy/economic side," he says.

The CEQH is focusing on issues of particular interest to policy-makers and regional planners in California. Recently, a study led by Dr. Beate Ritz, associate professor of epidemiology at the UCLA School of Public Health and faculty member of the CEQH's Center for Occupational and Environmental Health (COEH), found that pregnant women living close to heavily traveled highways are at greater risk for adverse birth outcomes, including preterm birth and low birth weight. Ritz's group is following up with more precise risk estimates based on truck-related traffic and the influences of meteorology.

Dr. Wendie Robbins is also looking at adverse birth outcomes resulting from environmental and occupational exposures, but, while Ritz's epidemiologic studies focus on large population samples, Robbins, assistant professor in both the School of Nursing and the School of Public Health, works in the laboratory evaluating human sperm cells for chromosomal abnormalities. She recently found that exposure to air pollution and tobacco smoke can lead to aneuploidy of the sex chromosomes – subtle changes suggesting the need for further study. Aneuploidy can be transmitted to the offspring through sperm, and is the largest single genetic cause of mental retardation and developmental disabilities in humans.

By casting a wide net in terms of its scientific expertise, the CEQH will ensure that its research methods as well as the problems it studies will remain at the scientific cutting edge, Froines says. One particularly intriguing area for future study is the emerging field of nanotechnology, a new frontier of science that exploits the fundamentally unique properties of materials roughly 75,000 times smaller than the width of a human hair. From chemical sensing, optics and electronics to computers and medicine, nanotechnology is expected to bring revolutionary advances. But it also could come with unanticipated health implications. The SCPCS already conducts research on nanoparticles; recently, Froines and colleagues reported that ultrafine particulates, the smallest airborne pollutants produced by automobile and diesel truck exhaust, can cause severe damage to human lung cells. Froines expects CEQH scientists to move further into the field of nanotechnology as it affects occupational and environmental health.

But at the same time that they explore new areas, the centers will continue to emphasize research and training in the existing problems that aren't going away, including air pollution. "We have a long-term commitment to studying air pollution in the basin and throughout California," says Froines. One recent example of the importance of this work came from a study that found that being on or within 50 meters downwind of a freeway dramatically increases one's exposure to ultrafine particles. Dr. William Hinds, professor of environmental health sciences and lead author of the project, is following up with a study of indoor air quality in apartment buildings adjacent to freeways. Hinds is measuring carbon monoxide, nitrogen oxides, and the size distributions of ultrafine particles outside and inside of the apartments to determine how much protection a building provides against ultrafine particles.

The traditional focus also includes worker health. The COEH was established in 1978 with a mandate from the California Legislature to increase the state's commitment to occupational health through research and training. The UCLA Labor Occupational Safety and Health (UCLA-LOSH) Program, part of the COEH, teams with workers, unions, community-based organizations, academics and health professionals to improve environmental health and safety conditions for workers, with a special emphasis on those in Southern California. The program has focused many of its research and outreach efforts on particularly vulnerable groups. For example, classes on workplace health and safety are offered for Spanish-speaking workers in an effort to fill a substantial unmet need, according to Marianne Parker Brown, the program's director and a lecturer in the School of Public Health. "Many of them don't know they have a right to a safe workplace, and don't know where to turn if they have problems," she says. LOSH also has worked with local school districts to develop a curriculum on worker safety for teens, who have among the highest injury rates in the workplace. Since 1987, LOSH has provided health and safety training for hazardous waste workers.

UCLA's CEQH also includes the Southern California NIOSH Education and Research Center, one of 16 multidisciplinary centers in the United States supported by the National Institute for Occupational Safety and Health for education and research in the field of occupational health. The center, directed by Hinds, supports graduate degree programs in industrial hygiene, occupational medicine



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—Dr. John Froines

and occupational health nursing. Research projects examine everything from exposure to potential toxins in the workplace to the ergonomic problems facing certain occupations and detection and prevention of job-related psychosocial stress factors.

The CEQH multidisciplinary focus will strengthen these types of studies, says Dr. Philip Harber, director of the occupational medicine residency program of the Department of Family Medicine and the Southern California NIOSH Education and Research Center. Harber studies occupational respiratory epidemiology, assessing the risk of lung disease resulting from workplace exposures to materials such as coal, beryllium, and asbestos. He recently concluded a large study of the North American carbon black industry to esti-

disease, taking advantage of more than three decades of data collected as part of California's mandate on reporting commercial and agricultural pesticide use.

The CEQH also includes an increasing emphasis on international issues, which can often help researchers to better understand problems at home. With funding from NIOSH, Robbins is leading a team examining the reproductive effects of occupational exposure to boron in male workers who mine the element in Liaoning Province, China, where exposure levels are reported to be significantly higher than in the only boron mining plant in the United States, U.S. Borax in California. Animal studies have found that certain levels of exposure to boron can cause testicular atrophy; human studies to determine whether boron is a reproductive toxicant have been inconclusive – perhaps, Robbins suggests, due to the limited range of exposures that have been evaluated. “If we can determine what the toxic level is, that information can be used to protect workers all over the world,” Robbins says.

Similarly, Dr. Zuo-Feng Zhang, professor of epidemiology, has joined with Froines and others to study the possible link between air pollution and lung cancer, comparing data collected in Los Angeles and the Chinese city of Taiyuan, where air pollution levels have been found to be approximately 10 times worse than in Los Angeles. “When you're looking at low environmental exposure with small variations in one population, it is very hard to link the exposure to the risk of the disease,” Zhang explains. “International comparisons allow us to make greater contrasts to see important effects.”

The international emphasis is also important in the context of globalization, Froines notes. “On top of the significant air pollution problem that we already have in Los Angeles, we have this expanding port in Long Beach where products made in China, the Philippines and other nations are being brought in and transported to other cities,” he says. “It's anticipated that globalization is going to triple the number of diesel trucks on the 710 freeway leading out of Long Beach, resulting in tremendous concentrations of ultrafine particles for the dozens of surrounding cities, as well as more pollution problems for the entire basin.”

Froines expects that the CEQH will take a more active role in discussions on how to solve that and many other environmental problems that affect the quality of life in Southern California. “We now have the infrastructure in place to be able to identify progressive directions that make Los Angeles more livable,” he says. “We shouldn't lose sight of our initial missions, but we also can and should look at the problems in a much broader way than in the past.”



Members of the Southern California Particle Center and Supersite's Particle Instrumentation Unit are visited by colleagues from Mexico during a meeting in which they made plans for a future collaborative study.

mate the impact of the material as a guide to potential occupational health standards. “Teaming with other researchers in the CEQH can help to provide perspective on the implications of our work as it relates to exposure assessment and regulations,” Harber explains.

New environmental health problems are being identified and studied. The CEQH, in collaboration with UC Berkeley, was designated by the Centers for Disease Control and Prevention as a Center for Excellence in Public Health Tracking – a partnership with the California Department of Health Services to monitor environmental hazards and create research-driven policy options for a national tracking system. The CEQH is also linking with UCLA's new Center for Genes, Environment, and Parkinson's Disease, one of three such centers in the country funded by the National Institute of Environmental Health Sciences. Ritz, the UCLA center's co-director, is investigating the impact of exposure to pesticides suspected of playing a role in increasing the risk of Parkinson's