

Setting a Course for 2020: The HEI Strategic Plan

HEI's vision for 2015–2020, and beyond, is taking shape this fall in the *HEI Strategic Plan for Understanding the Health Effects of Air Pollution*. A revised draft version — based on extensive comments received from the institute's sponsors and others during and since the HEI Annual Conference last May — is now posted at www.healtheffects.org. This revised draft lays out in more detail what HEI intends to do over the next five years and adds a timeline for implementation. Comments are encouraged and very welcome.

One key theme of the suggestions received after the conference was that, while HEI needs to plan for specific actions to be taken in the next five years, it should do so with a clear eye on the much longer time frames for future air quality and climate decisions. Challenging air quality standards questions continue to arise around the globe as science evolves. And the timeline for decisions on technology to meet goals for greenhouse-gas emissions (e.g., for vehicles and stationary sources) is already extended to 2025. Given these realities, the HEI Strategic Plan is built around one overarching theme: “Informing Air Quality and Climate Technology Decisions for 2015–2020 ... and Beyond.” The revised draft plan integrates this theme into four core program elements:

- The Continuing Challenges of Multipollutant Science
- Accountability and Transparency
- Assessing Emerging Fuels and Technologies, and
- Global Health Science.

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Wanted: New Epidemiologic Studies

HEI Solicits Proposals to Examine Long-Term Effects of Low-Level Pollution

Late this fall, HEI will issue a request for applications (RFA 14-3) for studies to assess the health effects of exposure to low levels of air pollution, including all-cause and cause-specific mortality and morbidity from chronic disease and respiratory infection. Applicants will be asked to propose studies that would provide evidence regarding the potential adverse effects of pollutants — such as PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5 μm or smaller) — at low levels currently prevalent in developed countries. In addition, small-scale studies to develop methods for conducting such research will be considered responsive to this RFA. HEI's goal is for the new studies to help inform critical future policy decisions regarding air quality standards and guidelines designed to protect public health.

Ambient air pollution levels have generally declined in North America, Western Europe, and other developed regions as a result of air quality regulations, improvements in vehicular technology, and controls on energy production. Nonetheless, concern persists about the potential adverse health effects of long-term exposure at lower levels, and additional investigation is needed into the potential effects at and below current air pollution levels. To date, policymakers and risk-assessment experts have taken a variety of approaches to estimating adverse effects from low levels of ambient air pollution — for example, by designating a threshold below which no risks are assumed, by estimating effects without using a threshold, or by using, as a cutoff point, a “policy-relevant background.”

In June, several leading air pollution researchers attended an HEI workshop to discuss the work required in this area (see *HEI Update*, Summer 2014). These experts emphasized that large studies will be needed to assess health effects at low pollutant levels — larger than most studies conducted to date. Investigators could achieve the necessary number of observations by combining existing studies or by using data from very large populations. Such data could be obtained from, for example, the administrative databases of census bureaus or health insurance programs. The HEI studies will need to develop methods to

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Progress on Major Ozone Study

HEI's Multicenter Ozone Study in Elderly Subjects (MOSES) has been examining the effects of controlled exposures to low concentrations of ozone on the cardiovascular system in men and women 55 to 70 years old. On July 22, two principal investigators from each of the four MOSES centers and Maria Costantini of HEI met in Chicago, Illinois, to discuss and finalize the penultimate draft of the study's data-analysis plan and start preparing for writing the final report. The meeting was led by Mark Utell of the University of Rochester

Medical Center (URMC) in Rochester, New York, who chairs the MOSES Oversight Committee. Pictured, clockwise from front, are investigators Philip Bromberg of the University of North Carolina–Chapel Hill (UNC); Eric Gerstenberger and Anne Stoddard, both of the New England Research Institute in Watertown, Massachusetts; John Balmes and Mehrdad Arjomandi, both of the University of California–San Francisco; Utell; David Rich of URMC; Milan Hazucha of UNC; and Mark Frampton of URMC. [HEI]



PHOTO BY MARIA COSTANTINI

HEI SOLICITS STUDIES (Continued from page 1)

estimate the exposure of large populations at relevant spatial and temporal scales in geographic areas characterized by relatively low ambient concentrations. They also will need to quantify exposure measurement error and adjust for it, if possible, and to pay careful attention to controlling for the confounding effects of other risk factors, such as smoking.

Before funding full studies, HEI plans to ask for preliminary applications so as to evaluate the feasibility of the proposed studies. The HEI Research Committee will review these preliminary applications and decide whether full applications are warranted, whether other populations or researchers should be added to the study proposal, and whether preliminary applications received would be best combined using a common methodology for characterizing exposure and health. HEI will ask for full proposals from the successful team or teams. A final funding decision will be made in the fall of 2015. [HEI]

Details on RFA 14-3 will be available in the late fall on HEI's Web site at www.healtheffects.org/funding.htm. For more information contact Hanna Boogaard, jboogaard@healtheffects.org, or Aaron Cohen, acohen@healtheffects.org.

NEW HEI RESEARCH REPORT

How PM May Affect Epithelial Cell Differentiation

Exposure to particulate matter (PM) from combustion sources has been associated with lung inflammation and injury, which trigger repair responses to restore normal tissue function. Disturbance of these responses can result, over time, in fibrotic changes that can cause tissues to stiffen and impair gas exchange. Fibrosis in the lung can be progressive and fatal and is also a feature of chronic pulmonary diseases, such as asthma, so it is important to understand the underlying mechanisms, and whether exposure to fine PM (PM ≤ 2.5 μm in aerodynamic diameter) might enhance them. Such was the motivation for a three-year study by Thomas H. Barker of the Georgia Institute of Technology and Emory University in Atlanta — a recipient of HEI's Walter A. Rosenblith New Investigator Award — and his colleagues. Their results

will appear in the forthcoming HEI Research Report 182, *Synergistic Effects of Particulate Matter and Substrate Stiffness on Epithelial-to-Mesenchymal Transition*.

In its independent review, the HEI Health Review Committee noted that the study by Barker and colleagues highlights the potential importance of cell–matrix interactions when evaluating the effects of environmental triggers and provides a basis for future research. Considerable work will be needed to confirm these initial observations, understand the mechanisms, and determine whether they are relevant to in vivo processes and the development of fibrosis. [HEI]

Research Report 182 will soon be available for downloading, free of charge, at <http://pubs.healtheffects.org>; printed copies can be purchased from HEI. For more information, contact Maria Costantini (mcostantini@healtheffects.org).

STRATEGIC PLAN (Continued from page 1)

The draft plan also includes a “Mid-Plan Review” to assess progress, scope out the continuing and likely future policy directions, make adjustments to ensure that HEI is attuning its work to the greatest science and policy needs, and, most important, begin to map out a longer-term plan — *Vision 2020* — for HEI.

“HEI looks forward to taking on board further comments from our sponsors, the scientific community, and the full range of stakeholders — and plotting a course for the future,” said HEI President Dan Greenbaum. [HEI]

Health Effects Institute

101 Federal Street, Suite 500
Boston, MA 02110-1817, USA
Phone: +1-617-488-2300
Fax: +1-617-488-2335
www.healtheffects.org

Richard F. Celeste, *Chair, Board of Directors*
Daniel S. Greenbaum, *President*

HEI is a nonprofit organization funded jointly by government and industry to research and evaluate the health effects of air pollution. An overview of HEI, information on its current research program, and all published HEI reports are available for downloading, free of charge, from the Web site.

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Communicating Results

Throughout the year HEI plays an important role at widely attended scientific meetings, whether it is presenting findings from the studies it has funded or coordinating sessions where scientists can share ideas and approaches relevant to HEI's work. Here are two recent examples.

ISEE Conference

At the International Society for Environmental Epidemiology (ISEE) conference in Seattle, Washington, this past summer, HEI scientist Annemoon van Erp and HEI Research Committee member Francesca Dominici, of the Harvard School of Public Health, chaired a symposium entitled "New Methods to Assess the Health Effects of Air Quality Actions." In a packed room they led a discus-

sion of novel approaches, including quasi-experimental methods and the use of causal models, and pointed out future directions for this emerging research field. HEI has been at the forefront of this area of research from its onset and continues to look for opportunities to move the field forward. In addition, HEI President Dan Greenbaum chaired a panel discussion on sharing research data while resolving confidentiality issues. Providing access to data from studies while protecting subject privacy is of growing interest throughout the scientific community, including the air pollution research community.

ISES Annual Meeting

This fall HEI scientists Hanna Boogaard and Maria Costantini organized, in collaboration

with Rob Beelen of Utrecht University, the Netherlands, and Jeff Brook of Environment Canada, two symposia at the International Society of Exposure Science (ISES) annual meeting in Cincinnati, Ohio, about approaches to detailed exposure characterization for use in epidemiologic studies. Ongoing and future efforts for enhancement of land-use–regression models and saturation and mobile-monitoring approaches were discussed; such methods are able to capture variation in air quality at a fine spatial scale. Investigators are applying these approaches to some of the recently funded HEI studies aimed at improving the assessment of near-road exposure to traffic-related pollution. 

HEI Launches New International Project

Institute Leads Expert Group Estimating Global Burden of Disease from Specific Air Pollution Sources in China, India, and Eastern Europe

With support from the William and Flora Hewlett Foundation and the Oak Foundation, HEI has initiated the Global Burden of Disease Major Air Pollution Sources (GBD MAPS) project. This new endeavor follows on HEI's work strengthening scientific capacity in the developing world since 2001 and entails a multi-year collaboration among HEI and the Institute for Health Metrics and Evaluation (IHME) at the University of Washington–Seattle; Tsinghua University in Beijing, China; the University of British Columbia in Vancouver, Canada; and other leading academic centers.

GBD MAPS scientists will build on the work of the broader Global Burden of Disease (GBD) project, a comprehensive effort, coordinated by IHME, to estimate the loss of healthy life due to more than 200 diseases and 72 risk factors in 188 countries. To achieve this goal, GBD provides rigorously conducted, peer-reviewed analyses involving multiple institutions and more than a thousand investigators worldwide. The GBD 2010 study estimated that exposure to ambient fine-particulate air pollution contributed to 3.2 million premature deaths in 2010, with two-thirds of those deaths occurring in China, India, and the other developing countries of Asia and with large burdens found in Eastern Europe as well. (The 2010 results and subsequently released data appear at www.thelancet.com/themed/global-burden-of-disease.) Beginning with GBD 2013, estimates will be updated annually. Producing and communicating rigorous estimates of the burden of disease attributable to ambient air pollution from specific major sources will help inform actions to reduce air pollution while also informing steps to reduce greenhouse-gas emissions that contribute to climate change.

Using the GBD framework, investigators for GBD MAPS will estimate the burden of disease attributable to ambient air pollution from coal burning and other sources in China, India, and Eastern Europe and will prepare a series of reports timed to inform anticipated policy decisions in these locales, including the Chinese government's next Five-Year Plan. The ultimate objective is to apply methods developed and tested intensively as part of GBD MAPS



Smog over Beijing, China.

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to the study of multiple air pollution sources on a global scale and integrate them into future GBD estimates.

The GBD MAPS project will be designed and conducted by a working group cochaired by HEI Review Committee member Michael Brauer of the University of British Columbia and HEI Principal Scientist Aaron Cohen. The group's investigators are international experts in source-specific air pollution emissions, atmospheric modeling, and burden-of-disease assessment. HEI is also assembling a high-level international steering

committee to advise the working group on technical issues, the relevance of their findings to regional decisions, and communication of the project's results to national leaders. The committee will be composed of global experts on health, energy, emissions, and other pertinent fields.

The new project is off to a strong start following the first meeting of the working group, which Tsinghua University hosted in mid-September. The meeting included a workshop on current research on the health effects of coal burning in China that was attended by more than 20 representatives of major Chinese air pollution research institutes and agencies — the Chinese Academy of Environmental Planning, the Chinese Center for Disease Control and Prevention, and the Ministry of the Environment — and prominent nongovernmental organizations, along with Peking University and other academic centers. GBD MAPS will focus its initial work in China and release its first source-specific health-impact analysis early in the summer of 2015. 

For more information on GBD MAPS contact Aaron Cohen (acohen@healtheffects.org) or Robert O'Keefe (rokeefe@healtheffects.org).



Health Effects Institute

101 Federal Street, Suite 500
Boston, MA 02110-1817

Panel Tours Gas Well Sites

In early September, HEI's Special Committee on Unconventional Oil and Gas Development in the Appalachian Basin examined a drilling operation (pictured) and a hydraulic fracturing operation, both in southeastern Ohio. The purpose of the site visits was to inform committee members about current industry practices for developing natural gas wells in shale formations. During the tour the committee also inspected a system for computerized monitoring of fracturing and leak detection and other key features of natural-gas well operations. Below are some of the committee members with HEI Senior Scientist Donna Vorhees (right) and HEI Vice President Robert O'Keefe (fifth from left). A complete list of the committee members and further information about this special HEI project, which Vorhees is coordinating, appear at www.healtheffects.org/UOGD/UOGD.htm (see also *HEI Update*, Summer 2014). 



The natural gas well on this well pad extends for approximately 16,000 feet, including both its vertical and horizontal segments, into the Utica Shale.

