“There is a rare combination of political will and financial support from the European Union. After I complete my studies, I want to be part of that effort.”

TYLER LANE
Master’s student, Department of Environmental Health

Tyler Lane has long been concerned about the environment and the impact of its degradation on human populations. Tyler combined a major in international relations with minors in environmental science and philosophy at the University of Virginia. Graduating in 1998, he went to Mauritania as a Peace Corps volunteer in the agricultural and forestry sector. "In Mauritania," he says, "so many public health issues—deforestation, pesticide exposures, nutrition—presented themselves firsthand."

In 2001 Tyler got a job with the Environmental Protection Agency as a chemical review manager. During his two-and-a-half years at EPA, Tyler was detailed for six months to the NAFTA Secretariat, harmonizing the pesticide regulatory activities of Mexico, Canada, and the United States. As a result of these experiences, Tyler realized that he wanted to move beyond regulatory work and needed a more technical background necessary to effect change.

Tyler decided to come to HSPH for a master's program in industrial hygiene, with a focus on hazardous substances. For his required internship, he plans to spend the summer and fall at the Institute for the Ecology of Industrial Areas in Katowice, Poland. Tyler feels that eastern Europe, where industrial contamination is high and regulation sparse, represents an extraordinary opportunity for environmental progress. "There is a rare combination of political will and financial support from the European Union," he says. "After I complete my studies, I want to be part of that effort."

DEPARTMENT OF ENVIRONMENTAL HEALTH

THE MISSION OF THE DEPARTMENT of Environmental Health is to advance the health of all people in the United States and around the world through research and training in environmental health. The department emphasizes the role of air, water, the built environment, and the workplace as critical determinants of health.

Faculty members in the department study the pathogenesis and prevention of environmentally produced illnesses and act as catalysts for scientifically based public health advances. Research approaches range from the molecular to the epidemiologic.

The Department of Environmental Health focuses on complex problems that require the contributions of many specialties. The department's faculty, research staff, and students reflect the multidisciplinary nature of the field and include chemists, engineers, epidemiologists, applied mathematicians, physicians, occupational health nurses, physiologists, cell biologists, molecular biologists, and microbiologists. Teaching and research activities of the department are carried out through four concentrations:

- exposure, epidemiology, and risk
- occupational health
- physiology
- population genetics

EXPOSURE, EPIDEMIOLOGY, AND RISK

The mission of the concentration in exposure, epidemiology, and risk is the investigation and mitigation of health risks associated with environmental and occupational hazards. The concentration addresses these environmental challenges to our society through an interdisciplinary approach. This involves the characterization of contaminant sources and environmental transport, identification of routes of exposure, investigation of health effects, and the employment of risk assessment and management strategies to minimize adverse outcomes.

Faculty members focus their research, and students acquire core competencies, in three domains:

- exposure, which emphasizes the chemical, physical, microbiological, and engineering aspects of environmental and occupational exposures. Faculty members study the transport and fate of environmental contaminants by measurement and modeling of ambient, indoor, and personal exposures to environmental and workplace contaminants. They also develop instruments and methods for collecting, analyzing, and assessing the effects of physical, chemical, and biological stressors.

- epidemiology, which focuses on identifying and measuring the influence of environmental factors (physical, chemical, and biologic) on human disease in communities to provide scientific evidence for sound environmental and health policies.

- risk assessment, involving the integration of evidence from exposure assessment, epidemiology, toxicology, and other disciplines to inform policy decisions in the presence of uncertainty. Faculty members are involved in research and training on analytic methods to quantify human health risks, with applications that include evaluations of new products, fuels, water supplies, technologies, remediation strategies, and development of policies to protect both ecological and human health.

In addition, students specialize in one or more of the areas of interest described below:

Environmental epidemiology This area is for students interested in measuring the influence of environmental factors (physical, chemical, and biologic) on human disease in communities to provide scientific evidence for sound environmental and health policies.

Environmental health management This area is geared toward midcareer professionals with interests in learning skills that can inform environmental policies in developing countries. Topics include environmental science, energy systems, epidemiology, risk assessment, resource management, and negotiation skills.

Ergonomics and safety This area provides a public health and engineering approach to the prevention of work-related injuries.

Exposure assessment This area of interest prepares students to identify and characterize human and ecological exposures to environmental contaminants, model fate and transport, and develop strategies to control environmental hazards, allergens, and pathogens.

Industrial hygiene This area of interest offers training in the anticipation, identification, evaluation, and control of occupational hazards.

Risk assessment This area provides an integrated education in environmental science, risk analysis, and decision science applied to environmental management.

Degree Programs in Exposure, Epidemiology, and Risk

The exposure, epidemiology, and risk concentration offers both 80-credit and 40-credit master of science (SM) programs in environmental health, including the 80-credit SM in industrial hygiene, as well as a program leading to the doctor of science (SD) degree.

All students must meet the school requirements for core knowledge in public health (for information about schoolwide requirements for master's and doctoral students, see page 58). In addition, both doctoral and master's students in this concentration take core courses in human physiology and toxicology, analytical chemistry and exposure assessment, environmental and occupational epidemiology, and risk assessment. Beyond the general core requirements, areas of interest have specific course requirements. Advanced courses in exposure, epidemiology, and risk are oriented toward specific pollutants or media (such as air, surface water, or groundwater). They may focus on monitoring, modeling, or the control of pollutants; health effects; or management, regulation, and policy.

Many students also take courses at MIT and at other Harvard schools, including the Kennedy School of Government and the Faculty of Arts and Sciences.

Master of Science in Environmental Health (80-credit and 40-credit programs)

Graduates of these professional programs assume positions in government, in private companies, or in research institutions. In the past few years some graduates have gone to work as scientists in environmental consulting firms, as industrial hygienists, or as academic and government researchers. Some are working for nonprofit community and international organizations, while others have gone on to pursue doctoral programs.

Applicants' personal statements should clearly state their preferred area of interest within the exposure, epidemiology, and risk concentration and the ways that the program will further their careers.

Applicants to the 80-credit program generally have undergraduate degrees and limited work experience. Consistent with the interdisciplinary nature of the concentration, a broad range of undergraduate or graduate degrees are acceptable. Among these are environmental science, physics, mathematics, biology, chemistry, engineering, geology, meteorology, and decision analysis. Applicants to the program are expected to have evidence of strong quantitative skills. Occasionally applicants with social science, business, or policy backgrounds are successful if they can demonstrate some academic background in math, chemistry, and biology. At times applicants are accepted conditional upon completing science and/or math courses.

Applicants with exceptional credentials (including postbaccalaureate degrees and/or professional experience) may request consideration for admission to a 40-credit SM program.

The exposure, epidemiology, and risk master's programs are based on a set of core courses in the first two semesters, followed by more specialized courses in the later semesters. Within these constraints students have some flexibility to change their focus within the program. Students enrolled in the 80-credit program in industrial hygiene follow the same general curriculum and may also elect a focus in hazardous substances, which involves several additional targeted courses and a related internship.

Doctor of Science in Environmental Health

Doctoral graduates are qualified for research and teaching positions in schools of public health and other academic institutions, in local and federal agencies, and in the private sector. Recent graduates have taken positions as junior faculty members; as research scientists with the Environmental Protection Agency, the National Institute for Occupational Safety and Health (NIOSH), the environmental division of Health Canada, and Taiwan's Institute of Occupational Health and Safety; and as staff scientists with the National Research Council, the Mexican Ministry of Health, and consulting organizations.

Applicants to the doctoral program normally have a master's degree in a related science or math field and strong scientific and quantitative skills. Admission into the doctoral program in all areas of interest depends upon demonstrated competence in the requirements for an SM program described above. Those applying to study industrial hygiene usually have several years of relevant work experience in addition to a master's degree.

Students interested in a research career in environmental epidemiology are encouraged to apply to the doctoral program in epidemiology with a minor in environmental health (see page 18).

Students with a strong interest in both environmental science and methodological aspects of the decision sciences are encouraged to apply to the environmental science and risk management area of interest for doctoral students. This program involves admission to both the Department of Environmental Health and the Department of Health Policy and Management and requires a double major. Students uncertain about whether their interests are better suited for the risk assessment area of the exposure, epidemiology, and risk concentration or the joint degree program should contact the concentration for clarification.

Doctoral candidates are provided training in teaching and oral presentation. They serve as teaching assistants and receive training, evaluations, and academic credit for this work. They are also expected to present their research in departmental seminars. During the course of their program, doctoral students are encouraged to present papers at scientific conferences.

Depending on the specialty area, doctoral students may be funded either fully or partially through research or training-grant fellowships. National Institutes of Health (NIH) traineeships are restricted to doctoral students who are U.S. citizens or permanent residents. For students specializing in industrial hygiene, tuition support may be available through a NIOSH Education and Research Center Grant for highly qualified U.S. citizens.

Related Programs

Interdisciplinary concentration in genetic and molecular epidemiology, see page 56.

Contact Information

For more information about research and training in environmental science and engineering, please contact the exposure, epidemiology, and risk concentration, HSPH Landmark Center, Box 15677, 401 Park Drive West, Boston, MA 02215.

Applicants to the doctoral program are strongly encouraged to arrange an interview with faculty members. Please contact Avis Stiller, academic coordinator, exposure, epidemiology, and risk concentration, at the address above.
Phone: 617-384-8822
Fax: 671-384-8728
Email: astiller@hsph.harvard.edu

OCCUPATIONAL HEALTH

This concentration is designed to train occupational health and safety professionals to recognize and prevent occupational disease and injuries. Faculty members carry out research spanning a wide range of occupational health problems, with the broad objective of identifying and contributing to the reduction or elimination of job-related health hazards. Research topics include respiratory disease among exposed populations (including construction, auto, textile, and agricultural workers, workers exposed to particles, and building occupants); reproductive and chronic disease studies of populations exposed to petrochemicals, heavy metals, and persistent organic compounds; biological and chemical hazards assessment; epidemiology of acute injury and cumulative trauma disorders; occupational and environmental cancers such as lung, skin, and bladder cancer; biomonitoring and medical surveillance; occupational and environmental health research and training in developing countries; and occupational health policy and services research. Faculty members have been in the forefront of the development of biochemical, molecular, and genetic markers and their applications in epidemiologic studies of exposed populations. Additional areas of interest within this concentration include environmental molecular epidemiology and occupational epidemiology.

Degree Programs in Occupational Health

The training programs in occupational health are offered through the NIOSH-sponsored Harvard Education and Research Center for Occupational Safety and Health. As described below, the following programs are offered: master of occupational health (MOH); master of science (SM) in primary health care nursing (from Simmons College) and dual-degree SM in environmental health and primary health care nursing (from HSPH, in cooperation with Simmons College); SM in environmental health with a focus on occupational safety and health; and doctor of science (SD) or doctor of public health (DPH). For information about schoolwide requirements for master's and doctoral degrees, see page 58.

Master of Occupational Health (40-credit program)

This professional program is designed to train physicians in the public health disciplines relevant to the prevention and control of occupational disease and injury. Physicians interested in occupational and environmental medicine may apply either to the MOH program or to the occupational and environmental health concentration of the master of public health (MPH) program. Either the MOH or the MPH is taken as the first year of a two-year Occupational and Environmental Medicine Residency (see below).

For the MOH (or the MPH) program, in addition to schoolwide requirements, students take core courses in toxicology, ergonomics and human factors, occupational safety, occupational health policy and administration, the work environment, occupational and environmental medicine, environmental and occupational epidemiology, and the practice of occupational health. Recommended electives include the analysis of rates and proportions, regression and analysis of variance in experimental research, and the ethical basis of the practice of public health.

Master of Science in Environmental Health (80-credit and 40-credit programs)

The occupational health concentration emphasizes the epidemiologic and biostatistical aspects of this field. The SM is normally an 80-credit program, although an individual with a PhD or JD may be admitted to a 40-credit program. It is generally expected that students without a prior doctoral degree will wish to enroll in a subsequent doctoral program.

This program provides training appropriate for those who wish to work in research or teaching environments. Applicants normally have a bachelor's degree and advanced training in science, including college-level organic and inorganic chemistry. Those currently holding positions in the field of occupational safety and health and planning to return to these positions are considered particularly strong candidates for admission.

In addition to schoolwide requirements, students take courses in toxicology, pathophysiology, ergonomics and human factors, occupational safety, occupational health policy and administration, the work environment, environmental and occupational epidemiology, the practice of occupational health, advanced biostatistics, and ethics.

Master of Science in Primary Health Care Nursing (40-credit program)

This program is offered by the Harvard Education and Research Center and Simmons College, which awards the degree. The program is designed for registered nurses seeking preparation as occupational health nurse practitioners.

Applicants must have at least a bachelor's degree in nursing from a program accredited by the National League of Nursing, must show satisfactory completion of basic statistics and physical assessment courses, and must be registered to practice nursing in a U.S. state or territory.

Participants undertake practica in industrial settings, clinics, and hospital-based occupational health programs and complete a course at HSPH in occupational health policy and administration and courses at Simmons College in normal and abnormal human physiology, research methods, the theory and practice of primary health care nursing, the theoretical foundations for nursing practice, clinical pharmacology for nurses in ambulatory care,

health in the workplace, health care systems, and health promotion.

Master of Science in Environmental Health (HSPH) and Primary Health Care Nursing (Simmons College) (dual-degree, 80-credit program)

This dual-degree professional program emphasizes identification of health hazards, workplace assessment, program planning and intervention, worker health promotion, and disease and injury prevention. The program integrates curricula from HSPH and Simmons College, with courses taken concurrently at these institutions.

The program focusing on occupational health nursing is also aimed at preparing nurses for positions as occupational health nurse practitioners. Practice locations include workplaces/corporations, clinics (including occupational and environmental medicine facilities), and hospitals.

Applicants must have at least a bachelor's degree in nursing from a program accredited by the National League of Nursing, must show satisfactory completion of a basic statistics course, and must be registered to practice nursing in a U.S. state or territory. Nurses interested in this program must apply to, be accepted by, and maintain satisfactory academic progress in both schools.

Students in this program must fulfill essentially the same course requirements at Simmons College as those enrolled in the master of science in primary health care nursing (see above). At HSPH, in addition to schoolwide requirements, students take courses covering ergonomics and human factors, the work environment, occupational safety, and environmental and occupational epidemiology; a tutorial in toxicology; and two electives. Students must also complete an independent study project.

Doctor of Science in Environmental Health/Doctor of Public Health

The SD or DPH degree may be earned by students who wish to concentrate in occupational health. Applicants to the DPH program must hold an MPH and a prior doctoral degree.

In addition to schoolwide requirements, students in the doctoral program complete many of the same courses as those in the SM program (see above) and also courses in exposure assessment for epidemiology, biomarkers in chronic disease, and advanced epidemiology.

Some financial support may be available for doctoral students who are U.S. citizens or permanent residents through NIH National Research Service Awards, NIOSH or other traineeships, or scholarships.

COURSES OF INSTRUCTION

Please note that the courses listed are subject to change and some are not offered every year. Complete course descriptions are available at http://www.hsph.harvard. edu/registrar/courses.

Introduction to Environmental Health
Principles of Environmental Health
Human Physiology
Advanced Respiratory Physiology
Advanced Topics in Physiology
Occupational Health Policy and Administration
Introduction to Occupational and Environmental Medicine
Epidemiologic Basis of Occupational Health Standards
Occupational Safety and Injury Prevention
Ergonomics and Human Factors
Protecting Workers and Communities from Hazardous Substances
Ventilation and Indoor Air Quality
Evaluation and Control of Noise and Vibration
Introduction to Aerobiology
Water Pollution
Properties of Environmental Contaminants
Introduction to the Work Environment
Analytical Methodology and Exposure Assessment
Water Systems Management
Industrial Hygiene/Ergonomics Internship and Environmental Sciences Research Seminar
Exposure Assessment for Environmental and Occupational Epidemiology
Genetic Epidemiology and Gene-Mapping
Human Health and Global Environmental Change
Radiation Environment: Identification, Evaluation, and Control
Occupational Health Care Delivery
Injury Epidemiology and Prevention
Industrial Ecology and Life-Cycle Assessment
Research in Physiology
Properties and Behavior of Airborne Particles
Air Pollution and Energy Processes
Advanced Seminar in Aerobiology
Regulatory Toxicology
Environmental and Occupational Epidemiology
Respiratory Epidemiology
Advanced Regression for Environmental Epidemiology
Risk Assessment
Environmental Science and Risk Management Practicum
Independent Research, Tutorials

Occupational and Environmental Medicine Residency

The residency is a two-year program consisting of an academic year leading to the master of public health or master of occupational health degree and a practicum year devoted to the development of skills in clinical occupational and environmental medicine and epidemiologic research. During the practicum year acquired knowledge and skills are applied to patient management and workplace community problem solving; at least one short-term research project is designed, executed, and documented under faculty supervision. Field experience includes rotations through hospital- and community-based occupational and environmental health clinics. Additional rotation choices are available in corporate medical departments and governmental agencies. The residency is fully accredited by the Accreditation Council for Graduate Medical Education.

Applicants must be graduates of an approved school of medicine and must have completed at least one year of internship training in an accredited U.S. or Canadian clinical program; board eligibility or certification in a primary care specialty is preferred. Physicians currently holding positions in the field of occupational safety and health who plan to return to these positions are considered strong candidates for admission.

In addition to submitting an application to the degree program, prospective residents should send a letter of interest to the occupational health concentration, enclosing a curriculum vitae listing medical training and experience, research experience, and publications. Admission to the practicum year of the residency is a separate process from, and usually occurs shortly after, admission to the degree program. Applicants to the MOH program and the MPH program with a concentration in occupational and environmental health who are also applying to the Occupational and Environmental Medicine Residency program must apply by September 1, 2004, for 2005–06 matriculation. Continuation into the second year of the residency is contingent upon having had adequate prior clinical experience and exemplary performance in the didactic phase of the program.

Some financial support for residency candidates who are U.S. citizens or permanent residents may be available through traineeships.

Related Offerings

Environmental/occupational epidemiology area of interest, Department of Epidemiology, see page 18.
MPH concentration in occupational and environmental health, see page 53.

Contact Information

For more information about the occupational health concentration, MOH program, training in occupational epidemiology, and related offerings, please contact David C. Christiani, MD, MPH, SM, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1260
Fax: 617-432-3441
Email: dchristi@hsph.harvard.edu
Web: http://www.hsph.harvard.edu/erc

For more information about the Occupational and Environmental Medicine Residency, please contact Howard Hu, MD, SM, SD, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2790
Fax: 617-432-0219
Email: howard.hu@channing.harvard. edu
Web: http://www.hsph.harvard.edu/erc

PHYSIOLOGY

The concentration in physiology focuses on normal and pathological functions of organisms. It centers on the respiratory system, which presents an immense thin-surface area to the environment, and thus is an important route of entry and site of damage from toxins and infections. Areas of research include biomechanical properties of cells/tissue in normal/inflamed lungs; smooth muscle and airway constriction in asthma; mediators and adhesion molecules involved in pulmonary inflammation; effects of inhaled particles; lung infections; control of breathing in humans; sleep-related breathing disorders; respiratory sensations; and epithelial cell, macrophage, lymphocyte, and neutrophil lung biology. The biology is broadly based, ranging from molecular and cell biology to integrated organismic, environmental, and comparative physiology.

The physiology concentration integrates a range of scientific disciplines, including physics, bioengineering, physiology, biomathematics, cell biology, molecular biology, proteomics and genomics, clinical science, and epidemiology. By working within this rich interdisciplinary environment, students learn many measurement technologies, discover a variety of disciplinary approaches, and develop mature scientific thinking.

Degree Programs in Physiology

As described below, the concentration in physiology leads either to the doctor of science (SD) degree, offered through the Department of Environmental Health, or to the doctor of philosophy (PhD) degree, offered through the Division of Biological Sciences.

Doctor of Science in Environmental Health

Students wishing to study cellular, integrative, or engineering approaches as they pertain to problems in the environment, physiology, or public health may apply directly to the SD program in the Department of Environmental Health.

The SD program prepares students for research careers in respiratory physiology, cell and molecular biology, or bioengineering. Graduates assume positions as faculty members and research scientists at medical schools, research institutes, and schools of public health. Career opportunities in physiology as they apply to public health are expected to grow both in academia and in the biotechnology and pharmaceutical industries.

Applicants to the program generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics, and calculus. Students in this program follow a different curriculum from those in the PhD program. In consultation with their adviser, students design a program of course work with their specific objectives in mind. The program offers a firm foundation in the basic biomedical sciences, as well as in epidemiology and biostatistics, and provides the opportunity for students to engage in laboratory rotations. For information about schoolwide requirements for doctoral degrees, see page 58.

Most students admitted to the SD program receive a stipend, as well as tuition and health insurance support. Students are encouraged to apply for fellowships from outside sources since certain external fellowships provide higher stipends.

Doctor of Philosophy in Biological Sciences in Public Health (Physiology)

Students wishing to study cellular and molecular biology or physiology as it pertains to major problems in public health may apply to the PhD program offered by the Division of Biological Sciences through the Harvard University Graduate School of Arts and Sciences. The PhD program is designed to prepare students for research careers in respiratory physiology, cell and molecular biology, or bioengineering. For more information about the PhD program, see page 55.

Contact Information

For more information about research and training in physiology or about the SD program, please contact Jeffrey J. Fredberg, PhD, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-0198
Fax: 617-432-3468
Email: jfredber@hsph.harvard.edu

POPULATION GENETICS

The aim of the population genetics concentration is to consider the effects of genes, environmental risk factors, and the interaction of the two in the process for genetically complex diseases such as asthma, osteoporosis, diabetes, hypertension, nicotine addiction, and reproductive health.

Population genetics is a multidisciplinary field, combining various aspects of genetics, epidemiology, statistics, biology, medicine, and computer science; those who work in this field have equally diverse backgrounds. The concentration in population genetics is intended to provide candidates with ample training in all critical areas needed to carry on independent research in this field, including gene-mapping to identify the genetic loci and variants responsible for the genetic contribution to complex diseases; gene assessment to investigate the role of a particular (candidate) gene in disease pathogenesis; gene expression profiling to investigate the genes with differential expression in normal and disease tissues and in subtypes of diseases; analysis of gene-environmental interactions to investigate the relative contributions of genetic and environmental factors in disease manifestation; development of novel statistical methods and tools for genetic analysis; and development of databases and bioinformatics tools for data management and information extraction from public databases.

Investigators in the concentration are presently engaged in several large-scale studies of common, genetically complex human diseases. In addition, population genetics investigators collaborate closely on related studies in occupational health; exposure, epidemiology, and risk; and other programs in the Departments of Environmental Health, Epidemiology, Biostatistics, and Nutrition.

Degree Programs in Population Genetics

As described below, the concentration offers a doctor of science (SD) program. No master's degree programs are currently available.

Doctor of Science in Environmental Health

While the program aims to prepare every student for an academic career in research and teaching, graduates are well prepared for a variety of potential career paths. Opportunities for research careers in the private sector (for example, biotech and genetics/genomics companies) have increased greatly in recent years. Graduates have also found themselves to be highly sought by management consulting firms and other organizations requiring strong technical backgrounds and problem-solving skills.

Applicants to the SD program are required to have an undergraduate degree in any area of the natural sciences, and some research experience is desirable. Students from any branch of the life sciences are the most logical candidates, but the statistical foundations of population genetics make applicants with degrees in mathematics, physics, or chemistry highly competitive. Some familiarity with basic concepts of biology and genetics is recommended; the necessary fundamentals of biology, genetics, biochemistry, epidemiology, and medicine can be acquired through course work following acceptance. Highly motivated applicants from nonscientific fields may be accepted in exceptional circumstances.

In addition to the schoolwide requirements, doctoral students must complete 30 credits emphasizing population genetics, including elements of epidemiologic research, the design and analysis of case-control and cohort studies, the molecular epidemiology of cancer, studies in molecular epidemiology, human physiology, environmental and occupational epidemiology, exposure assessment for environmental and occupational epidemiology, modern genetic epidemiology and gene-mapping, the genetic basis of human disease, and molecular biology for epidemiologists. Students take an additional 10 credits from a list of electives. For information on schoolwide requirements for doctoral degrees, see page 58.

Some financial support for doctoral students may be available to U.S citizens and permanent residents.

Contact Information

For more information about research and training in population genetics, please contact Xiping Xu, MD, PhD, SM, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2959
Fax: 617-432-2956
Email: xu@hsph.harvard.edu

DEPARTMENT FACULTY

Please note that some faculty members may be on leave during academic year 2004–05.

Department chair: Joseph D. Brain, SM, SM, SD; Cecil K. and Philip Drinker Professor of Environmental Physiology. Function and structure of pulmonary macrophages; deposition and clearance of inhaled particles and responses to them; respiratory infection.

Deborah H. Bennett, MS, PhD; Assistant Professor of Environmental Health and Risk Assessment. Fate and transport of persistent organic chemicals in a multimedia environment as related to environmental risk analysis.

James P. Butler, AM, PhD; Senior Lecturer on Physiology. Lung structure and function; parenchymal micromechanics; magnetic twisting cytometry; nemoendocrinology; avian physiology.

David C. Christiani, MD, SM, MPH; Professor of Occupational Medicine and Epidemiology. Occupational diseases; biomarkers and molecular epidemiology.

Philip Demokritou, MEng, PhD; Assistant Professor of Aerosol Physics. Development of human exposure measurement techniques; sources, transport, and the fate of air pollutants in the built environment.

Jack T. Dennerlein, SM, PhD; Assistant Professor of Ergonomics and Safety. Work-related chronic musculoskeletal disorders; design of human-machine interfaces.

Douglas W. Dockery, SM, SM, SD; Professor of Environmental Epidemiology. Epidemiologic studies of respiratory health effects of air pollution; environmental exposures and lifetime development of respiratory disease.

John S. Evans, SM, SM, SD; Senior Lecturer on Environmental Science. Assessment of human exposures to pollutants; evaluation of uncertainty; application of decision analysis; assessment of health risk from waste disposal and energy production.

Jeffrey J. Fredberg, SMME, ME, PhD; Professor of Bioengineering and Physiology. Identification of the mechanical basis of airway and lung parenchymal function at the levels of organ, tissue, cell, and protein.

Beatriz S. González-Flecha, MS, PhD; Assistant Professor of Molecular Biology and Environmental Health. Biochemistry of oxygen free radicals; oxidative stress in biological systems; mechanisms of oxidative damage in eukaryotic and prokaryotic cells.

Joseph J. Harrington, AM, PhD; Professor of Environmental Health Engineering. Water resources planning and quality management; environmental monitoring and control systems; applied statistics for modeling; management for tropical disease control.

Russ B. Hauser, MD, MPH, SD; Associate Professor of Occupational Health. Epidemiology of reproductive health in relation to occupational and environmental exposure to dioxins, pesticides, phthalates, and PCBs.

Robert F. Herrick, MS, SD; Senior Lecturer on Industrial Hygiene. Exposure-reactive aerosols; characterization of complex exposures; interaction of individuals with a source of exposure.

Howard Hu, MD, MPH, SM, SD; Professor of Occupational and Environmental Medicine. Epidemiology of metals toxicity using novel biological markers of dose and genetic susceptibility.

Karl T. Kelsey, MD, MOH; Professor of Cancer Biology and Environmental Health. Occupational and environ-

mental carcinogenesis, with emphasis on the study of workplace mutagen and carcinogen exposure.

Petros Koutrakis, MS, PhD; Professor of Environmental Sciences. Sampling and analysis of air pollutants; atmospheric, indoor air, and aerosol chemistry; application of multivariate techniques to source apportionment; acid rain; urban air pollution.

Francine Laden, MS, SD; Assistant Professor of Environmental Epidemiology. Environmental epidemiology of cancer and respiratory disease.

Jonathan I. Levy, SD; Assistant Professor of Environmental Health and Risk Assessment. Health effects of air pollution; public health benefits of energy conservation; methods for assessing environmental risks in developing countries.

Nancy C. Long Sieber, PhD. Lecturer on Physiology. Mechanisms of pulmonary inflammation, particularly interactions between lung infection and air pollution; transport of heavy metals from respiratory and gastrointestinal tracts.

Donald K. Milton, MD, MPH, DPH; Lecturer on Occupational and Environmental Health. Measurement of airborne endotoxin; epidemiology of acute and chronic responses to bioaerosol exposure.

Joseph P. Mizgerd, SD; Associate Professor of Physiology and Cell Biology. Physiology of inflammation, particularly the molecular mechanisms regulating the emigration of neutrophils.

Richard R. Monson, MD, SM, SD; Professor of Epidemiology and Associate Dean for Professional Education. Relationship between the workplace, the environment, and disease.

Heather H. Nelson, MPH, PhD; Assistant Professor of Environmental Epidemiology. Cancer susceptibility and etiology, with particular emphasis on gene-environment interaction and the genetic epidemiology of somatically acquired changes in malignant disease.

Melissa Perry, ScD, MHS; Assistant Professor of Occupational Epidemiology. Occupational injury epidemiology and prevention, especially methods to collect risk-factor information for interventions to reduce injury morbidity and mortality in high-risk industries.

Stephen N. Rudnick, MS, SM, SD; Lecturer on Industrial Hygiene Engineering. Engineering control of particulate air contaminants in indoor and occupational settings and engineering control systems; sampling and analysis of air contaminants.

Joel D. Schwartz, PhD; Associate Professor of Environmental Epidemiology. Environmental epidemiology; natural history of lung function and disease; cost-benefit analysis; nonclassical time series analysis; nonparametric smoothing and graphical methods.

Jacob Shapiro, SM, PhD; Lecturer on Biophysics. Occupational and environmental radiation protection; low-level radioactive waste disposal; radiation dosimetry and protection standards; environmental radiation surveillance.

James P. Shine, PhD; Assistant Professor of Aquatic Chemistry. Distribution, fate, and effects of contaminants in aquatic ecosystems; influence of environmental variables on routes of exposure to toxic substances.

Stephanie A. Shore, PhD; Senior Lecturer on Physiology. Airway physiology and pharmacology; role of neuropeptides in the pathogenesis of airway disease.

Thomas J. Smith, MPH, MS, PhD; Professor of Industrial Hygiene. Evaluation of exposure-response relationships through occupational epidemiologic studies; application of pharmacokinetic modeling to exposure-tissue dose relationships.

Frank E. Speizer, MD; Professor of Environmental Science. Environmental epidemiology; pulmonary diseases; cancer and nutrition; health effects of air pollution; occupational and environmental medicine.

John D. Spengler, PhD, SM; Akira Yamaguchi Professor of Environmental Health and Human Habitation. Personal monitoring, air pollution health effects, and indoor air pollution; effects of ventilation rates, building materials, allergens.

Helen H. Suh, SM, SD; Associate Professor of Environmental Chemistry and Exposure Assessment. Multimedia exposure assessment; exposure modeling; ambient and indoor air pollution; study design.

Daniel Tschumperlin, MS, PhD; Assistant Professor of Bioengineering and Airway Biology. Remodeling of the airway biology wall and its implications in asthma; transduction of physical forces at a cellular and molecular level.

Ning Wang, MS, SD; Associate Professor of Physiology and Cell Biology. Cytoskeletal mechanics; mechanochemical signal transduction; cell adhesion and migration; cancer metastasis; effects of mechanical forces on cells.

Xin Xu, MD, PhD; Assistant Professor of Genetic Epidemiology. Genetic epidemiology of complex traits in humans, with specific reference to asthma and hypertension; statistical methods and tools; bioinformatics.

Xiping Xu, MD, PhD, SM; Associate Professor of Occupational Epidemiology. Environmental, occupational, and genetic epidemiology of respiratory, cardiovascular, and metabolic diseases.

Secondary Appointments

(primary appointments at Harvard Medical School)

Robert B. Banzett, PhD; Associate Professor in the Department of Environmental Health. Respiratory neurophysiology and mechanics; perceived sensation; control; interaction with locomotion; fluid dynamics in the avian lung.

David C. Bellinger, PhD, MSc; Professor in the Department of Environmental Health. Developmental impact of early metabolic and chemical insults to the nervous system; neuropsychological toxicology.

Jeffrey M. Drazen, MD; Professor in the Department of Environmental Health. Pulmonary and respiratory pharmacology; mediators of immediate hypersensitivity; mucus regulation and expression in chronic bronchitis.

John J. Godleski, MD; Associate Professor in the Department of Environmental Health. Experimental models of normal and pathologic responses to inhaled particles.

Diane R. Gold, MD, MPH; Associate Professor in the Department of Environmental Health. Acute lower-respiratory illness in childhood as a predictor of lung function and chronic respiratory symptoms; air pollution and childhood respiratory morbidity.

Rose H. Goldman, MD, MPH, SM; Associate Professor in the Department of Environmental Health. Occupational health in the biotechnology industry; metal poisoning; neurotoxicity; cumulative trauma injuries.

Stefanos N. Kales, MD, MPH; Assistant Professor in the Department of Environmental Health. Occupational and environmental lung disease; occupational/environmental toxicology.

Jeffrey N. Katz, SM, MD; Associate Professor in the Departments of Environmental Health and Health Policy and Management. Clinical policy relating to noninflammatory musculoskeletal conditions; health policy questions; back pain and upper-extremity disorders.

Lester Kobzik, MD; Associate Professor in the Department of Environmental Health. Lung macrophage phagocytosis and response to inhaled particles; pulmonary inflammation and pathology.

Stephen H. Loring, BMS, MD; Associate Professor in the Department of Environmental Health. Chest-wall mechanics, hyperinflation, and lung transplantation; mechanics and physiology of respiratory muscles and the pleural space.

Edward A. Nardell, MD; Associate Professor in the Departments of Environmental Health and Immunology and Infectious Diseases. Airborne transmission and infection control of *Mycobacterium tuberculosis;* air disinfection with ultraviolet irradiation.

Steven Shapiro, MD; Professor in the Department of Environmental Health. Metalloproteinases in the pathogenesis of lung diseases and the role of neutrophil elastase in smoking-related emphysema.

Eric Silverman, MD; Assistant Professor in the Department of Environmental Health. Gene regulatory mechanisms and gene sequence variability as it effects the pathogenesis of asthma and other pulmonary diseases.

George P. Topulos, MD; Assistant Professor in the Department of Environmental Health. Pulmonary micromechanics and pulmonary circulation.

Richard Verrier, PhD; Associate Professor in the Department of Environmental Health. Neural triggers of sudden cardiac death; cardiac electrophysiology; T-wave alternans; coronary hemodynamic function; novel delivery systems for anti-arrhythmic therapy.

Scott T. Weiss, MD, SM; Professor in the Department of Environmental Health. Natural history of chronic lung disease; epidemiology of asthma and hypertension; cardiovascular, occupational, environmental, and genetic epidemiology.

Robert O. Wright, MD, MPH; Assistant Professor in the Department of Environmental Health. Pediatric environmental health; gene-environmental interactions and psychosocial factors as modifiers of chemical neurotoxicants.

Adjunct Faculty

Harriet A. Burge, MA, PhD. Environmental Microbiology Laboratory.

Allard E. Dembe, MA, DS. University of Massachusetts Medical School.

Ellen A. Eisen, SM, SM, SD. University of Massachusetts, Lowell.

Alan Eschenroeder, BME, PhD. Consultant.

Timothy E. Ford, PhD. Montana State University.

Philippe Grandjean, MD, DMSc. Odense University, Denmark.

Steven R. Hanna, MS, PhD. School of Computational Sciences, George Mason University.

Robert B. Pojasek, PhD. Cambridge Environmental, Inc.

David H. Wegman, MD, SM. Department of Work Environment, University of Massachusetts, Lowell.