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### Environmental Medicine at a Crossroad: Health in the United States

Environmental medicine is at a crossroad. We increasingly observe the profound impact of molecular biology on defining the combined influence of environmental factors and genetic susceptibility in diseases, but there is a decreasing number of physicians and scientists who pursue these leads and translate them in the clinical setting. Economic realities often experienced by academic physicians are disincentives for them to pursue clinical research. Our response to this challenge will be a factor in health in the future.

In this century, there have been many notable achievements in environmental medicine, including the recognition of the health benefits of disinfecting water, the health hazards of tobacco smoking, and the realization that even low levels of lead exposure are toxic, especially to young children. The example of lead poisoning illustrates the broad public health impact of environmental medicine. Although it was acknowledged in the time of the Romans that lead is "hurtful to the human system," it was not until the 1980s that adverse effects were shown to occur even at low exposure levels and that children are particularly vulnerable to these effects (1-4). Public health laws in the United States reduced sources of environmental lead, and these efforts led to an impressive reduction in the blood lead levels in children in the last decade. Much of the impetus for reducing lead exposures has come from concerned pediatricians, which illustrates the power and importance of environmental awareness among physicians.

Physicians need to be well versed in environmental medicine for a number of reasons. One reason is that patients are concerned about the environmental roots of their diseases. Questions will only increase as patients become better informed about environmental exposures and factors in disease. In the future, government agencies in the United States plan to notify residents of chemicals present in municipal drinking water. Any relevance of these chemicals to human health is not expected to accompany the analysis. Additionally, there are a number of new exposure assessment initiatives under way at the federal level. It will fall to physicians and public health officials to explain the health consequences of exposure data. Clearly, there is a need for more training in the area of environmental and occupational medicine in order for practicing physicians to adequately respond. This need has been recognized for several years through various publications (5-8).

Another area where the need for environmentally trained physicians is important is that of the physician/scientist, in which clinical observations are used to stimulate relevant basic research questions and vice versa. Findings generated in the laboratory can be used in clinical applications that might not otherwise have been apparent. Thus, there is a great need for physicians who are well trained in environmental medicine and who have access to bench research and collaborations. The U.S. infrastructure to nurture such interactions is, unfortunately, very small. There are some programs in the National Institutes of Health (NIH) that are designed to stimulate environmental and occupational medicine curricula and to support research centers throughout the country where physicians can work in an integrated clinical research and laboratory research setting. These efforts, however, are far outpaced by the need. This concern is acute in environmental medicine, but is general to the entire field of clinical research, as recognized recently by the NIH Director's Panel on Clinical Research (9).

Another factor in the equation of environmental medicine and the physician is the "landscape change" in teaching hospitals across the



United States This change stems from a combination of factors, including federal Medicare cuts enacted in the 1990s, pressure from managed-care organizations to reduce costs, and the increasing cost burden of highly sophisticated modern equipment. Academic physicians working under managed-care agreements are often not encouraged to develop projects involving bench research. Thus, the

pool of potential physician collaborators is shrinking (9).

The NIH should take a more active role in coordination and development of environmental medicine. As with all fields of biomedical research, the needs and opportunities in environmental health are outpacing the existing research and training infrastructure. In the future, environmental health research and training in the United States must be given priority if environmental medicine is to keep pace with our needs. Possible solutions to this challenge include a) increasing the number of interdisciplinary environmental health research units in academic centers throughout the country and increasing the role of clinical research in these units; b) increasing the cadre of environmental medicine physicians through expansion of mentoring and training programs in this area; and c) educating the public and medical-care organizations to better use long-term prevention and intervention made possible through environmental health research.

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**Samuel H. Wilson**  
NIEHS

Research Triangle Park, North Carolina  
E-mail: wilson5@niehs.nih.gov

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