Guest Editorial

Our Children and the Environment

The publication of research articles in this issue of Environmental Health Perspectives and papers from two important symposia concerning children and their environments in the June issue of EHP Supplements is an encouraging sign of increased attention to the importance of scientific research on the relationship of children to their environments. A recent publication by the National Science and Technology Council (1) emphasized the minimal effort expended on research to benefit children in general and pointed out many defects in research in pediatric environmental health. According to this document, in fiscal year 1995 “all levels of government combined spent an estimated $500 billion on children and adolescents.” This expenditure encompassed all activities including the education of children. In the same fiscal year, only $2 billion was spent on research and development for children. This $2 billion expenditure represented only 3% of federal research expenditures. Furthermore, in contrast to other research areas in which private sector contributions provided a majority of funding, expenditures for children’s research were funded 92% by the federal government.

While these statistics reflect a lack of commitment to research regarding children, there are some hopeful signs. In September 1996, the administrator of the U.S. EPA published a document that outlined an approach to the protection of children from environmental risk and suggested a research strategy to develop the scientific information necessary to improve protection of children (2). President Clinton, in April 1997, issued an executive order that demanded increased emphasis on the protection of children from environmental hazards (3). At the same time, the White House issued a report that outlined the defects in children’s research, further defined some of the knowledge gaps, and proposed a plan to help solve these problems (4). In March of 1998, the National Institutes of Health (NIH) issued a new policy and guidelines that required the inclusion of children in all research submitted to NIH unless exclusion of children is specifically justified (5). This requirement is in addition to existing guidelines that require the inclusion of both sexes and minority groups in all submissions.

The two symposia (the Conference on Children’s Environmental Health: Research, Practice, Prevention, and Policy held 21–23 February 1997 in Washington, DC; and the U.S. EPA Conference on Preventable Causes of Cancer in Children, held 15–16 September 1997 in Arlington, VA) outline many of the defects in our research agenda. They also provide a framework for increased research in these areas and define a specific agenda for this research. The children’s environmental health conference identified areas of research interest, including children’s cancer, childhood asthma, neurobehavioral toxicants, and endocrine disrupting chemicals. Although the cancer conference only considered one of these topics, several themes were common to both conferences. In addition, the agents of concern for children with regard to cancer often are also agents of concern for other disease end points, particularly as endocrine disrupting chemicals and neurotoxicants. Of particular interest in this context are the persistent organic pollutants such as the polychlorinated biphenyls (PCBs) and dioxins.

Both of these symposia identified as cause for concern the rise in the prevalence of many disease processes involving children, such as the rise in incidence of certain childhood cancers including brain cancers, acute lymphoblastic leukemia, Wilm’s tumor, and testicular cancer. It is discouraging that progressive decreases in the death rates from childhood cancers seem to be offset by increases in incidence and in morbidity associated with the treatment of these cancers. Neither of these symposia alleged that environmental agents are directly responsible for these rises in incidence, but both provided interesting clues as to the interaction of environmental exposure with other factors to produce greater risks of cancers in children.

Similarly, because there are clear increases in the prevalence and severity of childhood asthma, we have an obligation to consider the role of children’s environments in the cause and exacerbation of asthma. The children’s environmental health symposium highlighted the important interactions among heredity, the environment, and alterations in the immune response as factors in the etiology of asthma. The discussions of asthma highlighted the need for integration between well-conducted epidemiological investigations and basic mechanistic laboratory research, and the need to differentiate between general environments and microenvironments and between outdoor and indoor environments. This symposium highlighted the need to better understand microenvironments, including indoor environments. Likewise, the papers on asthma illustrate the importance of the interaction between genetic predisposition and certain elements in the environment in causing this disease.

The study of agents such as lead and PCBs has shown the extreme sensitivity of the developing nervous system to injury. Tilson’s review of the neurodevelopmental effects of endocrine disruptors and pesticides (5) highlights this effect for many chemical agents and supports the view that agents already considered to present risk for carcinogenesis may also adversely affect the development of the fetus and child. Tilson (5) also outlines some of the recognized defects in the present regulatory scheme. He describes significant agreement that science must be improved in order to develop a stronger regulatory framework for the protection of children.

The review of endocrine disrupting chemicals by Landrigan et al. (6) and Tilson (5) highlight the ability of a variety of environmental toxicants to act as carcinogens and neurotoxics, and to directly impair endocrine function. Whether these agents result in all these end points by a common mechanism or alter different functions by differing mechanisms remains a subject of considerable

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Scientific interest. Furthermore, the precise extent and magnitude of effects from the agents need further study in epidemiological studies of human populations.

Several common themes can be observed in the various reports in these two symposia:

- Children are indeed different from adults, both in patterns of exposure to environmental risk and in their responses to environmental hazards. The major determinants of these differences are related to the rapid growth and development of children. Considerations of development must take into account both biological and behavioral development.

- Epidemiological observations are useful in tracking incidence, prevalence, and patterns of all of the diseases and environmental risks concerned with the health of fetuses and children, but are insufficient by themselves in defining etiology and mechanisms of environmental disease.

- Laboratory investigations are critical to the understanding of the responses of fetuses and children to environmental risks. Taken together with epidemiological observations, strong inferences can be made as to mechanisms and causes of disease.

- The responses of fetuses and children to environmental risks are functions of a child's environment and genetic makeup. It is important to understand both in order to define risk and response.

- Many environmental hazards are capable of causing a variety of diseases, perhaps by multiple mechanisms. In considering such agents, we must consider all disease end points, rather than focusing on a single disease process.

- It is better to prevent environmental diseases in children than to treat them. As mechanisms of exposure and disease are better defined, it is essential that we focus on primary prevention of environmental illness.

These two symposia are important in themselves because they demonstrate an increased awareness of the scientific issues in pediatric environmental health. In addition, they outline and define an ambitious research agenda. There are many important questions that demand answers regarding the relationship of children to their environments, and these conferences did much to frame these questions. But will our society devote the resources necessary to properly answer the questions? It remains to be seen whether the promises made by the present administration can and will be fulfilled. The health and future of our children require that we keep these promises and that we provide for them safe and healthful environments.

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REFERENCES AND NOTES

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