

FOCUS: NUTRITION AND ENVIRONMENTAL TOXINS

Introductory comments: nutrition, environmental toxins and implications in prevention and intervention of human diseases

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Received 13 December 2006; accepted 13 December 2006

Keywords: Environmental chemicals; Persistent organic pollutants (POPs); Diet-related chronic disease; Toxins

Exposure to environmental chemicals or pollutants can contribute to compromised health and the pathology of many age-related diseases [1]. Human contact with toxic chemicals can originate from environmental and occupational sources primarily occurring through the food chain and polluted water, as well as through airborne or dermal exposure. Excessive and uncontrolled hazardous waste sites, as well as the ever increasing use and accumulation of pollutants in general, and persistent organic pollutants in particular, are a major environmental and public health concern in the United States.

As in most developing countries, the United States counts diet-related chronic disease as the single largest cause of morbidity and mortality [2]. These diseases are epidemic in populations of most developed nations, but were (or are) rather rare among people who rely on food through hunting–gathering and individual farming. For example, overconsumption of high-fat and high-calorie foods coupled with a sedentary lifestyle has become a critical risk factor for most chronic diseases and in particular vascular diseases [3]. Research over the last decade clearly indicates that the

pathology of virtually all age-related or chronic diseases (sometimes referred to as “diseases of civilization”) is regulated by multifactorial dietary elements, along with other environmental agents and genetic susceptibility [4].

Exposure to hazardous toxins is becoming more prevalent especially in overpopulated and industrialized parts of the world. Such exposure contributes to increased health risks. Unfortunately, there is no easy “fix” to protect or intervene against diseases associated with exposure to environmental pollutants. Many pollutants, including heavy metals and persistent organics, bioaccumulate in our bodies, but bioremediation is extremely difficult. Furthermore, many environmental pollutants induce signaling pathways that are oxidative stress-sensitive and similar to or the same as those associated with the etiology and early pathology of many chronic diseases [5]. Fascinating studies from epidemiological research, basic research, as well as clinical data are evolving which suggest that diet, nutrition and lifestyle changes could modify pathologies of chronic diseases, as well as diseases associated with environmental toxic insults.

To further explore the nutritional paradigm in environmental toxicology and the impact on health, the University of Kentucky Superfund Basic Research Program (UK-SBRP) hosted the Nutrition and Environmental Chemical

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Toxicity Workshop on November 18, 2005. The workshop was organized under the umbrella of the UK-SBRP Research Translation Core. Experts in the fields of nutritional sciences, medicine and environmental toxicology were invited to present exciting evidence on the paradigm that nutrition or diet can modulate toxicological insults and associated disease states.

Some of the major conclusions resulting from this conference include the following: (1) in the United States, diet-related chronic diseases represent the single largest cause of morbidity and mortality; (2) research over the last decades clearly indicates that, in addition to genetic susceptibility, the pathology of virtually all age-related or chronic diseases is linked to multifactorial dietary elements, along with other environmental agents; (3) there is a great need to further explore this nutritional paradigm in environmental toxicology to improve our understanding of the relationships among nutrition, exposure to environmental toxins and disease; (4) there is clear evidence that exposure to environmental pollutants (such as Superfund chemicals) can contribute to compromised health and to the pathology of many age-related diseases; and (5) nutrition may be the most sensible means to develop intervention and prevention strategies for diseases associated with many environmental toxic insults.

This workshop was supported in part by funds from NIEHS/NIH (UK SBRP), University of Kentucky Office of Executive Vice President for Research, College of Agriculture Office of the Associate Dean for Research, Department

of Animal & Food Sciences, College of Public Health and the Kentucky Water Resources Research Institute.

The following papers highlight summaries of presentations made at the University of Kentucky workshop. They emphasize the importance of nutrition as a new paradigm in our understanding of the interaction between environmental exposures and genes involved in the development and progression of human diseases. Clearly, nutrition can modulate the toxic insult of environmental pollutants by either up- or down-regulating their effect on human health and disease.

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