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# Environmental Threats to Healthy Aging

*With a Closer Look at Alzheimer's  
& Parkinson's Diseases*

Greater Boston Physicians for Social Responsibility  
and Science and Environmental Health Network

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*With a Closer Look at Alzheimer's  
& Parkinson's Diseases*

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*This report is dedicated to Maria Valenti by her co-authors  
with gratitude for her tireless, inspiring work for peace,  
justice, health, and the environment.*

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### Authors

Jill Stein MD serves on the Steering Committee of GBPSR and is Co-Founder of the Massachusetts Coalition for Healthy Communities. Ted Schettler MD MPH is Science Director of the Science and Environmental Health Network. Ben Rohrer is a neuroscience graduate of Trinity College, currently pursuing studies in medicine and public health. Maria Valenti is GBPSR's Executive Director.

### Production

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### Organizations

**Greater Boston Physicians for Social Responsibility**  
<http://www.psr.org/Boston>.

GBPSR is a chapter of Physicians for Social Responsibility, a national nonprofit organization of over 30,000 health care professionals and supporters who are committed to the elimination of nuclear and other weapons of mass destruction and the preservation of a sustainable environment. PSR is the national affiliate of International Physicians for the Prevention of Nuclear War, the 1985 Nobel Peace Prize-winner. Since the early nineties GBPSR has been effectively working to educate the medical community, policy makers and the public about the health consequences of environmental degradation and exposures to toxic chemicals, and advocating for strategies to protect public health. Our research reports, *Generations at Risk: Reproductive Health and the Environment* (1996, and MIT Press, 1999), and *In Harm's Way: Toxic Threats to Child Development* (2000) have provided the scientific groundwork for advocacy campaigns to protect health, and have helped change public policies and clinical practice. We have educated thousands of health professionals through hundreds of education courses and presentations throughout the country and Canada at hospitals, clinics, and medical schools. We have continued to break new ground by developing clinical tools such as our Pediatric Environmental Health Toolkit, endorsed by the American Academy of Pediatrics. GBPSR remains committed to working to educate about the dangers of nuclear weapons, and the health effects of militarism and war.

**The Science and Environmental Health Network**  
<http://www.sehn.org>

The Science and Environmental Health Network (SEHN) is a think tank engaging organizations, communities, and governments in the effective application of science to protect and restore public and ecosystem health. SEHN uses the concepts of ecological medicine and ecological health to address the nexus of science, the environment, and human and ecosystem health. SEHN is also a leading developer of theory, law, and practice based on the precautionary principle. Founded in 1994, SEHN operates as a virtual organization, currently with six staff members working across the U.S.

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A symbol of longevity in Japanese culture. Look for other symbols of health and long life throughout the book.

## Foreword

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A healthy brain is absolutely essential for successful, healthy aging. The brain is the center of thought and the seat of emotion. The brain is responsible for receiving, interpreting, and organizing data from the senses; formulating speech; guiding action; storing memories of the past; and planning strategies to shape the future. The brain directs all of our dealings with the world around us and all of our interactions with the people whom we love.

When the human brain is afflicted by degenerative conditions such as Alzheimer's disease, other forms of dementia, or Parkinson's disease, quality of life is severely diminished. In persons with Alzheimer's disease, memory is lost, speech becomes impaired, and interactions with the world are constricted. In persons with Parkinson's disease and amyotrophic lateral sclerosis, cognition is preserved, at least for a while, but movement is impaired, fine motor functions are degraded, walking becomes difficult, and even the ability to breathe can be lost.

Alzheimer's disease and Parkinson's disease are the two most common neurodegenerative diseases of the older American population, and they profoundly threaten healthy aging. Causation of these diseases is complex. In a minority of cases, particularly in those with onset before age 50, causation appears to be largely genetic. But in most cases, causation appears to involve still poorly understood interactions among multiple genetic and environmental factors. Lead and PCBs are among the environmental agents that have been linked to dementia. Parkinson's disease has been linked with exposures to the synthetic heroin MPTP, the pesticide rotenone, and the metal manganese. It seems very likely that many other modern synthetic chemicals, the majority of which have never been properly tested for neurotoxicity, may also be potential causes of neurodegenerative diseases, and research to establish these associations is urgently needed. In addition to chemicals, nutrition and socioeconomic circumstances seem to influence the risk in many people. Social isolation and inadequate access to healthy food are toxic to the aging brain and are all too common in today's world.

Information is emerging that exposures sustained in the earliest stages of life—even in the womb and in the first years after birth—may have the potential to initiate changes in the brain that, decades later, result in Alzheimer's disease, Parkinson's disease, or other forms of neurological degeneration. This “early origins hypothesis” was first proposed by Professor David Barker of the University of Southampton in the UK in studies of the antecedents of heart disease and diabetes. Professor Barker found that infants with low birth weight and small head circumference are at increased risk as adults of developing coronary heart disease, hypertension, stroke, insulin resistance, and diabetes. He found that reduced fetal growth and impaired development during infancy are associated



*When the human brain is afflicted by degenerative conditions... quality of life is severely diminished.*

The whale symbolizes longevity in Native American mythology



*This book is a “must read.” While it emphasizes the importance of research to understand the origins of neurodegenerative diseases, it also calls for action.*

with increased mortality from cardiovascular disease across the entire lifespan. More recently, information on early life exposures to toxic chemicals such as lead, mercury, pesticides, and PCBs has extended the early origins hypothesis to encompass chemical exposures. This research suggests that early chemical exposures may result in a range of diseases in childhood and throughout the lifespan, including diseases of the central nervous system such as reductions in intelligence, shortening of attention span, and disruptive behavior. Animal studies suggest that early exposure to a combination of two herbicides—maneb and paraquat—may accelerate development of Parkinson’s disease. These discoveries establish the concept that environmental exposures can produce degenerative disease of the brain. The task now is to identify additional causal exposures, so that evidence-based programs of prevention can be launched.

**T**his important book from Greater Boston Physicians for Social Responsibility and the Science and Environmental Health Network presents in clear, balanced, and understandable terms the emerging evidence that toxic environmental exposures, in combination with nutritional, social, and exercise variables, contribute to the causation of Alzheimer’s disease, Parkinson’s disease, and other chronic degenerative diseases of aging. It offers prudent suggestions in light of current knowledge for reducing exposures and building resilience against environmental threats.

This book is a “must read.” While it emphasizes the importance of research to understand the origins of neurodegenerative diseases, it also calls for action. Urgently needed reforms include requiring safety tests for industrial chemicals before marketing; providing incentives to produce and market healthy food rather than products that contribute to chronic diseases; reducing or eliminating emissions that accelerate chronic disease and climate change; and emphasizing disease prevention in healthcare policies. These are essential to confront the public health threats facing the U.S. and many other countries of the world, but they are not enough. Every economic sector, school district, city council, hospital, legislature, community, family, and individual has a role to play. This book is important today, and it will become increasingly important in the years ahead as the number of elderly among us continues to increase.

I highly recommend this book for physicians, nurses, and other healthcare providers as well as for policy makers and the general public. It is readable at every level. It is a treasure house of important information.

Philip J. Landrigan, MD, MSc

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