DECLARATION OF PHILIP J. LANDRIGAN, M.D., M.SC. IN SUPPORT OF PETITION TO SUSPEND AND CANCEL CHLORPYRIFOS USES

I, Philip J. Landrigan, M.D., M.Sc., hereby declare and state as follows:

1. I submit this declaration in support of the petition to cancel and suspend chlorpyrifos uses that is being submitted by Earthjustice on behalf of United Farm Workers and other farmworker advocates.

PROFESSIONAL BACKGROUND AND EXPERTISE

2. I am a pediatrician and epidemiologist, and I am board certified in occupational medicine, general preventive medicine and pediatrics. I have been a member of the faculty of the Icahn School of Medicine at Mount Sinai since 1985 and am currently a professor of preventive medicine and a professor of pediatrics. I am also the Dean for Global Health, a position I have held since 2010.

3. I obtained my medical degree from Harvard Medical School in 1967. I completed an internship at Cleveland Metropolitan General Hospital and a residency in pediatrics at Boston Children's Hospital. In 1977, I received a Diploma of Industrial Health from the University of London and a Master of Science degree in Occupational Medicine from the London School of Hygiene and Tropical Medicine. My CV is attached as Exhibit 1.

4. I served for 15 years as an Epidemic Intelligence Service Officer and medical epidemiologist at the Centers for Disease Control and Prevention (CDC) and the National Institute for Occupational Safety and Health (NIOSH). I directed the national program in occupational epidemiology for NIOSH from 1979-1985. I have been awarded numerous honors throughout my career, including the Meritorious Service Medal of the U.S. Public Health Service in 1985.

5. From 2000 to 2002, I served on the Armed Forces Epidemiological Board, and from 1996 to 2005, in the Medical Corps of the U.S. Naval Reserve. I retired from the United States Navy in 2005 at the rank of Captain (O-6) and continue to serve as Surgeon General of the New York Naval Militia, the naval component of the New York National Guard.

6. I was elected a member of the Institute of Medicine of the National Academy of Sciences in 1987. I have chaired committees at the National Academy of Sciences (NAS) on Environmental Neurotoxicology and on Pesticides in the Diets of Infants and Children. From 1997 to 1998, I served as Senior Advisor on Children's Health to the Administrator of the U.S. Environmental Protection Agency (EPA) and was instrumental in helping to establish a new Office of Children's Health Protection at EPA.

7. I am editor in chief of the *Annals of Global Health*, deputy editor of the *American Journal of Industrial Medicine*, and an associate editor of *Environmental Health Perspectives*.

8. I have studied the impacts of toxic chemicals, including pesticides, on children's health for over thirty years. I have published more than 500 scientific papers and five books, on subjects including epidemiology, occupational health, environmental neurotoxicity, and children's health. I have extensive knowledge and expertise in environmental and occupational medicine, epidemiology, environmental neurotoxicity, and the effects of pesticides and other chemicals on children through my education, training, professional experience, involvement in applicable peer-reviewed research, and my ongoing review of the pertinent medical and scientific literature.

CHILDREN'S VULNERABILITY TO PESTICIDES

9. A key policy breakthrough occurred over the past three decades with the discovery that children are far more sensitive than adults to toxic chemicals in the environment.

This finding led to the recognition that chemical exposures early in life are significant yet preventable causes of disease in children and adults.

10. In the 1970s, my research showed that 60% of children living within one mile of ASARCO's El Paso smelting plant had elevated blood lead levels and that even small amounts of lead exposure lowered a child's IQ. My research showed that lead can cause brain damage to children at levels too low to clinically detect signs and symptoms. This phenomenon is now called "subclinical toxicity." These studies contributed importantly to the U.S. federal government's decision to phase out lead components from gasoline and regulate the lead content of paint in the 1970s.

11. I led a five-year study as chair of the NAS Committee that published *Pesticides in the Diets of Infants and Children* in 1993.[1] This pivotal study showed that infants and children, including infants in the womb, are much more sensitive to pesticides and other toxic chemicals than adults and documented four differences between children and adults that contribute to children's heightened susceptibility to chemicals in the environment. The following description of this work is taken from an article that I co-authored with Dr. Lynn R. Goldman, "Children's Vulnerability to Toxic Chemicals: A Challenge and Opportunity to Strengthen Health and Environmental Policy," *Health Affairs* 30, no.5 (2011): 842-850 (Exhibit 2):

> First, children have greater exposures to toxic chemicals for their body weight than adults. A six-month-old infant drinks seven times more water per pound than an adult, and children take in three to four times more calories per pound than adults. The air intake per pound of an infant is twice that of an adult. These differences result in children being disproportionately exposed to toxic chemicals in air, food, and water. Children's hand-to-mouth behavior and play on the ground further magnify their exposures.

[1] National Research Council. Pesticides in the Diets of Infants and Children. Washington, DC: National Academy Press, 1993.

> Second, children's metabolic pathways are immature, and a child's ability to metabolize toxic chemicals is different from an adult's. In some instances, infants are at lower risk than adults because they cannot convert chemicals to their toxic forms. More commonly, however, children are more vulnerable because they lack the enzymes needed to break down and remove toxic chemicals from the body.
>
> Third, children's early developmental processes are easily disrupted. Rapid, complex, and highly choreographed development takes place in prenatal life and in the first years after birth, continuing more slowly throughout childhood into puberty. In the brain, for example, billions of cells must form, move to their assigned positions, and establish trillions of precise interconnections. Likewise, development of the reproductive organs is guided by a complex and precisely timed sequence of chemical messages and is shaped by maternal and fetal hormones.
>
> Recent research in pediatrics and developmental toxicology has elaborated the concept of "windows of vulnerability." These are critical periods in early development when exposures to even minute doses of toxic chemicals—levels that would have no adverse effect on an adult—can disrupt organ formation and cause lifelong functional impairments. . . .These windows of vulnerability have no equivalent in adult life.
>
> Fourth, children have more time than adults to develop chronic diseases. Many diseases triggered by toxic chemicals, such as cancer and neurodegenerative diseases, are now understood to evolve through multistage, multiyear processes that may be initiated by exposures in infancy.

12. Since the 1993 publication of the NAS report, peer-reviewed research continues to document the developing human brain's unique vulnerability to toxic chemical exposures, and to confirm that major windows of developmental vulnerability occur *in utero,* during infancy, and in early childhood. During these sensitive life stages, exposure to pesticides and other chemicals can cause permanent brain injury at levels of exposure far below those which would have an effect in adults.

13. A fetus in the womb is at risk of exposure to pesticides and other toxic chemicals because of both exposure and vulnerabilities. In terms of exposure, the placenta does not block the passage of many toxic chemicals from the maternal to the fetal circulation. In fact, more than 200 chemicals have been detected in infants' umbilical cord blood, meaning they have passed from the mother's circulation to the baby's circulation prior to birth. In terms of susceptibility,

several prenatal developmental processes have been shown to enhance the vulnerability of the fetus in the womb to toxic chemicals.

14. Prior to the publication of the NAS report, virtually all environmental policy in the United States had focused on assessment of risk to the average adult man weighing 150 pounds. Little attention was paid to the unique risks faced by infants, children, or other vulnerable groups within the population.

15. The core findings and recommendations of the NAS report were incorporated into the 1996 Food Quality Protection Act (FQPA), which revamped federal pesticide laws. The FQPA changed risk assessment by requiring the use of child-protective safety factors to account for children's exposures and unique susceptibilities and to account also for gaps in data, and by requiring consideration of aggregate exposures to a pesticide via multiple routes, including diet, drinking water, and interaction with pesticide residues through play and other activities. It also required evaluation of cumulative effects of multiple pesticides that have the same mechanism of toxicity.

16. Implementation of the new standards led to bans on residential applications of two very widely used organophosphate insecticides: chlorpyrifos and diazinon. These bans were triggered by recognition of these compounds' neurodevelopmental toxicity to children and documentation of their long residence time in indoor environments. FQPA implementation also led to a cumulative risk assessment for all organophosphates because they have a common mechanism of toxicity, as discussed below.

NEURODEVELOPMENTAL HARM TO CHILDREN'S BRAINS FROM CHLORPYRIFOS AND OTHER ORGANOPHOSPHATES

17. Chlorpyrifos, like other organophosphate pesticides (OPs), causes acute poisonings by inhibiting the enzyme acetylcholinesterase (AChE), which regulates nerve

impulses. When cholinesterase is inhibited, it leads rapidly to overt symptoms of cholinergic hyperstimulation. The symptoms include nausea, headaches, skin rashes, eye irritation, vomiting, dizziness, seizures, coma, and death, depending on the dose and the toxicity of the product. When EPA conducted risk assessments on the organophosphates in the 1990s through 2006, it set human exposure limits based on detection of AChE inhibition. Specifically, it uses 10% red-blood cell AChE inhibition as its regulatory endpoint, called its point of departure.

18. A growing body of scientific evidence has documented neurodevelopmental harm to the developing brain from organophosphates, including chlorpyrifos. This evidence comes both from animal and epidemiology studies. EPA has compiled and reviewed the published studies in its Revised Human Health Risk Assessment for Chlorpyrifos Registration Review (Dec. 29, 2014) (RHHRA), and in its Literature Review on Neurodevelopmental Effects & FQPA Safety Factor Determination for the Organophosphate Pesticides (Sept. 15, 2015).

19. Numerous scientific studies have documented neurodevelopmental harm from prenatal and early postnatal exposures to chlorpyrifos. Animal studies have found disruption in neuronal development, neurotransmitter systems and synaptic function, as well as behavioral and cognitive impairments following low-dose perinatal chlorpyrifos exposure. Neurobehavioral effects include impairment on maze performance, locomotion, and balance in neonates exposed *in utero* or during postnatal life.

20. Direct evidence that chlorpyrifos can cause neurodevelopmental harm to children's brains comes from three epidemiology studies conducted respectively at Columbia University, University of California-Berkeley, and Mount Sinai School of Medicine. These universities conducted this research through their Centers for Children's Environmental Health and Disease Prevention Research.

21. These Centers are part of an NIH-funded, competitively awarded national network of such Centers established to increase scientific understanding of the impacts of toxic exposures on children. The Berkeley study studied children of farmworkers in the Salinas Valley of California, the Mount Sinai study observed a New York City Hispanic population whose exposures were primarily residential, and the Columbia study examined African-American and Dominican children in New York City, whose exposures were similarly residential.

22. These three Centers have been conducting long-term birth-cohort studies in which pregnant women are enrolled during their pregnancies. Their environmental exposures during pregnancy are recorded through objective measures like blood and urine samples, dust and air samples, and cord blood. Chlorpyrifos exposure during pregnancy was measured through analysis of chlorpyrifos' metabolic breakdown products in maternal urine samples. Even though these three studies were conducted in distinct geographic regions of the country, on different populations, with different routes of exposure, and using different biomarkers, they produced strongly convergent results. All studies found cognitive impairments that persist into school years from OP exposures. The Columbia study was specific to chlorpyrifos. It found that prenatal exposure to chlorpyrifos resulted in the birth of babies with reduced head circumference. Reduction in head circumference at birth is a measure of delayed or reduced brain growth during pregnancy and is an effect seen also in infants exposed in the womb to Zika virus. In the Columbia study, the degree of reduction in head circumference was proportional to the degree of maternal exposure to chlorpyrifos during pregnancy. The impact of chlorpyrifos on head circumference was no longer observed after the ban on residential application of chlorpyrifos was imposed.

23. Follow-up studies of the babies in these three studies have found that prenatal exposures have persistent deleterious effects on cognitive function through 7 years of age. The brain impairments observed in these infants and children include reduction in motor function, decreases in working and visual memory, processing speed, verbal comprehension, perceptual reasoning, and diminished IQ. The studies also documented neurobehavioral problems, including increased risk of attention deficit hyperactivity disorder, pervasive developmental disorder, and behaviors typical of the autism spectrum. Certain subpopulations demonstrate greater susceptibility, including children of farmworkers and those who have reduced capacity to detoxify OPs. Some studies found elevated risks of respiratory symptoms consistent with asthma. And recently, a study using magnetic resonance imaging found that even low to moderate levels of prenatal exposure to chlorpyrifos may lead to long-term, potentially irreversible changes in the structure of the developing brain, causing thinning of the cerebral cortex.

24. These studies found damage to children's brains from exposures to chlorpyrifos that produced no or less than 1% red-blood cell cholinesterase inhibition. In other words, the harm to the developing brain and nervous systems occurred at exposures substantially below EPA's regulatory limit, which is based on exposures that are high enough to inhibit cholinesterase in adults. EPA acknowledged in its 2014 revised human health risk assessment on chlorpyrifos that the neurodevelopmental harm to children's brains occurred at lower doses than its regulatory endpoint.

EPA'S RISK ASSESSMENTS DO NOT PROTECT AGAINST BRAIN DAMAGE TO CHILDREN

25. Even though EPA has acknowledged that neurodevelopmental harm to children occurs at exposures that produce no or only minimal cholinesterase inhibition, EPA has

continued to set its exposure limits based on cholinesterase inhibition. It continues to use 10% red-blood cell cholinesterase inhibition as the endpoint in its risk assessments, even though the mothers in the Columbia study who gave birth to infants with brain injury exhibited less than 1% cholinesterase inhibition or no inhibition at all.

26. Safety factors are used in risk assessment and standard-setting to account for uncertainties. In setting a standard or tolerance for a pesticide, EPA will begin the risk assessment by identifying an exposure level that produces no adverse effect as its endpoint. This is called the no observable adverse effect level. If some adverse effects are observed at that exposure level, EPA will add a three-fold safety factor. EPA then typically uses a tenfold safety factor to account for uncertainties in extrapolating from animal studies to people, and a second tenfold safety factor to account for differences among human populations due to such factors as genetic predisposition and other stressors. Finally, the FQPA requires EPA to use a third tenfold "child-protective" safety factor when there is either evidence that children are especially vulnerable to a chemical or when there are gaps in data concerning children's exposures or vulnerabilities. For OPs, EPA has retained a 10X child-protective FQPA safety factor because of the published evidence that these chemicals cause neurodevelopmental harm to infants and children.

27. For chlorpyrifos, however, EPA departed from this usual practice and instead relied on the Dow Agrosciences Company's pharmacokinetic-pharmacodynamic (PBPK) model of OP toxicity, which tries to pinpoint the exposures that will produce 10% cholinesterase inhibition. The Dow model is drawn largely from human studies that included deliberate dosing of people. Many of these studies were conducted in countries outside of the United States. Use of human studies in risk assessment poses significant ethical and scientific issues, and the Dow

human studies have been criticized for not meeting the informed consent standards that would be required in the US and also for scientific deficiencies. Because the Dow model uses human data, it obviates the need to extrapolate data from animals to humans. In relying on the Dow data, EPA therefore dispensed with the 10X inter-species safety factor for all populations except for women of child-bearing years. For women of child-bearing years, EPA retained the 10X intra-species safety factor because Dow did not have human data for this population.

EPA'S RISK ASSESSMENTS DO NOT PROTECT WORKERS OCUPATIONALLY EXPOSED TO CHLORPYRIFOS AND DO NOT PROTECT THE CHILDREN IN THE WOMB OF PREGNANT WOMEN WORKERS

28. In their assessments of risk from occupational exposures to chlorpyrifos, EPA identified risks of concern for over half of the handler exposure scenarios. EPA states that additional engineering controls or protective gear could eliminate the risks of concern for 27 of these activities, but notes that 126 would remain of concern regardless of the level of personal protective equipment or environmental controls. EPA also found that protection of agricultural field workers against chlorpyrifos toxicity would need longer re-entry intervals to reduce risks.

29. For many of the handler exposure scenarios, EPA found Margins of Exposure (MOEs) of less than 10 and for some scenarios the MOEs were close to or even less than 1. In other words, EPA estimates that worker exposures from these activities likely would result in 10% cholinesterase inhibition. In these scenarios, the current EPA standard manifestly fails to protect worker health or to comply with the fundamental intent of the Occupational Safety & Health Act of 1970 (OSHA) which states that every worker has the "right to a safe and healthful workplace."

30. EPA has acknowledged that its regulatory end point is underprotective. It has proposed using umbilical cord blood chlorpyrifos levels from the Columbia study to develop a more protective end point based on loss of working memory. It convened a Scientific Advisory

Panel (SAP) to review this proposal. The SAP did not support developing a point of departure based on a single study, but it did agree that EPA's approach of using 10% cholinesterase inhibition as the regulatory endpoint was underprotective.

31. The California Department of Pesticide Regulation (DPR) prepared its own risk assessment of chlorpyrifos which was modeled on EPA's approach and like EPA incorporated 10% cholinesterase inhibition, Dow's PBPK model, and the reduced safety factors. California's Office of Environmental Health Hazard Assessment (OEHHA), which routinely reviews pesticide standards proposed by DPR to ensure that they protect worker health, conducted a scientific peer review of DPR's human health risk assessments on chlorpyrifos and released its review in June 2016. OEHHA found that the 10% cholinesterase inhibition end point and the reduced safety factors proposed by the DPR failed to adequately protect human health and therefore failed to comply with occupational safety and health legislation. OEHHA recommended using a total uncertainty factor of 1000X or 3000X to protect the health of workers occupationally exposed to chlorpyrifos.

32. Any occupational exposure standard for chlorpyrifos needs to take cognizance of the fact that the workforce may include pregnant women workers (who may not yet realize that they are pregnant) and that pregnant women workers who are occupationally exposed to chlorpyrifos will unwittingly pass any chlorpyrifos that they absorb into the bodies of their unborn children where the chlorpyrifos will cause irreversible brain damage. To prevent this sequence of events, EPA should at a minimum use safety factors that total 1000X. Moreover, an additional 3X uncertainty factor is warranted over and above the 1000X safety factor because 10% cholinesterase inhibition cannot be considered a "no observable adverse effect level" in

light of the finding that neurodevelopmental harm to the fetus can result at exposure levels below this outdated limit value.

PREVENTING BRAIN DAMAGE TO CHILDREN FROM TOXIC CHEMICAL EXPOSURES YIELDS SIGNIFICANT COST SAVINGS

33. Neurobehavioral development disorders affect 10-15% of births in the United States, and the prevalence of attention deficit hyperactivity disorder, autism and other neurodevelopmental disorders is increasing in the US and worldwide. Subclinical decrements in brain function are even more common. All of these disabilities can have serious consequences for individuals, such as diminished quality of life, reduced academic achievement, behavioral disruptions, and they also have consequences for society in the form of the diminished economic productivity of affected children and the increased risk that these children will grow up to become unemployed, underemployed and institutionalized or incarcerated adults. Environmental exposures play a role in many, if not most, of these developmental disorders as genetic factors account for only approximately 30-40% of them.

34. Preventing exposures to chemicals can yield great economic savings. While it is difficult to precisely quantify the harm from neurodevelopmental disorders and the cost savings that result from their prevention, several studies suggest that both are quite large. To estimate the contribution of environmental pollutants to the prevalence and costs of disease in American children, investigators at Mount Sinai School of Medicine examined four categories of illness: lead poisoning, asthma, cancer, and neurobehavioral disorders. Based on prevalence, the environmentally attributable fraction of each disease, and national economic data, they calculated that the total annual costs of these diseases attributable to environmental exposures is $54.9 billion (range $48.8 billion to $64.8 billion): $43.4 billion for lead poisoning, $2.0 billion for asthma, $0.3 billion for childhood cancer, and $9.2 billion for neurobehavioral disorders.

Because of the difficulties inherent in assessing the full economic consequences of neurobehavioral impairments, it is likely that these estimates are low.

35. After the phase-out of lead in gasoline from 1976 and 1990, the mean blood lead level of American children decreased by more than 90% (to below 2 micrograms per deciliter today), and the incidence of childhood lead poisoning also fell by more than 90%. A further consequence of the reduction in exposure to lead was that the mean IQ of American children has increased. Children born in the United States today are estimated to have IQ scores that, on average, are 2.2–4.7 points higher than those of children born in the early 1970s. And because each 1-point gain in population mean IQ is associated with an estimated 2% increase in productivity over a lifetime, the gain in population IQ is estimated to have produced a national economic benefit of $110–$319 billion in each annual cohort of babies born in the United States since the 1980s.

36. Dr. David Bellinger, a professor of neurology at Harvard Medical School, published a paper in 2012, which estimated that Americans have collectively forfeited 41 million IQ points as a result of exposure to lead, mercury, and OPs. He calculated a total loss of 16.9 million IQ points due to exposure to OPs.[2]

EPA'S APPROACH TO WORKER RISK MITIGATION IS UNDERPROTECTIVE AND AT ODDS WITH STANDARD OCCUPATIONAL HEALTH PRACTICE

37. When EPA identifies a risk of concern, it explores as a first priority whether use of personal protective equipment will eliminate the risk. If personal protective equipment is found not to be protective, EPA then asks whether engineering controls or administrative controls such as restricted re-entry intervals will eliminate the risk. Only if the risk of concern

[2] D.C. Bellinger, "A Strategy for Comparing Contributions of Environmental Chemicals and Other Risk Factors to Neurodevelopment of Children," *Environmental Health Perspectives*, Vol. 120, No. 4, pp.501-507 (April 2012).

remains after implementation of all such mitigation does EPA explore eliminating the exposure or shifting to less harmful alternative chemicals or application methods.

38. EPA's approach is backwards and wrong. It violates standard, long-established occupational health practice. It fails to protect worker health.

39. In the field of occupational safety and health, regulators adhere to a hierarchy of controls that prioritizes prevention of exposure – not use of personal protection. Regulators start by asking whether the exposure can be eliminated altogether or whether other less toxic chemicals can be substituted. If those approaches are found not to be feasible, the regulator will look to engineering controls such as machine-guarding or administrative controls such as longer re-entry times to sprayed fields. The regulator will turn to personal protective equipment only as a last resort, because personal protective equipment has been shown repeatedly over the decades to be far less effective at worker protection than product substitution, engineering controls and administrative controls. A final reason for not relying on personal protective equipment is that such equipment degrades workers' ability to function and increases risk of heat stress and heat stroke. Thus double-layers of clothing, gloves, and respirators likely impede mobility and contribute to heat and respiratory stress of pesticide handlers working in hot temperatures during summer growing seasons.

40. OSHA has adhered to this prioritization for decades. The lead standard is illustrative. EPA refused to rely on personal protective equipment, and on respirators in particular, because they fail to eliminate exposure, provides inadequate protection, and creates additional hazards by interfering with vision and mobility. The 1978 lead standard is replete with findings that respirators afford inadequate protection. OSHA required respirators **in**

addition to engineering controls to afford workers additional protection during the time it would take to fully implement the controls. 43 Fed. Reg. 52,952 (Nov. 14, 1978).

41. For decades, EPA has adopted a wrong-headed strategy for mitigating worker exposures to chlorpyrifos and other toxic pesticides that relies first and foremost on personal protective equipment. By relying on this inadequate strategy and by relying on personal protective equipment that has been shown to confer highly inadequate protection, EPA has allowed workers to be exposed to harmful levels of chlorpyrifos. By relying on this ineffective strategy, EPA has allowed pregnant women workers to be occupationally exposed to levels of chlorpyrifos that can result in fetal brain damage to infants in the womb. Sound occupational health principles require engineering or administrative controls, where effective, or elimination of the exposure, where engineering or administrative controls are not effective.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 7th day of September 2016, in New York, New York.

Philip J. Landrigan, M.D., M.Sc.

Exhibit 1

CURRICULUM VITAE
Philip J. Landrigan, M.D., M.Sc., D.I.H., F.A.A.P., F.A.C.P.M.

ACADEMIC APPOINTMENTS

Current:

Icahn School of Medicine at Mount Sinai, Dean for Global Health, 2010-Present

Icahn School of Medicine at Mount Sinai, Professor, Department of Preventive Medicine, 1990-Present

Icahn School of Medicine at Mount Sinai, Professor of Pediatrics, 1985-Present

Previous:

Icahn School of Medicine at Mount Sinai, Ethel H. Wise Professor and Chairman, Department of Preventive Medicine, 1990-2015.

Icahn School of Medicine at Mount Sinai, Director, Division of Environmental and Occupational Medicine, Department of Community and Preventive Medicine, 1985-1990.

U.S. Environmental Protection Agency, Senior Advisor to the Administrator on Children's Health and the Environment, 1997-1998. (Sabbatical position)

National Institute for Occupational Safety and Health, Director, Division of Surveillance, Hazard Evaluations and Field Studies, 1979-1985.

Centers for Disease Control and Prevention

- Chief, Environmental Hazards Activity, Bureau of Epidemiology, 1974-1979.
- Director, Research and Development, Bureau of Smallpox Eradication, 1973-1974.
- Epidemic Intelligence Service (EIS) Officer, 1970-1973.

Adjunct Positions:

Harvard School of Public Health, Adjunct Professor of Environmental Health, 2010-present; Visiting Lecturer on Occupational Health, 1981-2010

Harvard Medical School, Clinical Instructor in Pediatrics, 1969-1970; Visiting Lecturer on Preventive Medicine and Clinical Epidemiology, 1982-Present

University of Washington School of Public Health and Community Medicine, Auxilary Clinical Professor of Environmental Health, 1983-2013

University of Cincinnati, Department of Environmental Health, College of Medicine, Assistant Clinical Professor of Environmental Health, 1981-1986

London School of Hygiene and Tropical Medicine, Visiting Fellow, TUC Institute of Occupational Health, 1976-1977

EDUCATION

High School: Boston Latin School, 1959
College: Boston College, A.B. (magna cum laude), 1963
Medical School: Harvard Medical School, M.D., 1967

POSTDOCTORAL TRAINING

Internship: Cleveland Metropolitan General Hospital, 1967-1968
Residency: Children's Hospital Medical Center, Boston, (Pediatrics), 1968-1970
Post Graduate: London School of Hygiene & Tropical Medicine, 1976-77
Diploma of Industrial Health (England), 1977
Master of Science in Occupational Medicine, University of London (with distinction), 1977

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CERTIFICATION

American Board of Pediatrics - 1973
American Board of Preventive Medicine:
General Preventive Medicine - 1979
Occupational Medicine - 1983

MEDICAL LICENSURE

Massachusetts #31277, 1967 - present
New York #162034, 1985 - present

INSTITUTE OF MEDICINE

Institute of Medicine, National Academy of Sciences, Elected to membership, 1987

HONORS/AWARDS

Asbestos Disease Awareness Association – Dr. Irving Selikoff Lifetime Achievement Award, 2016
Grassroots Environmental Education, Award for Outstanding Leadership in Children's Environmental Health, 2015
Boston College – Distinguished Alumni Research Award, 2014
Boston Latin School - Distinguished Graduate Award, 2014
University of Medicine & Dentistry of New Jersey - Senator Frank R. Lautenberg Annual Award in Public Health, 2011
Hearst Foundation, The Daily Green – The Heart of Green Award, 2010
The New York Academy of Medicine – The Stephen Smith Medal for Lifetime Achievement in Public Health, 2009
U.S. Environmental Protection Agency, Region II – Environmental Quality Award on behalf of Mount Sinai Medical Center, 2009
Westchester County (NY). Sustainability Award for Service on Westchester County Global Warming Task Force, 2009
Student Physicians for Social Responsibility. Lifetime Achievement Award, 2009
Women's City Club of New York. Civic Spirit Award, 2009
Boston College. Alumni Award for Professional Excellence, 2008
Collegium Ramazzini. Irving J. Selikoff Award, 2008
Healthy Schools Network, Inc. Healthy Schools Hero Award, 2008
Westchester Children's Association. Edith Macy Award for Distinguished Service, 2008
Children's Health Environmental Coalition. Lifetime Achievement Award, 2006
U.S. Environmental Protection Agency. Child Health Champion Award, 2006
Huntington Breast Cancer Action Coalition. Humanities Award for Children's Health Protection, 2005
Icahn School of Medicine at Mount Sinai. J. Lester Gabrilove Award, 2005
American College of Occupational and Environmental Medicine. Health Achievement in Occupational Medicine Award, 2005
National Nutritional Foods Association. Rachel Carson Environmental Award, 2005
Federated Conservationists of Westchester County. Super Hero Award for Children's Health, 2005
Physicians for Social Responsibility, Los Angeles Chapter. Socially Responsible Medicine Award, 2004
Organic Style Magazine. Environmental Power List, 2004
Finnish Institute for Occupational Health. Jorma Rantanen Award, 2003
American Public Health Association, David P. Rall Award for Advocacy in Public Health, 2003
Castle Connolly Ltd.-America's Top Doctor. Preventive Medicine. New York Metropolitan Area and United States 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 and 2015

HONORS/AWARDS (cont)

Public Health Association of New York City, Haven Emerson Award, 2002
National Institute for Occupational Safety & Health, James Keogh Award, 2002
Icahn School of Medicine at Mount Sinai, Jacobi Medallion, 2002
Environmental Advocates (New York), Award for Environmental Advocacy on Behalf of Children, 2000
American Conference of Governmental Industrial Hygienists, William Steiger Memorial Award, 2000
Russian Academy of Medical Science, Elected as Foreign Member, 2000
Earth Day New York, Award for Excellence in Environmental Medicine, 1999
Mothers & Others for a Livable Planet, Award for Advocacy on Behalf of the Health of Children, 1999
American College of Preventive Medicine, Katherine Boucot Sturgis Award, 1999
International Society for Occupational and Environmental Health, Vernon Houk Award, 1998
New Jersey Environmental Federation Certificate of Recognition. Environmental Achievement Award, 1998
Physicians for Social Responsibility, Broad Street Pump Award in Environmental Health, 1996
International Association of Fire Fighters, Occupational Health and Safety Award, 1995
American Public Health Association, Herbert L. Needleman Medal and Award for Scientific Contributions and Advocacy on Behalf of Children, 1995
United Brotherhood of Carpenters, William Sidell Presidential Award, 1995
New England College of Occupational and Environmental Medicine, Harriet Hardy Award, 1993
New York Committee for Occupational Safety and Health, Annual Honoree, 1985
United States Navy
- Navy & Marine Corps Commendation Medal (3 awards), 2002, 2003 and 2005
- National Defense Service Medal, 2003
- Secretary of Defense Medal for Outstanding Public Service, 2002

U.S. Public Health Service
- Meritorious Service Medal, 1985
- Group Citation as Member of Beryllium Review Panel, 1978
- Career Development Award, 1976

U.S. Department of Health, Education and Welfare, Volunteer Award, 1973

HONORARY DEGREES:
Mount Sinai School of Medicine, Doctor of Science (honoris causa), 2007

OTHER PROFESSIONAL APPOINTMENTS:
American College of Preventive Medicine Fellow, 2003-present
Physicians for Social Responsibility, Board of Directors 1996-1999; Board of Sponsors, 1994-95
New York Academy of Medicine, Elected Fellow, 1991
American College of Occupational and Environmental Medicine, Fellow, 1986
Herman Biggs Society, Member, 1986-1992
International Commission on Occupational Health, Member, 1985-present
Collegium Ramazzini, Fellow, 1983-present
President, 1997-present
American College of Epidemiology, Fellow, 1983-present
Board of Directors, 1990 - 1993
American Epidemiological Society, Elected Member, 1982-present
American Public Health Association, Member, 1982-present
Occupational Health Section, Chair, 1989-90

OTHER PROFESSIONAL APPOINTMENTS: (cont)

Society for Epidemiologic Research, Member, 1978-present
Royal Society of Medicine, Elected Fellow, 1977
American Academy of Pediatrics, Fellow, 1975-present
New York Occupational Medicine Association, Member 1985-present
Board of Directors, 1988-1990
New York Academy of Sciences, Fellow 2002-present

COMMITTEES:

The White House

Presidential Advisory Committee on Gulf War Veterans' Illnesses, 1995-1996

American Academy of Pediatrics

Committee on Environmental Hazards, 1976-1987. Chairman, 1983-1987

National Research Council

Institute of Medicine, Chairman, Interest Group (14) Environmental and Occupational Health and Toxicology, 2009-2011
National Academy of Sciences, Board on Sustainable Development, 1995-1998
National Academy of Sciences, Committee on the Scientific Issues Surrounding the Regulation of Pesticides in the Diets of Infants and Children, Chairman, 1988-1992
National Academy of Sciences, Committee on Neurotoxicology in Risk Assessment, 1987-1989
National Academy of Sciences, Committee on the Epidemiology of Air Pollutants, Vice-Chairman, 1984-1985
National Academy of Sciences, Assembly of Life Sciences, 1981-1982;
Commission on Life Sciences, 1982-1984
National Academy of Sciences, Panel on the Proposed Air Force Study of Herbicide Agent Orange, 1979-1980
Institute of Medicine, Committee for a Planning Study for an Ongoing Study of Costs of Environment-Related Health Effects, 1979-1980
National Academy of Sciences, Assembly of Life Sciences. Board on Toxicology and Environmental Health Hazards, 1978-1987; Vice-Chairman, 1981-1984

National Institutes of Health/U.S. Public Health Service

National Institutes of Health, National Institute of Environmental Health Sciences, External Clinical Advisory Council, 2009-present
National Institute of Child Health and Human Development, Federal Advisory Committee to the National Children's Study, 2003-2005
National Institute of Child Health and Human Development, National Children's Study, Executive Steering Committee, 2007-2009
Food and Drug Administration, Ranch Hand Advisory Committee, 2000-2001
National Institute for Occupational Safety and Health, Board of Scientific Counselors, 1995-1997
National Institutes of Health, Study Section on Epidemiology and Disease Control, 1986-1990
National Institute of Environmental Health Sciences, Third Task Force for Research Planning in the Environmental Health Sciences; Chairman, Subtask Force on Research Strategies for Prevention of and Intervention in Environmentally Produced Disease, 1983-1984

Department of Defense

Armed Forces Epidemiological Board, 2000-2002

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COMMITTEES: (cont)

State and Local Government

New York State, Governor's Advisory Committee on Safety and Healthy New York Foods, 2015-2016
State of New York, Advisory Council on Children's Environmental Health, Co-Chair 2009-present
State of New York, Advisory Council on Lead Poisoning Prevention, 2009-present
Westchester County, New York, Westchester County Global Warming Task Force, 2006-2008
City of New York, Weapons of Mass Destruction (WMD) Advisory Group, 2002-2008
State of New York, Health Research Science Board, 1997-present
State of New York, Public Health Priorities Committee, 1996
State of New York, New York State Advisory Council on Lead Poisoning Prevention, Chairman, 1993-2004
City of New York, Mayor's Lead Paint Poisoning Advisory Committee, 1991-1993
State of New York, Asbestos Advisory Board, Chair, 1987-present
State of New Jersey, Meadowlands Cancer Advisory Board, Chair, 1987-1989
State of New York, Governor's Blue Ribbon Committee on the Love Canal, 1978-1979

Academic

Cornell University, Dean's Advisory Council in Veterinary Medicine, 1996-1997
Mickey Leland National Urban Air Toxics Research Center, National Advisory Committee, 1994-1995
New York Academy of Medicine, Working Group on Housing and Health, 1987-1989; Chairman, 1989
New York Lung Association, Research and Scientific Advisory Committee, 1986-1989. Board of Directors, 1987-1990
Association of University Programs in Occupational Health and Safety, 1985-Present; President, 1986-1988
Milbank Memorial Foundation, Technical Board, 1986-1988
Harvard School of Public Health, Occupational Health Program, Residency Review Committee, 1981-1983; Chairman, 1981

International Organizations

World Health Organization. Contributor to the WHO Publication: "Guidelines on Studies in Environmental Epidemiology" (Environmental Health Criteria, No. 27), 1984.
International Agency for Research on Cancer, service as member of Working Groups on Cancer Assessment, volume 29 (benezene), 1981; volume 42 (silica), 1986; voume 87 (lead), 2005; volume 98, (firefighting) 2007; volume 100 (asbestos). 2011.

Environmental Organizations

Healthy Child, Healthy World, Board of Directors, 1996-present
Children's Environmental Health Network, Board of Directors, 1995-present
Environmental Health Foundation, Board of Directors, 1993-1996
INFORM, Board of Directors, 1991-2003

Labor Unions

International Brotherhood of Teamsters, National Health and Safety Advisory Committee, 1994-2002
George Meany Center for Labor Studies, Board of Trustees, 1994-1997
United Brotherhood of Carpenters, National Health and Safety Fund, Medical Advisory Committee, 1990 -2000; Chairman, 1994-2000

COMMITTEES: (cont)

Labor Unions

United Automobile Workers (UAW) - Chrysler Corporation, Joint Scientific Advisory Committee, Member, 1990-2006

International Association of Fire Fighters, John Redmond Foundation, Medical Advisory Committee, 1989-present

Other Organizations

Health Insurance Plan (HIP) of Greater New York, Board of Directors, 1992-1994

American Legion, Science Panel, Chairman, 1988-2000

Editorial Boards

Editor-in-Chief: *Annals of Global Health*, 2013-present

Deputy Editor: *American Journal of Industrial Medicine,* 2007-present

Associate Editor: *Environmental Health Perspectives,* 2002-present

Editorial Board: *Journal of Public Health Management and Practice*, 1995-1996

Editor-in-Chief: *American Journal of Industrial Medicine*, 1992-2006; Consulting Editor, 1979-1992

Editorial Board: *New Solutions*: A Journal of Environmental and Occupational Health Policy, 1990-present

Editorial Board: *The PSR Quarterly*, 1990-1994

Editorial Board: *American Journal of Public Health*, 1987-1993

Editor-in-Chief: *Environmental Research*, 1987-1994

Senior Editor: *Environmental Research*, 1985-1987

Editorial Board: *Annual Review of Public Health*, 1984-1990

Consulting Editor: *Archives of Environmental Health*, 1982-present

National Service

United States Naval Reserve, Medical Corps, 1996-2005
LCDR (0-4) 1996-98; CDR (0-5) 1998 – 2004; CAPT (0-6) 2004-2005. Retired January 1, 2005.

United States Public Health Service, Commissioned Corps, 1970-1995. LCDR (0-4) to CAPT (0-6).

New York Naval Militia 2000-present; CAPT (0-6); Surgeon General.

GRANT SUPPORT

ACTIVE:

Blacksmith Institute (Landrigan, PI) 01/01/12 – 12/23/17
$45,000

Assessing the Disease Burden of Hazardous Waste Sites

The purpose of this contract is to support the development of a series of scientific papers that will assess the health burden associated with human exposure to hazardous waste sites in the developing world.

2011-N-13318 (Lucchini, PI) 07/01/11 – 12/31/16
CDC $28,422,550

World Trade Center Data and Coordination Center

This project is the coordinating center for a multicenter program providing monitoring and treatment to volunteers who assisted in the recovery and cleanup after the 9/11 attack.

Role: Co-Investigator

Completed Research Support:

1T32HD049311 (Landrigan, PI) 05/01/07 - 07/01/13
NICHD $323,002
Research Training Program in Environmental Pediatrics
The goal of this interdisciplinary research training program is to train the next generation of physician-researchers and academic leaders in environmental pediatrics.

C-010124 NYS DoH Landrigan(PI) 4/1/09 – 3/31/12; Lucchini (PI) 4/1/12 – present
World Trade Center Responders Data and Coordinating Center. This program has collected, analyzed and published medical monitoring and treatment data collected clinically on 30,000 9/11 responders evaluated at five Clinical Centers in the New York metropolitan area.

NIH-HHSN27520080031C (Landrigan, PI) 09/28/08 - 09/27/13 (Monroe)
NIH
National Children's Study Vanguard Centers
This project will recruit 1250 live births into a NICHD study of social, behavioral and environmental factors and their impact on childhood health, growth and development. The Queens Vanguard Center is one of the first six sites selected to pilot the NCS, which will follow more than 100,000 children across the United States from birth until age 21.

U10-OH08232 CDC Landrigan (PI) 6/1/04 – 3/31/12; Lucchini (PI) 4/1/12 - present
New York/New Jersey Education Research Center in Occupational Safety & Health. The goal of this multi-institutional program is to train professionals from multiple disciplines - medicine, nursing, industrial hygiene and industrial safety - to be future leaders in occupational health and safety.

Children's Environmental Health Center - Inner City Toxicants, Child Growth and Development
Co-Principal Investigator
EPA RD831711-01 11/1/03 – 10/31/10
NIEHS P01 ES009584 11/1/98 – 10/31/10

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ORIGINAL, PEER-REVIEWED PUBLICATIONS

1. Lovejoy FH Jr, Marcuse EK, Landrigan PJ: Two examples of purpura factitia. *Clinica Pediatr* 10:183-184, 1971.
2. Landrigan PJ, Conrad JL: Current status of measles in the United States. *J Infect Dis* 124:620-622, 1971.
3. Landrigan PJ: Epidemic measles in a divided city. *JAMA* 221:567-570, 1972.
4. Hattwick MA, Hochberg FH, Landrigan PJ, Gregg MG: Skunk-associated human rabies. *JAMA* 222:44-50, 1972.
5. Grand MG, Wyll SA, Gehlbach SH, Landrigan PJ, Judelsohn RG, Zendel SA, Witte JJ: Clinical reactions following rubella vaccination: A prospective analysis of joint, muscular, and neuritic symptoms. *JAMA* 220:1569-1572, 1972.
6. Landrigan PJ, Griesbach PH: Measles - In previously vaccinated children in Illinois. *Illinois Med J* 141:367-372, 1972.
7. Tarlin L, Landrigan PJ, Babineau R, Alpert JJ: A comparison of the antipyretic effect of acetaminophen and aspirin: Another approach to poison prevention. *Am J Dis Child* 124:880-882, 1972.
8. Landrigan PJ, Witte JJ: Neurologic disorders following live measles-virus vaccination. *JAMA* 223:1459-1462, 1973.
9. Landrigan PJ, Murphy KB, Meyer HM, Parkman PD, Eddins DL, Witte JJ: Combined measles-rubella vaccines: virus dose and serologic response. *Am J Dis Child* 125:65-67, 1973.
10. Landrigan PJ, Huber DH, Murphy GC, Creech WB, Bryan JA: The protective efficacy of immune serum globulin in hepatitis A: A statistical approach. *JAMA* 223:74-75, 1973.
11. Landrigan PJ, Bresnan M, Berenberg W: Behr's syndrome: Familial optic atrophy, spastic diplegia, and ataxia. *Develop Med Child Neurol* 15:41-47, 1973.
12. Brandling-Bennett AD, Landrigan PJ, Baker EL: Failure of vaccinated school children to transmit measles. *JAMA* 224:616-618, 1973.
13. Barthel WF, Smrek AL, Angel GP, Liddle JA, Landrigan PJ, Gehlbach SH, Chisholm JJ: Modified Delves' cup atomic absorption determination of lead in blood. *J Official Analyst Chemists* 56:1252-1256, 1973.
14. Schluederberg A, Lamm SH, Landrigan PJ, Black FL: Measles immunity in children vaccinated before one year of age. *Am J Epidemiol* 97:402-409, 1973.
15. Landrigan PJ, Stoffels MA, Anderson E, Witte JJ: Epidemic rubella in adolescent boys - clinical features and results of vaccination. *JAMA* 227:1283-1287, 1974.
16. Marshall R, Habicht JP, Landrigan PJ, Foege WH, Delgado H: Effectiveness of measles vaccine given simultaneously with DTP. *J Trop Pediatr* 20:126-129, 1974.
17. Landrigan PJ, Navarro E, Eddins D: Epidemiologic assessment of a nationwide multiple antigen vaccine campaign. *J Trop Pediatr* 20:135-140, 1974.
18. Landrigan PJ, Gehlbach SH, Rosenblum BF, Shoults JM, Candelaria RM, Barthel WF, Liddle JA, Smrek AL, Staehling NW, Sanders JF: Epidemic lead absorption near an ore smelter: the role of particulate lead. *New Engl J Med* 292:123-129, 1975.
19. Landrigan PJ, Whitworth RH, Baloh RW, Barthel WF, Staehling NW, Rosenblum BF: Neuropsychological dysfunction in children with chronic low-level lead absorption. *Lancet* 1:708-712, 1975.

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ORIGINAL, PEER-REVIEWED PUBLICATIONS (cont)

20. Landrigan PJ, McKinney AS, Hopkins LC, Rhodes WW Jr, Price WA, Cox DH: Chronic lead absorption - result of poor ventilation in an outdoor pistol range. *JAMA* 234:394-397, 1975.
21. Wallace RB, Landrigan PJ, Smith EA, Pifer J, Teller B, Foster SO: Trial of a reduced dose of measles vaccine in Nigerian children. *Bull WHO* 53:361-364, 1976.
22. Landrigan PJ, Baker EL, Feldman RH, Cox DH, Eden KV, Orenstein WA, Mather JA, Yankel AJ, VonLindern IH: Increased lead absorption with anemia and slowed nerve conduction in children near a lead smelter. *J Pediatr* 85:904-910, 1976.
23. Levine RJ, Moore RM, McLaren CD, Barthel WF, Landrigan PJ: Occupational lead poisoning, animal deaths, and environmental contamination at a scrap smelter. *Am J Public Health* 66:548-552, 1976.
24. Baker EL, Folland DS, Taylor TA, Frank M, Peterson W, Lovejoy G, Cox D, Housworth J, Landrigan PJ: Lead poisoning in children of lead workers: Home contamination with industrial dust. *New Engl J Med* 296:260-261, 1977.
25. Diggory HJP, Landrigan PJ, Latimer KP, Ellington AC, Kimbrough RD, Liddle JA, Cline AE, Smrek AL: Fatal parathion poisoning caused by contamination of flour in international commerce. *Am J Epidemiol* 106:145-153, 1977.
26. Winegar DA, Levy BS, Andrews JS Jr, Landrigan PJ, Scruton WH, Krause MJ: Chronic occupational exposure to lead: an evaluation of the health of smelter workers. *J Occup Med* 19:603-606, 1977.
27. Baker EL, Smrek A, Kimbrough RD, Hudgins M, Landrigan PJ, Liddle JA: Hereditary cholinesterase deficiency: A report of a family with two rare genotypes. *Clinical Genetics* 12:134-138, 1977.
28. Baker EL Jr, Hayes CG, Landrigan PJ, Handke JL, Leger RT, Housworth WJ, Harrington JM: A nationwide survey of heavy metal absorption in children living near primary copper, lead and zinc smelters. *Am J Epidemiol* 106:261-273, 1977.
29. Baker EL, Field PH, Basteyns BJ, Skinner GH, Bertozzi PE, Landrigan PJ: Phenol poisoning due to contaminated drinking water. *Arch Environ Health* 33:89-94, 1978.
30. Wysowski DK, Landrigan PJ, Ferguson SW, Fontaine RE, Liddle JA: Cadmium exposure in a community near a smelter. *Am J Epidemiol* 107:27-35, 1978.
31. Cannon SB, Veazey JM, Jackson RS, Burse VW, Hayes C, Straub WE, Landrigan PJ: Epidemic kepone poisoning in chemical workers. *Am J Epidemiol* 107:529-537, 1978.
32. Harrington JM, Craun GF, Meigs JW, Landrigan PJ, Flannery JT, Woodhull RS: An investigation of the use of asbestos cement pipe for public water supply and the incidence of gastrointestinal cancer in Connecticut 1935-1973. *Am J Epidemiol* 107:96-103, 1978.
33. Baker EL, Peterson WA, Holtz J, Mann JM, Coleman C, Landrigan PJ: Subacute cadmium intoxication in jewelry workers: An evaluation of diagnostic procedures. *Arch Environ Health* 34:173-177, 1979.
34. Morse DL, Baker EL, Landrigan PJ: Cut flowers: A potential pesticide hazard. *Am J Public Health* 69:53-56, 1979.
35. Morse DL, Watson WN, Housworth J, Witherell LE, Landrigan, PJ: Exposure of children to lead in drinking water. *Am J Public Health* 69:711-712, 1979.
36. Morse DL, Kominsky JR, Wisseman CL III, Landrigan PJ: Occupational exposure to hexachlorocyclopentadiene: How safe is sewage? *JAMA* 241:2177-2179, 1979.

ORIGINAL, PEER-REVIEWED PUBLICATIONS (cont)

37. Morse DL, Landrigan PJ, Rosenblum BF, Housworth J: El Paso revisited: epidemiologic follow-up of an environmental lead problem. *JAMA* 242:739-741, 1979.
38. Morse DL, Harrington JM, Kelter A, Housworth J, Landrigan PJ: Arsenic exposure in multiple environmental media in children near a smelter. *Clin Toxicol* 14:389-399, 1979.
39. Landrigan PJ, Wilcox KR Jr, Silva J Jr, Humphrey HEB, Kauffman C, Heath CW Jr: Cohort study of Michigan residents exposed to polybrominated biphenyls: epidemiologic and immunologic findings. *Ann NY Acad Sci* 320:284-294, 1979.
40. Baker EL, Landrigan PJ, Barbour AG, Cox DH, Folland DS, Ligo RN, Throckmorton J: Occupational lead poisoning in the United States: Clinical and biochemical findings related to blood lead levels. *Br J Ind Med* 36:314-322, 1979.
41. Silva J, Kauffman CA, Simon DG, Landrigan PJ, Humphrey HEB, Heath CW, Wilcox ER, VanAmburg G, Kaslow RA, Hoff K: Lymphocyte function in humans exposed to polybrominated biphenyls. *J Recituloendothelial Soc* 26:341-347, 1979.
42. Englender SJ, Landrigan PJ, Atwood RB, Clarkson TW: Organic mercury exposure from fungicide-contaminated eggs. *Arch Environ Health* 35:224-228, 1980.
43. Baker EL, Landrigan PJ, Glueck CJ, Zack MM, Liddle JA, Burse VW, Housworth WF, Bayse DD, Needham LL: Metabolic consequences of exposure to polychlorinated biphenyls (PCBs) in sewage sludge. *Am J Epidemiol* 112:553-563, 1980.
44. Landrigan PJ, Tamblyn PB, Nelson M, Kerndt P, Kronoveter KJ, Zack MM: Lead exposure in stained glass workers. *Am J Ind Med* 11:177-180, 1980.
45. Wilson R, Lovejoy FH, Jaeger RJ, Landrigan PJ: Acute phosphine poisoning aboard a grain freighter: epidemiologic, clinical, and pathological findings. *JAMA* 244:148-150, 1980.
46. Rosenberg MJ, Landrigan PJ, Hahn JL, Crowley S: Low-level arsenic exposure in wood processing plants. *Am J Ind Med* 1:99-108, 1980.
47. Nelson DB, Kimbrough ED, Landrigan PJ, Hayes AW, Yang GC, Benanides J: Aflatoxin and Reye's Syndrome: A case-control study. *Pediatrics* 66:865-869, 1980.
48. Hassan A, Velasques E, Belmar R, Coye M, Drucker E, Landrigan PJ, Michaels D, Sidel KB: Mercury poisoning in Nicaragua: A case study of the export of environmental and occupational health hazards by a multinational corporation. *Int J Health Serv* 11:221-226, 1981.
49. Halperin W, Landrigan PJ, Altman R, Iaci AW, Morse DL, Needham LL: Chemical fire at toxic waste disposal plant: Epidemiologic study of exposure to smoke and fumes. *J New Jersey Med Soc* 78:592-594, 1981.
50. Rinsky RA, Zumwalde RD, Waxweiler RJ, Murray WE, Bierbaum PJ: Landrigan PJ, Terpilak M, Cox C: Cancer mortality at a naval nuclear shipyard. *Lancet* 1:231-235, 1981.
51. Froneberg B, Johnson PL, Landrigan PJ: Respiratory illness caused by overheating of polyvinyl chloride. *Br J Ind Med* 39:239-243, 1982.
52. Landrigan PJ, Baker EL, Himmelstein JS, Stein GF, Weddig JP, Straub WE: Exposure to lead from the Mystic River Bridge - The dilemma of deleading. *New Engl J Med* 306:673-676, 1982.
53. Schulte PA, Singal M, Stringer WT, Kominsky JR, Landrigan PJ: The efficacy of a population-based comparison group in cross-sectional occupational health studies. *Am J Epidemiol* 116:981-989, 1982.

54. Landrigan PJ, Costello RJ, Stringer WT: Occupational exposure to arsine: An epidemiologic reappraisal of current standards. *Scand J Work Environ Health* 8:169-177, 1982.
55. Halperin WE, Goodman M, Stayner L, Elliott LJ, Keenyside RA, Landrigan PJ: Nasal cancer in a worker exposed to formaldehyde. *JAMA* 249:510-512, 1983.
56. Landrigan PJ, Powell KE, James LM, Taylor PR: Paraquat and marijuana: epidemiologic risk assessment. *Am J Public Health* 73:784-788, 1983.
57. Kreiss K, Zack MM, Landrigan PJ, Feldman RG, Niles CA, Chirico-Post J, Sax DS, Boyd MH, Cox DH: Neurologic evaluation of a population exposed to arsenic in Alaskan well water. *Arch Environ Health* 38:116-121, 1983.
58. Landrigan PJ, Miller BP: The Arjenyattah Epidemic: Home interview data and toxicological aspects. *Lancet* 2:1474-1475, 1983.
59. Horan JM, Kurt T, Landrigan PJ, Melius JM, Singal M: Neurologic dysfunction from exposure to 2-t-butylazo-2-hydroxy-5-methylhexane (BHMH): A new occupational neuropathy. *Am J Public Health* 75:513-517, 1985.
60. Selevan SG, Landrigan PJ, Stern FB, Jones JH: Mortality of lead smelter workers. *Am J Epidemiol* 122:673-683, 1985.
61. Robins JM, Landrigan PJ, Robis TG, Fine LJ: Decision-making under uncertainty in the setting of environmental health regulations. *J Public Health Policy* 3:322-328, 1985.
62. Landrigan PJ, Straub WE: Occupational lead exposure aboard a tall ship. *Am J Ind Med* 8:233-239, 1985.
63. Landrigan PJ, Cherniack MG, Lewis FA, Catlett LR: Silicosis in a grey iron foundry: The persistence of an ancient disease. *Scand J Work Environ Health* 12:32-39, 1986.
64. Liss GM, Halperin WE, Landrigan PJ: Occupational asthma in a home pieceworker. *Arch Environ Health* 41:359-326, 1986.
65. Stern FB, Waxweiler RA, Beaumont JJ, Lee ST, Halperin WE, Zumwalde RD, Bierbaum PJ, Rinsky RA, Landrigan PJ, Murray WE: A case-control study of leukemia at a naval nuclear shipyard. *Am J Epidemiol* 123: 980-992, 1986.
66. Wielopolski K, Ellis KJ, Vaswani AN, Cohn SH, Greenberg A, Puschett JB, Parkinson DK, Fetterolf DE, Landrigan PJ: In vivo bone lead measurements: A rapid monitoring method for cumulative lead exposure. *Am J Ind Med* 9:221-226, 1986.
67. Greenberg A, Parkinson DK, Fetterolf DE, Ellis KJ, Wielopolski L, Vaswani AN, Cohn SH, Landrigan PJ, Puschett JB: Effects of elevated lead and cadmium burdens on renal function and calcium metabolism. *Arch Environ Health* 4:69-76, 1986.
68. Landrigan PJ, Stein GF, Kominsky JR, Ruhe RL, Watanabe AS: Common source community and industrial exposure to trichloroethylene. *Arch Environ Health* 42:327-332, 1987.
69. Rinsky RA, Smith AB, Hornung R, Filloon TG, Young RJ, Okun AH, Landrigan PJ: Benzene and Leukemia: An epidemiologic risk assessment. *New Engl J Med* 316:1044-1050, 1987.

70. Schwartz E, Landrigan PJ: Use of court records for supplementing occupational disease surveillance. *Am J Public Health* 77:1457-1458, 1987.
71. Rinsky RA, Melius JM, Hornung RW, Zumwalde RD, Waxweiler RJ, Landrigan PJ, Bierbaum PJ, Murray WE Jr: Case-control study of lung cancer in civilian employees at the Portsmouth Naval Shipyard, Kittery, Maine. *Am J Epidemiol* 127:55-64, 1988.
72. Schwartz J, Landrigan PJ, Feldman RG, Silbergeld EK, Baker EL Jr, VonLindern IH: Threshold effect in lead-induced peripheral neuropathy. *Pediatrics* 112:12-17, 1988.
73. Kraut A, Lilis R, Marcus M, Valciukas JA, Wolff MS, Landrigan PJ: Neurotoxic effects of solvent exposure on sewage treatment workers. *Arch Environ Health* 43:263-268, 1988.
74. Nicholson WJ, Landrigan PJ: Quantitative assessment of lives lost due to delay in regulation of occupational exposure to benzene. *Environ Health Perspect* 82:185-188, 1989.
75. Landrigan PJ, Halper LA, Silbergeld EK: Toxic air pollution across a state line: Implications for the siting of resource recovery facilities. *J Public Health Policy* 10:309-323, 1989.
76. Marino PE, Franzblau A, Lilis R, Landrigan PJ: Acute lead poisoning in construction workers - The failure of current protective standards. *Arch Environ Health* 44:140-145. 1989.
77. Fahs MC, Markowitz SB, Fischer E, Shapiro J, Landrigan PJ: The health costs of occupational disease in New York State. *Am J Ind Med* 16:437-449, 1989.
78. Landrigan PJ, Markowitz SB: Current magnitude of occupational disease in the United States: Estimates from New York State. *Ann NY Acad Sci* 572:27-45, 1989.
79. Wolff MS, Herbert R, Marcus M, Rivera M, Landrigan PJ, Andrews LR: PAH residues on skin in relation to air levels among roofers. *Arch Environ Health* 44:157-163, 1989.
80. Markowitz S, Landrigan P: The magnitude of the occupational disease problem: An investigation in New York State. *Toxicol Ind Health* 5:9-30, 1989.
81. Lilienfeld DE, Chan E, Ehland J, Godbold J, Landrigan PJ, Marsh G, Perl DP: Rising mortality from motoneuron disease in the U.S.A., 1962-1984. *Lancet* 1:710-713, 1989.
82. Elliott LJ, Halperin WE, Landrigan PJ: Perspectives on opportunities toward a hazard-free bioprocessing environment. In: *Bioprocessing Safety: Worker and Community Safety and Health Considerations*, ASTM STP 1051, WC Hyer Jr (ed). Philadelphia: American Society for Testing and Materials, pp 20-26, 1990.
83. Schwartz J, Landrigan PJ, Baker EL Jr, Orenstein WA, VonLindern IH: Lead-induced anemia: Dose-response relationships and evidence for a threshold. *Am J Public Health* 80:165-168, 1990.
84. Marino PE, Landrigan PJ, Graef J, Nussbaum A, Bayan G, Boch K, Boch S: A case report of lead paint poisoning during renovation of a Victorian farm house. *Am J Public Health* 80:1183-1185, 1990.
85. Herbert R, Marcus M, Wolff MS, Perera FP, Andrews L, Godbold JH, Rivera M, Stefanidis M, Quing Lu X, Landrigan PJ, Santella RM: Detection of DNA adducts in white blood cells of roofers by ^{32}P Postlabeling. In: *Complex Mixtures and Cancer Risk. Lyon: International Agency for Research on Cancer*. (Eds) H Vainio, M. Sorsa & AJ McMichael, pp 205-214, 1990.
86. Lilienfeld DE, Chan E, Ehland J, Godbold J, Landrigan PJ, Marsh G, Perl DP: Two decades of increasing mortality from Parkinson's disease among the nation's elderly. *Arch Neurol* 47:731-734, 1990.
87. Herbert R, Marcus M, Wolff MS, Perera FP, Andrews L, Godbold JH, Rivera M, Stefanidis M, Lu Q-X, Landrigan PJ, Santella RM: Detection of adducts of deoxyribonucleic acid in white blood cells of roofers by ^{32}P-postlabeling: Relationship of adduct levels to measures of polycyclic aromatic hydrocarbon exposure. *Scand J Work Environ Health* 16:135-143, 1990.

88. Lilienfeld DE, Chan E, Ehland J, Godbold J, Landrigan PJ, Marsh G: Mortality from pulmonary embolism in the United States: 1962-1984. *Chest* 98:1067-1072, 1990.

89. Kraut A, Chan E, Lioy PJ, Cohen FB, Goldstein BD, Landrigan PJ: Epidemiologic investigation of a cancer cluster in professional football players. *Environ Res* 56:131-143, 1991.

90. Rosenstock L, Rest KM, Benson JA Jr, Cannella JM, Cohen J, Cullen MR, Davidoff F, Landrigan PJ, Reynolds RC, Clever LH, Goldstein BD: Occupational and Environmental Medicine -- Meeting the Growing Need for Clinical Services (Special Article). *New Engl J Med* 325:924-927, 1991.

91. Johanning E, Wilder DG, Landrigan PJ, Pope MH: Whole-Body vibration exposure in subway cars and review of adverse health effects. *J Occup Med* 33:605-612, 1991.

92. Ehrlich R, Kattan M, Godbold J, Saltzberg DS, Grimm KT, Landrigan PJ, Lilienfeld DE: Childhood asthma and passive smoking: urinary cotinine as a biomarker of exposure. *Am Rev Respir Dis* 145:594-599, 1992.

93. Murata K, Landrigan PJ, Araki S: Effects of age, heart rate, gender, tobacco and alcohol ingestion on RR interval variability in human ECG. *J Autonomic Nervous System* 37:199-206, 1992.

94. Steenland K, Selevan S, Landrigan P: The mortality of lead smelter workers: an update. *Am J Public Health* 82:164l-1644, 1992.

95. McConnell R, Anderson K, Russell W, Anderson KE, Clapp R, Silbergeld EK, Landrigan PJ: Angiosarcoma, porphyria cutanea tarda and probable chloracne in a worker exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin-contaminated waste oil. *Br J Ind Med* 50:699-703, 1993.

96. Belville R, Pollack SH, Godbold JH, Landrigan PJ: Occupational injuries among working adolescents in New York State. *JAMA* 269:2754-2759 1993.

97. Markowitz SB, Nunez CM, Klitzman S, Munshi AA, Kim WS, Eisinger J, Landrigan PJ: Lead Poisoning Due to Hai Ge Fen. The porphyrin content of individual erythrocytes. *JAMA* 271:932-934, 1994.

98. Herbert R, Gerr F, Luo J, Harris-Abbott D, Landrigan PJ: Peripheral neurologic abnormalities among roofing workers: sentinel case and clinical screening. *Arch Environ Health* 50:349-354, 1995.

99. Lightdale JR, Oken E, Klein WM, Landrigan PJ, Welty TK: Psychosocial barriers to health promotion in a American Indian population. *American Indian and Alaska Native Mental Health Research* 7:34-49, 1997.

100. Herbert R, Plattus B, Kellogg L, Luo J, Marcus M, Mascolo A, Landrigan PJ: The union health center: A working model of clinical care linked to preventive occupational health services. *Am J Ind Med* 31:263-273, 1997.

101. Smith D, Herbert R, Schechter C, Phillips R, Diamond J, Carroll S, Weiner J, Dahms TE, Landrigan P: Occupational Coronary Heart Disease Among Bridge and Tunnel Officers. *Canadian J Cardiol* 13(Supp B):76B, 1997.

102. Leigh JP, Markowitz SB, Fahs M, Shin C, Landrigan PJ: Occupational injury and illness in the United States. Estimates of costs, morbidity, and mortality. *Arch Intern Med* 157:1557-1568, 1997.

103. Claudio L, Torres T, Sanjurjo E, Sherman LR, Landrigan PJ: Environmental Health Sciences Education - A Tool For Achieving Environmental Equity and Protecting Children. *Environ Health Perspect* 106:849-855, 1998.

104. Joellenbeck LM, Landrigan PJ, Larson EL: Gulf War Veterans' Illnesses: A Case Study in Causal Inference. *Environ Res* 79:71-81, 1998.

105. Ehrlich R, Robins T, Jordaan E, Miller S, Mbuli S, Selby P, Wynchank S, Cantrell A, De Broe M, D'Haese P, Todd AC, Landrigan PJ: Lead absorption and renal dysfunction in a South African battery factory. *Occup Environ Med* 55:453-460, 1998.

106. Claudio L, Tulton L, Doucette J, Landrigan PJ: Socioeconomic factors and asthma hospitalization rates in New York City. *J Asthma* 36:343-350, 1999.

107. Landrigan PJ, Claudio L, Markowitz SB, Berkowitz GS, Brenner BL, Romero H, Wetmur JG, Matte TD, Gore AC, Godbold JH, Wolff MS: Pesticides and inner-city children: Exposures, risks, and prevention. *Environ Health Perspect* 107 (Suppl 3):431-437, 1999.

108. Landrigan PJ, Suk WA, Amler RW: Chemical wastes, children's health, and the Superfund Basic Research Program. (Commentary). *Environ Health Perspect* 107:423-427, 1999.

109. Landrigan PJ: Risk assessment for children and other sensitive populations. In: Uncertainty in the Risk Assessment of Environmental and Occupational Hazards. *Annals of the New York Academy of Sciences* 895:1-9, 1999.

110. Marcus M, McChesney R, Golden A, Landrigan PJ: Video Display Terminals and Miscarriages. *J Am Wom Med Assoc* 55:84-88, 2000.

111. Forman J, Moline J, Cernichiari E, Sayegh S, Torres JC, Landrigan MM, Hudson J, Adel HN, Landrigan PJ: A cluster of pediatric metallic mercury cases treated with meso-2,3-Dimercaptosuccinic acid (DMSA). *Environ Health Perspect* 108: 575-577, 2000.

112. Herbert R, Schechter C, Smith DA, Phillips R, Diamond J, Carroll S, Weiner J, Dahms TE, Landrigan PJ: Occupational Coronary Heart Disease among Bridge and Tunnel Officers. *Arch Environ Health* 55:152-163, 2000.

113. Berkowitz GS, Wolff MS, Matte T, Susser E, Landrigan PJ: The Rationale for a National Prospective Cohort Study of Environmental Exposure and Childhood Development. *Environ Res* 85:59-68, 2001.

114. Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J. Environmental pollutants and disease in American children: Estimates of morbidity, mortality and costs for lead poisoning, asthma, cancer and developmental disabilities. *Environ Health Perspect* 110:721-728, 2002.

115. Etzel RA, Crain EF, Gitterman BA, Oberg C, Scheidt P, Landrigan PJ: Pediatric Environmental Health Competencies for Specialists. *Ambulatory Pediatrics* 3:60-63, 2003.

116. Berkowitz GS, Obel J, Deych E, Lapinski R, Godbold J, Liu Z, Landrigan PJ, Wolff MS. Exposure to indoor pesticides during pregnancy in a multiethnic urban cohort. *Environ Health Perspect* 111:79-84, 2003.

117. Berkowitz GS, Wolff MS, Janevic TM, Holzman IR, Yehuda R, Landrigan PJ. The World Trade Center Disaster and Intrauterine Growth Restriction. (Research Letter) *JAMA* 290:595-596, 2003.

118. Brenner BL, Markowitz S, Rivera M, Romero H, Weeks M, Sanchez E, Deych E, Garg A, Godbold J, Wolff MS, Landrigan PJ, Berkowitz G. Integrated Pest Management in an Urban Community – A Successful Partnership for Prevention. *Environ Health Perspect* 111:1649-1653, 2003.

119. Landrigan PJ, Kimmel CA, Correa A, Eskenazi B. Children's Health and the Environment: Public Health Issues and Challenges for Risk Assessment. *Environ Health Perspect* 112:257-265, 2003.

120. Landrigan P, Garg A, Droller DBJ. Assessing the Effects of Endocrine Disruptors in the National Children's Study. *Environ Health Perspect* 111:1678-1682, 2003.

121. Fewtrell LJ, Prüss A, Landrigan P, Ayuso-Mateos JL. Estimating the global burden of disease from environmental lead exposure. *Environ Res* 94:120-133, 2004.

122. Landrigan PJ, Lioy PJ, Berkowitz G, Chen LC, Chillrud SN, Georgopoulos PG, Geyh AS, Levin S, Perera F, Rappaport SM, Small C, Thurston G. Health and Environmental Consequences of the World Trade Center Disaster. The NIEHS World Trade Center Working Group. *Environ Health Perspect* 112:731-739, 2004.
123. Trasande L, Schechter C, Landrigan PJ: Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain. *Environ Health Perspect* 113:590-596, 2005.
124. Landrigan PJ, Sonawane B, Butler RN, Trasande L, Callan R, Droller D. Early Environmental Origins of Neurodegenerative Disease in Later Life. *Environ Health Perspect* 113:1230-1233, 2005.
125. Smith DA, Ness EM, Herbert R, Schechter CB, Phillips RA, Diamond JA, Landrigan PJ. Abdominal diameter index: a more powerful anthropometric measure for prevalent coronary heart disease risk in adult males. *Diabetes, Obesity & Metabolism* (in press), 2005.
126. Gobeille A, Morland K, Bopp R, Godbold J, Landrigan PJ: Body Burdens of Mercury in Lower Hudson River Area Anglers. *Env Res* 101:205-212, 2006.
127. Morland KB, Landrigan PJ, Sjödin A, Gobeille AK, Jones RS, McGahee EE, Needham LL, Patterson DG, Jr. Body Burdens of Polybrominated Diphenyl Ethers among Urban Anglers. *Environ Health Perspect* 113:1689-1692, 2005.
128. Boscarino JA, Adams RE, Foa EB, Landrigan PJ: A Propensity Score Analysis of Brief Worksite Crisis Interventions after the World Trade Center Disaster: Implications for Intervention and Research. *Med Care* 44:454-462, 2006.
129. Trasande L, Schechter C, Haynes KA, Landrigan PJ: Applying cost analyses to inform environmental health policy: mercury as a case study. *Annals of the New York Academy of Sciences* 1076: 911-923, 2006.
130. Golden AL, Berkowitz GS, Wolff MS, Godbold JH, Afilaka A, Chillrud SN, Bopp RF, Simpson HJ, Landrigan PJ. Body Burdens of Persistent Pollutants in Hudson River Anglers. *Environ Res* (submitted), 2005.
131. Trasande L, Schechter C, Haynes KA, Landrigan PJ. Mental Retardation and Prenatal Methylmercury Toxicity. *Am J Ind Med* 153-158, 2006.
132. Trasande L, Cronk CE, Leuthner SR, Hewitt JB, Durkin M, McElroy J, Anderson HA, Landrigan PJ. The Nationa Children's Study and the Children of Wisconsin. *Wisconsin Medical Journal* 105(2):45-49, 2006.
133. Trasande L, Schapiro ML, Falk R, Haynes KA, Behrmann A, Vohmann M, Stremski ES, Eisenberg C, Evenstad C, Anderson HA, Landrigan PJ. Pediatrician Attitudes and Knowledge of Environmental Health in Wisconsin. *Wisconsin Medical Journal* 105(2):50-54, 2006.
134. Trasande L, Boscarino J, Graber N, Falk R, Schechter C, Galvez, M, Dunkel G, Geslani J, Moline J, Kaplan-Liss E, Miller RK, Korfmacher K, Carpenter D, Forman J, Balk SJ, Laraque D, Frumkin H, Landrigan PJ. The Environment in Pediatric Practice: A Study of New York Pediatricians' Attitudes, Beliefs, and Practices towards Children's Environmental Health. *J Urban Health* 83(4):760-772, 2006.
135. Grandjean P, Landrigan PJ. Developmental neurotoxicity of industrial chemicals: A silent pandemic. *Lancet* 368(9553):2167-2178, 2006.
136. Landrigan PJ, Trasande L, Thorpe LE, Gwynn C, Lioy PJ, D'Alton ME, Lipkind HS, Swanson J, Wadhwa PD, Clark EB, Rauh VA, Perera FP, Susser E. The National Children's Study: A 21-year prospective study of 100,000 American children. *Pediatrics* 118(5):2173-2186, 2006.
137. Herbert R, Moline J, Skloot G, Metzger K, Baron S, Luft B, Markowitz S, Udasin I, Harrison D, Stein D, Todd A, Enright P, Stellman JM, Landrigan PJ, Levin S. The World Trade Center Disaster and the Health of Workers: Five-Year Assessment of a Unique Medical Screening Program. *Environ Health Perspect* 114:1853-1858, 2006.
138. Landrigan PJ, Woolf AD, Gitterman B, Lanphear B, Forman J, Karr C, Moshier EL, Steiner JF, Godbold J, Crain E. The Ambulatory Pediatric Association Fellowship in Pediatric Environmental Health: A Five-Year Assessment. *Environ Health Perspect* 115:1383-1387, 2007.

139. Chemtob CM, Conroy DL, Hochauser CJ, Laraque D, Banks J, Schmeidler J, Cruz MD, Nelson WC, Landrigan PJ. Children who lost a parent as a result of the terrorist attacks of September 11, 2001: Registry construction and population description. *Death Studies* 31:87-100, 2007.

140. Magdo HS, Forman J, Graber N, Newman B, Satlin L, Amler R, Winston JA, Landrigan PJ. Grand Rounds: Nephrotoxicity in a Young Child Exposed to Uranium from Contaminated Well Water. *Environ Health Perspect* 115(8):1237-1241, 2007.

141. Moline JM, Herbert R, Levin S, Stein D, Luft BJ, Udasin IG, Landrigan PJ. WTC Medical Monitoring and Treatment Program: Comprehensive Health Care Response in Aftermath of Disaster. *Mount Sinai J Med* 75:67-75, 2008.

142. Stellman JM, Smith RP, Katz CL, Sharma V, Charney DS, Herbert R, Moline J, Luft BJ, Markowitz S, Udasin I, Harrison D, Baron S, Landrigan PJ, Levin SM, Southwick S. Enduring Mental Health Morbidity and Social Function Impairment in World Trade Center Rescue, Recovery and Cleanup Workers: The Psychological Dimension of an Environmental Health Disaster. *Environ Health Perspect*, 116(9):1248-1253, 2008.

143. Rauh VA, Landrigan PJ, Claudio L. Housing and Health: Intersection of Poverty and Environmental Exposure. *Ann N Y Acad Sci* 1136:276-288, 2008.

144. Trasande L, Cronk C, Durkin M, Weiss M, Schoeller DA, Gall EA, Hewitt JB, Carrel AL, Landrigan PJ, Gillman MW. Environment and Obesity in the National Children's Study. *Environ Health Perspect* 117:159-166, 2009. PMID: 19270782

145. Moline JM, Herbert R, Crowley L, Troy K, Hodgman E, Ghukla G, Udasin I, Luft B, Wallenstein S, Landrigan P, Savitz DA. Multiple Myeloma in World Trade Center Responders: A Case Series. *J Occup Environ Med* 2009 Aug;51(8):896-902. PMID: 19620891

146. Zajac L, Sprecher E, Landrigan PJ, Trasande L. A systematic review of U.S. state environmental legislation and regulation with regards to the prevention of neurodevelopmental disabilities and asthma. *Environmental Health* 2:9, 2009. doi: 10.1186/1476-069X-8-9.PMID: 19323818

147. Tornheim JA, Morland KB, Landrigan PJ, Enrique Cifuentes. Water Privatization, Water Source, and Pediatric Diarrhea in Bolivia. *Int J Occup Environ Health* 15:241-248, 2009. PMID: 19323818

148. Lioy PJ, Isukapalli SS, Trasande L, Thorpe L, Dellarco M, Weisel C, Georgopoulos PG, Yung C, Brown M, Landrigan P. Using National and Local Extant Data to Characterize Environmental Exposures in the National Children's Study (NCS): Queens County, New York. *Environ Health Perspect* 117:1494-1504, 2009. PMID: 20019897

149. Miodovnik A, Landrigan PJ. The U.S. Food and Drug Administration Risk Assessment on Lead in Women's and Children's Vitamins is Based on Outdated Assumptions. (Commentary) *Environ Health Perspect* 17:1021-1022, 2009.

150. Landrigan PJ. What causes autism? Exploring the environmental contribution. *Curr Opin Pediatr* 2010, 22(2):219-25. Review. DOI: 10.1097/MOP.0b013e328336eb9a PMID: 20087185

151. Trasande L, Cortes JE, Landrigan PJ, Abercrombie MI, Bopp RF, Cifuentes E. Methylmercury exposure in a subsistence fishing community in Lake Chapala, Mexico: an ecological approach. *Environ Health* 9:1-10, 2010. doi: 10.1186/1476-069X-9-1. PMID 20064246

152. Cifuentes E, Trasande L, Ramirez M, Landrigan PJ. A qualitative analysis of environmental policy and children's health in Mexico. *Environ Health* 9:14, 2010. PMID: 20331868

153. Fleisch A, Sheffield P, Chinn C, Edelstein B, Landrigan P. Bisphenol A and Related Compounds in Dental Materials. *Pediatrics* 126:760–768, 2010. PMID: 20819896

154. Landrigan PJ, Rauh VA, Galvez MP. Environmental Justice and the Health of Children. *Mount Sinai J Med* 77:178-187, 2010.

155. Sheffield PE, Landrigan PJ. Global climate Change and Children's Helath: Threats and Strategies for Prevention. *Environ Health Perspect* 113(3):291-298, 2011. PMID 20947468

156. Crowley LE, Herbert R, Moline JM, Wallenstein S, Shukla G, Schechter C, Skloot GS, Udasin I, Luft BJ, Harrison D, Shapiro M, Wong K, Sacks HS, Landrigan PJ, Teirstein AS. "Sarcoid Like" Granulomatous Pulmonary Disease in World Trade Center Disaster Responders. *Am J Ind Med* 54:175-184, 2011.

157. Landrigan PJ, Goldman LR. Children's Vulnerability to Toxic Chemicals: A Challenge and Opportunity to Strengthen Health and Environmental Policy. *Health Affairs* 30(5):842-850, 2011.

158. Landrigan PJ, Ripp J, Murphy RJC, Claudio L, Jao J, Hexom B, Bloom HG, Shirazian T, Elahi E, Koplan JP. New Academic Partnerships in Global Health: Innovations at Mount Sinai School of Medicine. *Mount Sinai J Med.* 78:470-482, 2011.

159. Camargo MC, Stayner LT, Straif K, Reina M, Al-Alem U, Demers PA, Landrigan PJ. Occupational Exposure to Asbestos and Risk of Ovarian Cancer: A Meta-Analysis. *Environ Health Perspect* 119(9):1211-7, 2011.

160. Wisnivesky JP, Teitelbaum S, Todd A, Boffetta P, Crane M, Crowley L, Dellenbaugh C, Harrison D, Herbert R, Hyun K, Jeon Y, Kaplan J, Katz C, Levin S, Luft B, Markowitz S, Moline J, Osbay F, Pietrzak R, Shapiro M, Sharma V, Skloot G, Southwick S, Stevenson L, Udasin I, Wallenstein S, Landrigan PJ. Persistence of multiple illnesses in World Trade Center rescue and recovery workers: a cohort study. *Lancet* 378: 888–897, 2011.

161. Woskie S, Hyyun K, Freund A, Stevenson L, Park BY, Baron S, Herbert R, de Hernandez MS, Teitelbaum S, de la Hoz, RE, Wisnivesky JP, Landrigan PJ. World Trade Center Disaster: Assessment of Responder Occupations, Work Locations and Job Tasks. *Am J Ind Med* 54:681-695, 2011.

162. Kim H, Herbert R, Landrigan P, Markowitz SB, Moline JM, Savitz DA, Todd AC, Udasin IG, Wisnivesky JP. Increased Rates of Asthma Among World Trade Center Disaster Responders. *Am J Ind Med* 55:44-53, 2012.

163. Caravanos J, Chatham-Stephens K, Ericson BC, Landrigan PJ, Fuller R. The Burden of Disease from Pediatric Lead Exposure at Hazardous Waste Sites in 7 Asian Countries. *Environ Res* 120:119-125, 2012. http://dx.doi.org/10.1016/j.envres.2012.06.006.

164. Isukapalli S, Brinkerhoff CJ, Xu S, Dellarco M, Landrigan PJ, Lioy PJ, Georgopoulos PG. Exposure Indices for the National Children's Study: Application to inhalation exposures in Queens County, NY. *J Expo Sci Environ Epidemiol*, 2012. doi:10.1038/jes.2012.99 PMID: 23072768.

165. Pietrzak RH, Schechter CB, Bromet EJ, Katz CL, Reissman DB, Ozbay F, Sharma V, Crane M, Harrison D, Herbert R, Levin SM, Luft BJ, Moline JM, Stellman JM, Udasin IG, Landrigan PJ, Southwick SM. The burden of full and subsyndromal posttraumatic stress disorder among police involved in the World Trade Center rescue and recovery effort. *J Psych Research* 46:835-842, 2012.

166. Lucchini RG, Crane MA, Crowley L, Globina Y, Milek DJ, Boffetta P, Landrigan PJ. The World Trade Center health surveillance program: results of the first 10 years and implications for prevention. *G Ital Med Lav Erg*, 34:3, Suppl 539-533, 2012.

167. Pietrzak RH, Feder A, Singh R, Schechter CB, Bromet EJ, Katz CL, Reissman DB, Ozbay F, Sharma V, Crane M, Harrison D, Herbert R, Levin SM, Luft BJ, Moline JM, Stellman JM, Udasin IG, Landrigan, PJ, Southwick S M. Trajectories of PTSD risk and resilience in World Trade Center responders: An 8-year prospective cohort study. *Psychological Medicine*, pp 1-15, April 2013. DOI: http://dx.doi.org/10.1017/S0033291713000597

168. Schwartz AW, Clarfield AM, Doucette JT, Valinsky L, Karpati T, Landrigan PJ, Sternberg SA. Dispartities in pneumococcal and influenza immunization among older adults in Israel: A cross-sectional analysis of socio-demographic barriers to vaccination. *Preventive Medicine* 56:337-340, 2013. http://dx.doi.org/10.1016/j.ypmed.2013.01.019
169. Pietrzak RH, Feder A, Schechter CB, Singh R, Cancelmo L, Bromet EJ, Katz CL, Reissman DB, Ozbay F, Sharma V, Crane M, Harrison D, Herbert R, Levin SM, Luft BJ, Moline JM, Stellman JM, Udasin IG, El-Gabalawy R, Landrigan PJ, Southwick SM. Dimensional structure and course of post-traumatic stress symptomatology in World Trade Center responders. (Original Article) *Psychological Medicine,* pp 1-14. Cambrindge University Press, 2013.
170. Ericson B, Caravanos J, Chatham-Stephens, Landrigan P, Fuller R. Approaches to systematic assessment of environmental exposures posed at hazardous waste sites in the developing world: the Toxic Sites Identification Program. *Environ Monit Assess* 185:1755-1766, 2013. PMID: 22592783.
171. Chatham-Stephens K, Caravanos J, Ericson B, Sunga-Amparo J, Susilorini B, Sharma P, Landrigan PJ, Fuller R. Burden of Disease from Toxic Waste Sites in India, Indonesia, and the Philippines in 2010. *Environ Health Perspect* 121:791-796, 2013.
172. Solan S, Wallenstein S, Shapiro M, Teitelbaum SL, Stevenson L, Kochman A, Kaplan J, Dellenbaugh C, Kahn A, Biro FN, Crane M, Crowley L, Gabrilove J, Gonsalves L, Harrison D, Herbert R, Luft B, Markowitz SB, Moline J, Niu X, Sacks H, Shukla G, Udasin I, Lucchini RG, Boffetta P, Landrigan PJ. Cancer Incidence in World Trade Center Rescue and Recovery Workers; 2001-2008. *Environ Health Perspect* 121:699-704, 2013.
173. Espina C, Porta M, Schüz, Aguado IH, Percival RB, Dora C, Slevin T, Guzman JR, Meredith T, Landrigan PJ, Neira M. Environmental and Occupational Interventions for Primary Prevention of Cancer: A Cross-Sectorial Policy Framework. *Environ Health Perspect* 121:420-426, 2013.
174. Individual Scientists. Statement in Response to Asbestos Industry Efforts to Prevent a Ban on Asbestos in Pakistan: Chrysotile Asbestos Use is Not Safe and Must Be Banned. (Letter to Editor). *Arch Environ Occup Health* 68:243-249, 2013.
175. Grandjean P, Landrigan PJ. Neurobehavioural effects of developmental toxicity. *Lancet Neurol* 13:330-338, 2014.
176. Tolins M, Ruchirawat M, Landrigan P. The Developmental Neurotoxicity of Arsenic: Cognitive and Behavioral Consequences of Early Life Exposure. *Annals of Global Health* 80:303-314, 2014.
177. Landrigan PJ, Fuller R. Environmental pollution: An enormous and invisible burden on health systems in low- and middle-income countries. *World Hospitals and Health Services* 4:35-40, 2014.
178. Chatham-Stephens K, Caravanos J, Ericson B, Landrigan P, Fuller R. The pediatric burden of disease form lead exposure at toxic waste sites in low and middle income countries. *Environ Research* 132:379-383, 2014.
179. Georgopoulos PG, Brinkerhoff CJ, Isukapalli S, Dellarco M, Landrigan PJ, Lioy PJ. A tiered framework for risk-relevant chacterization and ranking of chemical exposures: applications to the National Children's Study (NCS). *Risk Analysis* 34:1299-1316, 2014.
180. Laborde A, Tomasina F, Bianchi F, Bruné M-N, Buka I, Comba P, Corra L, Cori L, Dufffert CM, Harari R, Iavarone I, McDiarmid MA, Gray KA, Sly PD, Soares A, Suk WA, Landrigan PJ. Children's Health in Latin America: The Influence of Environmental Exposures. *Environ Health Perspect* 123:201-209, 2015. In print: http://dx.doi.org/10.1289/ehp.1408292
181. Sly P, Carpenter D, Van den Berg M, Stein R, Landrigan P, Brune-Drisse MN, Suk W. Health consequences of environmental exposures: What is an environmental disease? *Lancet* 2015, in press.

ORIGINAL, PEER-REVIEWED PUBLICATIONS (cont)

182. Landrigan P, Ruchirawat M, Silva E, Huo X, Diaz-Barriga F, Zar H, King M, Ha EH, Asante KA, Ahanchian H. Health consequences of environmental exposures in early life: Changing global patterns of exposure and disease with data from the CEH WHO collaborating centers' network. *Lancet* 2015, in press.
183. E-Waste and Harm to Vulnerable Populations: A Growing Global Problem. Heacock M, Kelly CB, Asante KA, Birnbaum LS, Bergman AL, Bruné M-N, Buka I, Carpenter DO, Chen A, Huo X, Kamel M, Landrigan PJ, Magalini F, Diaz-Barriga F, Neira M, Omar M, Pascale A, Ruchirawat M, Sly L, Sly PD, van den Berg M, Suk W. (Commentary). *Environ Health Perspect* 124:550-555, 2016. DOI:10.1289/ehp.1509699.
184. Li Q, Kappil MA, Li A, Dassanyake PS, Darrah TH, Friedman AE, Friedman M, Lambertini L, Landrigan P, Stodgell CJ, Xia Y, Nanes JA, Aagaard KM, Schadt EE, Murray JC, Clark EB, Dole N, Culhane J, Swanson J, Varner M, Moye J, Kasten C, Miller RK, Chen J. Exploring the associations between microRNA expression profiles and environmental pollutants in human placenta from the National Children's Study (NCS). *Epigenetics* 10:793-802, 2015.
185. Heindel JJ, Balbus J, Birnbaum L, Brune-Drisse MN, Grandjean P, Gray K, Landrigan PJ, Sly PD, Suk W, Cory Slechta D, Thompson C, Hanson M. Developmental Origins of Health and Disease: Integrating Environmental Influences. *Endocrinology,* Mini Review 1-5, 2015. PMID: 26241070.
186. Landrigan PJ, Wright RO, Cordero JF, Eaton DL, Goldstein BD, Hennig B, Maier RM, Ozonoff DM, Smith MT, Tukey RH. The NIEHS Superfund Research Program: 25 Years of Translational Research for Public Health. (Commentary). *Environ Health Perspect* 123:909-918, 2015.
187. Feder A, Mota N, Salim R, Rodriguez J, Singh R, Schaffer J, Schechter C, Cancelmo L, Bromet EJ, Katz CL, Reissman DB, Ozbay F, Kotov R, Crane M, Harrison DJ, Herbert R, Levin SM, Luft BJ, Moline JM, Stellman JM, Udasin IG, Landrigan PJ, Zvolensky MJ, Yehuda R, Southwick SM, Pietrzak RH. Risk, Coping and PTSD Symptom Trajectories in World Trade Center Responders. *Journal of Psychiatric Research* 2016, in press.

BOOKS

1. Landrigan PJ, Selikoff IJ (editors). Occupational Health in the 1990's: Developing a Platform for Disease Prevention. Annals NY Academy of Sciences: 572 1-296, 1989.
2. Landrigan PJ. (Chair): Environmental Neurotoxicology. Commission on Life Sciences, National Research Council. Washington: National Academy Press, 1992.
3. Landrigan PJ (Chair): Pesticides in the Diets of Infants and Children. Committee on Pesticides in the Diets of Infants and Children. Board on Agriculture, and Commission on Life Sciences. National Research Council. Washington: National Academy Press, 1993.
4. Landrigan PJ, Needleman HL: Raising Children Toxic Free. How to Keep Your Child Safe From Lead, Asbestos, Pesticides and Other Environmental Hazards. New York: Farrar, Straus and Giroux, 1994.
5. Araki S: Neurobehavioral Methods and Effects in Occupational and Environmental Health. Ed. Araki S, Associate Eds. Gilioli R, Landrigan PJ, Yokoyama K. Academic Press, New York, 1994.
6. Leigh JP, Markowitz S, Fahs M, Landrigan P: Costs of Occupational Injuries and Illnesses. Ann Arbor: The University of Michigan Press, 2000.
7. Landrigan PJ, Needleman HL, Landrigan M. Raising Healthy Children in a Toxic World: 101 Smart Solutions for Every Family. Emmaus PA: Rodale Press, 2002.
8. Mehlman MA, Bingham E, Landrigan PJ, Soffritti M, Belpoggi F, Melnick RL. Carcinogenesis Bioassays and Protecting Public Health. Commemorating the lifework of Cesare Maltoni and colleagues. Annals of the New York Academy of Sciences (Vol. 982), New York, NY. GYAT/B-M Press, 2002.
9. Landrigan PJ, Etzel RA (Editors). *Textbook of Children's Environmental Health.* London: Oxford University Press, November 2013.

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OTHER PUBLICATIONS:

REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS

1. Landrigan PJ: Measles (Rubella). In: Immunization Against Disease – 1972. *Center for Disease Control*, 1972.
2. Landrigan PJ: Can measles vaccine cause hearing loss? *JAMA* 219:92, 1973.
3. McLaren GC, Barthel WF, Landrigan PJ: Screening for lead poisoning: Measurements and methodology. (Letter) *Pediatrics* 52:303, 1973.
4. Landrigan PJ: The exposure of children to lead from industry: Epidemiology and health consequences. In: *Proceedings of National Conference on Health Effects of Occupational Lead and Arsenic Exposure*, Chicago, February 24-25, 1975. HEW Pub. No. (NIOSH) 76-134, pp 147-156.
5. Landrigan PJ, Earl JL, Chow TJ: Biogeochemical studies of lead isotopes near a smelter. In: *Proceedings of the Second International Conference on Stable Isotopes*, Oak Brook, Illinois, October 20-23, 1975.
6. Bridbord K, Wagoner J, Blejer H, Landrigan PJ, Lemen R: The role of epidemiology in assessing the health effects of metals. In: Proceedings of the International Conference on Environmental Sensing and Assessment, Las Vegas, Nevada, September 14, 1975.
7. Landrigan PJ, Baker EL: Increased lead absorption with anemia and subclinical neuropsychologic dysfunction in children near two lead smelters. In: Proceedings of the International Conference on Heavy Metals in the Environment, Toronto, Ontario, Canada, October 27-31, 1975.
8. Landrigan PJ, Carter CD, Modlin FJ, Henderson RH, Edwards PQ: Infectious disease in adolescence. In: Adolescent Medicine Topics, Vol. I, (Ed) Ralph I. Lopez. New York: Spectrum Publications, 1976.
9. Landrigan PJ, Feldman RG, Baker EL, Coski CL, Hayes MK, Bernstein R, Cohen S: Lead absorption and slowed nerve conduction in children near a leadsmelter. (Abstract) *Neurology* 26:391-392, 1976.
10. Baker EL, Landrigan PJ, Harrington JM: Perspectives on environmental health: Vignettes from recent epidemiologic investigations. In: Toxic Torts: Tort Actions for Cancer and Lung Disease Due to Environmental Pollution. (Eds) Rheingold PD, Landau NJ, Canavan MM. Washington: The Association for Trial Lawyers of America, 1977.
11. Landrigan PJ, Baker EL: Child health and environmental lead. Letter to the Editor. *Brit Med J* 1:836, 1977.
12. Landrigan PJ, Baker EL: Reply to a note concerning the papers of Landrigan and associates. Letter to the Editor. *Peds* 91:515, 1977.
13. Baker EL, Landrigan PJ, Glueck CJ, Zack MM, Liddle JA, Burse VW: Metabolic consequences on population exposure to polychlorinated biphenyls. (Abstract) *Clin Res* 26:657A, 1978.

13.1 Miller RW, Brent RL, Brown AK, Finberg L, Frantz C, Goldbloom VC, Heavenrich RM, Peebles TC, Stevenson JL, Jr., Falk H, Knelson JH, Landrigan PJ, Rogan, WJ. National Standad for Airborne Lead: Committee on Environmental Hazards. *Peds* 62:1070-1071, 1978.

14. Landrigan PJ: Neurologic effects of exposure to lead. Letter to the Editor. *Peds* 94:504-505, 1979.
15. Landrigan PJ, Whitworth RH, Feldman RG: Neurotoxicologic evaluations of children with chronic increased lead absorption. (Abstract) In: Proceedings of the International Conference on Critical Current Issues in Environmental Health Hazard. Tel Aviv, Israel; 4-7, p 112, March 1979.
16. Landrigan PJ, Baker EL: Occupational lead poisoning: Clinical and biochemical findings related to blood lead levels. (Abstract) *Am J Epidemiol* 110:357, 1979.

EPA-HQ-2018-000065-0001162

OTHER PUBLICATIONS:
REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS (cont)

17. Landrigan PJ, Baker EL, Whitworth RH, Feldman RG: Neuroepidemiologic evaluations of children with chronic increased lead absorption. In: Low Level Lead Exposure: The Clinical Implications of Current Research. (Ed) Needleman HL. New York: Raven Press, 1980, pp 17-33.
18. Landrigan PJ, Kreiss K, Xintaras C, Feldman RG, Heath CW: Clinical epidemiology of occupational neurotoxic disease. *Neurobehav Toxicology* 2:43-48, 1980.
19. Landrigan PJ: General population exposure to environmental concentrations of halogenated biphenyls. Chapter 9A. Halogenated Biphenyls, Terphenyls, Napthalenes, Dibenzodioxins, and Related Products. (Ed) Kimbrough RD. Amsterdam: Elsevier, 1980, pp 267-286.
20. Halperin WE, Landrigan PJ: No time for vertigo. (Letter) *New Engl J Med* 303:467, 1980.
21. Landrigan PJ, Baker EL: Exposure of children to heavy metals from smelters: Epidemiology and toxic consequences. *Environ Res* 25:204-244, 1981.
22. Landrigan PJ: Arsenic: State of the Art. *Am J Ind Med* 2:5-14, 1981.
23. Needleman HL, Landrigan PJ: The health effects of low level exposure to lead. *Annual Rev Publ Health* 2:277-298, 1981.
24. Landrigan PJ, Harrington JM: Gynecomastia. (Letter) *New Engl J Med* 304:234-235, 1981.
25. Landrigan PJ, Hayes CG, Graham MG: Sources of lead for lead workers' children - A directory of scrap smelters. Appendix. *Pediatrics* 68:228-230, 1981.
26. Landrigan PJ, Gross RL: Chemical wastes - Illegal hazards and legal remedies. (Editorial) *Am J Public Health* 71:985-987, 1981.
27. Landrigan PJ: Toxic exposures and psychiatric diseases: An epidemiologic approach. In: Proceedings of the Third World Congress of Biological Psychiatry, Stockholm, 1981. Amsterdam: Elsevier North Holland Biomedical Press, 1981, pp 108-113.
28. Waxweiler RJ, Landrigan PJ, Infante P, Shapiro R: Introduction to Conference to Re-Evaluate the Toxicity of Vinyl Chloride Monomer, Poly (Vinyl Chloride) and Structural Analogs. *Environ Health Perspect* 41:1, 1981.
29. Landrigan PJ: Recent advances in the assessment of workplace exposure - Epidemiologic linkage of medical and environmental data. *J Environ Sci Health* A17:499-513, 1982.
30. Landrigan PJ: Increased lead absorption with anemia and slowed nerve conduction in children near a lead smelter. In: Proceedings of an International Workshop on Plans for Clinical and Epidemiologic Follow-up after Area-Wide Chemical Contamination. Washington, DC: National Academy of Sciences, 1982, pp 74-84.
31. Landrigan PJ: Cohort study of Michigan residents exposed to polybrominated biphenyls: Epidemiologic and immunologic findings. In: Proceedings of an International Workshop on Plans for Clinical and Epidemiologic Follow-up after Area-Wide Chemical Contamination. Washington, DC: National Academy of Sciences, 1982, pp 99-112.
32. Landrigan PJ: Epidemiology of lead and other metal poisonings in children. In: Chemical and Radiation Hazards to Children. Report of the 84th Ross Conference on Pediatric Research. Columbus, Ohio: Ross Laboratories, 1982, pp 40-49.
33. Landrigan PJ: Lead study results questioned. (Letter) *Pediatrics* 69:248, 1982.

EPA-HQ-2018-000065-0001163

OTHER PUBLICATIONS:
REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS (cont)

34. Landrigan PJ: Cancer: The Right to Know. (Guest Editorial) The Cincinnati Enquirer, April 2, 1982.
35. Landrigan PJ: Occupational and community exposures to toxic metals - lead, cadmium, mercury and arsenic. *Western J Med* 137:532-539, 1982.
36. Landrigan PJ, Rinsky RA, Waxweiler RJ: Epidemiologic assessment of occupational illness caused by exposures to petrochemicals. Proceedings of the Seventh Alaska Health Congress, 1982, pp 84-96.
37. Landrigan PJ, Cohen ML, Dowdle W, Elliott LJ, Halperin WE: Medical surveillance of biotechnology workers: Report of the CDC/NIOSH Ad Hoc Working Group on Medical Surveillance for Industrial Applications of Biotechnology. NIH Recombinant DNA Technical Bulletin 5:133-138, 1982.
38. Landrigan PJ: Epidemiologic approaches to persons with exposure to waste chemicals. *Environ Health Perspect* 48:93-97, 1983.
39. Landrigan PJ, Melius JM, Rosenberg MJ, Coye MJ, Binkin NJ: Reproductive hazards in the workplace: Development of epidemiologic research. *Scand J Work Environ Health* 9:83-88, 1983.
40. Landrigan PJ: Toxic exposures and psychiatric disease – Lessons from the epidemiology of cancer. *Acta Psychiatrica Scandinavica* 67 Suppl 303:6-15, 1983.
41. Landrigan PJ, Baker EL: Epidemiological aspects of occupational lead poisoning. *J Univ Occup Environ Health* (Japan) 5 Suppl:145-155, 1983.
42. Rinsky RA, Landrigan PJ: Data on lung cancer in radiation workers. (Letter) *Proc Royal Soc Med* 76:324-325, 1983.
43. Landrigan PJ: Occupational and pediatric aspects of lead toxicity. *Veterinary and Human Toxicology* 25(Suppl):1-6, 1983.
44. Landrigan PJ: Lead Exposure, Lead Absorption and Lead Toxicity in the Children of Port Pirie: A Second Opinion. Report to the Minister of Health of South Australia. Adelaide, 1983.
45. Landrigan PJ, Rinsky RA: The contribution of epidemiology to the development of disease prevention policy. In: Proceedings of a Conference on Health-Related Claims: Can the Tort and Compensation Systems Cope? Arlington, VA: National Legal Center for the Public Interest, 1983, pp 56-75.
46. Landrigan PJ: Arsenic. Chapter 41. In: Environmental and Occupational Medicine. (Ed) Rom WN. Boston: Little, Brown and Co., 1983.
47. Landrigan PJ, Bridbord K: Additional exposure routes. In: Changing Metal Cycles and Health. Dahlem Konferenzen. (Ed) Nriagu JO. Berlin:Springer-Verlag, 1984.
48. Landrigan PJ, Harrington JM, Elliott LK: The Biotechnology Industry. In: Recent Advances in Occupational Health. Vol. 2. (Ed) Harrington JM. London: Churchill, Livingstone, 1984, pp 3-13.
49. Landrigan PJ, Meinhardt TJ, Gordon J, Lipscomb JA, Berg JR, Mazzuckelli LR, Lewis TR, Lemen RA: Ethylene oxide: An overview of toxicologic and epidemiologic research. *Am J Ind Med* 6:103-116, 1984.
50. Landrigan PJ, Bainbridge JK, Melius JM: Multidisciplinary approach to prevention and health monitoring: Role of individual disciplines. Medical Inspectors/Medical Officers. In: Assessment of Toxic Agents at the Workplace - Roles of Ambient and Biological Monitoring. (Eds) Berlin A, Yodaiken RE, Henman BA. Boston: Kluwer Academic Publishers (for the Commission of the European Communities), 1984.
51. Landrigan PJ, Houk VN: EPA Review of Lead Study. Letter to the Editor. *Science* 223:118, 1984.

EPA-HQ-2018-000065-0001164

52. Moody L, Halperin WE, Fingerhut MA, Landrigan PJ: The chronic health effects of occupational exposure to dioxins: Unanswered questions. (Editorial) *Am J Ind Med* 5:157-160, 1984.
53. Landrigan PJ, Goyer RA, Clarkson TW, Sandler DP, Smith JH, Thun MJ, Weeden RP: The work-relatedness of renal disease and summary of the work group on renal disease. *Arch Environ Health* 39:225-230, 250, 1984.
54. Landrigan PJ, Rinsky RA: The application of epidemiology to the prevention of occupational cancer. *J Toxicol* 22:209-238, 1984.
55. Reeve GR, Halperin WE, Landrigan PJ: Brain tumor investigations in Texas. In: Proceedings of a Conference on Cancer in Texas. San Antonio: January 1984.
56. Landrigan PJ, Rinsky RA, Melius JM, Thun MJ: Approaches to the estimation of exposure in occupational and environmental epidemiology. Proceedings of the Banbury Center Conference on Risk Quantitation and Regulatory Policy, 1984.
57. Landrigan PJ, Froines JR, Mahaffey KR: Body lead burden: A summary of epidemiological data on its relation to environmental sources and toxic effects. Chapter 14. In: Dietary and Environmental Lead: Human Health Effects. (Ed) Mahaffey KR. Amsterdam: Elsevier Scientific Publishers, 1985.
58. Landrigan PJ: The importance of occupational cohorts in chronic disease epidemiology. Chairman's Remarks. *NCI Monograph* 67; 83, 1985.
59. Melius JM, Landrigan PJ: Occupational Health. In: Introduction to Environmental Health. (Ed) Blumenthal DS. New York: Springer Publishing Company, 1985.
60. Landrigan PJ: The uses of epidemiology in the study of neurotoxic pollutants - Lessons from the workplace. *Int J Mental Health* 14:44-63, 1985.
61. Brigham CR, Landrigan PJ: Safety and health in boat building and repair. *Am J Ind Med* 8:169-182, 1985.
62. Baker EL Jr, Smith TJ, Landrigan PJ: The neurotoxicity of industrial solvents: A review of the literature. *Am J Ind Med* 8:207-217, 1985.
63. Landrigan PJ: Academic occupational health and environmental medicine: Current directions. *Bull NY Acad Med* 61:901-916, 1985.
64. Landrigan PJ, Gehlbach SH, Graef JW, Hanson JW, Nathenson G: Smokeless Tobacco - A carcinogenic hazard to children. Committee on Environmental Hazards, American Academy of Pediatrics. *Pediatrics* 76:1009-1011, 1985.
65. Rosenstock L, Landrigan PJ: Occupational Health: The intersection between clinical medicine and public health. *Ann Rev Pub Health* 7:337-356, 1986.
66. Landrigan PJ, Robbins A: Foreword to The Hawk's Nest Incident: America's Worst Industrial Disaster. Cherniack MG. New Haven: Yale University Press, 1986.
67. Boardman B, Greaves I, Levenstein C, Landrigan PJ: The Pattern of White House Budget Office Decisions in Environmental Health Research: A Statistical Analysis. Report to Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, U.S. House of Representatives and to the American Public Health Association. September 29, 1986.
68. Wilkinson CW, Landrigan PJ, Eck J: Violent deaths: The mortality experience of police officers. (Abstract) Presented at the Annual Meeting of the Epidemiology Section of the International Commission on Occupational Health, Los Angeles, CA, September 1986.

69. Landrigan PJ: Epidemiologic and toxicologic analyses of the neurotoxicity of new materials. (Abstract) Presented at a Symposium on Health and Safety of New Technologies, "Workplace 2000." Boston, November 13-14, 1986.
70. Landrigan PJ, DiLiberti JH, Graef JW, Hanson JW, Nathenson G: Involuntary Smoking - A Hazard to Children. Committee on Environmental Hazards, American Academy of Pediatrics. *Pediatrics* 77:755-757, 1986.
71. Nelson N, Levine RJ, Albert RE, Blair AE, Griesemer RA, Landrigan PJ, Stayner LT, Swenberg JA: Contribution of Formaldehyde to Respiratory Cancer. *Environ Health Perspect* 70:23-35, 1986.
72. Cone JE, Reeve GR, Landrigan PJ: Clinical and epidemiologic studies. In: Toxic Substances and Human Risk - Principles of data interpretation. (Eds) Tardiff RB, Rodricks JV. New York: Plenum Press 1987, pp 95-120.
73. Hoel DG, Landrigan PJ: Comprehensive evaluation of human data. Chapter 7. In: Toxic Substances and Human Risk - Principles of data interpretation. Principles for the Evaluation of Toxic Hazards to Human Health. (Eds) Tardiff RB, Rodricks JV. New York: Plenum Press 1987, pp 121-130.
74. Landrigan PJ, Graef JW: Pediatric lead poisoning in 1987 - The silent epidemic continues. (Editorial) *Pediatrics* 719:582-583, 1987.
75. Landrigan PJ, Selikoff IJ: Primary prevention against occupational carcinogens. In: Cancer Risks: Strategies for Elimination. (Ed) P Bannasch. Springer-Verlag: Berlin, Heidelberg, New York, London, Paris, Tokyo, 1987.
76. Landrigan PJ: Silicosis. Occupational Medicine. *State of the Art Reviews* 2:319-326, 1987.
77. Landrigan PJ: Occupational leukemia. *State of the Art Reviews* 2:179-188, 1987.
78. Landrigan PJ: Principles for application of porphyrin markers in epidemiological studies. *Ann NY Acad Sci* 514:323-326, 1987.
79. Needleman HL, Rosen J, Piomelli S, Landrigan PJ, Graef J: The hazards of benign(?) neglect of elevated blood lead levels. Letter to the Editor. *Am J Dis Child* 141:941-942, 1987.
80. Landrigan PJ: Benzene and Leukemia. (Editorial) *Am J Ind Med* 11:605-606, 1987.
81. Wilkinson CW, Landrigan PJ, Eck JE: The contribution of bullet-proof vests and worker training to reduction of line-of-duty deaths in police officers. (Abstract) Presented at the Annual Meeting of the Society of Occupational and Environmental Health, 1987.
82. Landrigan PJ, DiLiberti JH, Graef JW, Jackson RJ, Nathenson G: Statement on Asbestos Exposure in Schools. Committee on Environmental Hazards, American Academy of Pediatrics. *Pediatrics* 79:301-305, 1987.
83. Landrigan PJ, DiLiberti JH, Gehlbach SH, Graef JW, Hanson JW, Jackson RJ, Nathenson G: Statement on Childhood Lead Poisoning. American Academy of Pediatrics, Committee on Environmental Hazards, Committee on Accident and Poison Prevention. *Pediatrics* 79:457-465, 1987.
84. Rinsky RA, Smith AB, Hornung R, Okun AH, Landrigan PJ: Benzene and Leukemia. (Letter) *New Engl J Med* 317:1027-1029, 1987.
85. Levin SM, Baker DB, Landrigan PJ, Monaghan SV, Frumin E, Brathwaite M, Towne M: Testicular cancer in leather tanners exposed to dimethyl formamide. (Letter) *Lancet* 2:1154, 1987.

86. Goldstein B, Gibson J, Henderson R, Hobbie J, Landrigan PJ, Mattison D, Perera F, Pfitzer E, Silbergeld E, Wogan G: Biological markers in environmental health research. *Environ Health Perspect* 74:3-9, 1987.
87. Landrigan PJ: Relation of body burden measures to ambient measures. In: Epidemiology and Health Risk Assessment. (Eds) L Gordis and CH Libauer. Oxford University Press, New York, 1988 pp 139-147.
88. Christiani DC, Melius JM, Landrigan PJ, Coye MJ, Wegman DH: Control of Occupational Disease in the U.S.A. (in Chinese). *Chinese J Occup Health* 4:314-320, 1988.
89. Landrigan PJ, Baker D, Needleman HL: Lead poisoning in automobile radiator mechanics. (Letter) *New Engl J Med* 318:320-321, 1988.
90. Selevan SG, Landrigan PJ, Stern FB, Jones JH: Brief Report: Lead and hypertension in a mortality study of lead smelter workers. *Environ Health Perspect* 78:65-66, 1988.
91. Landrigan PJ, Goldstein EA: Smoke gets in our eyes. New York Newsday, p 62, March 1, 1988.
92. Epstein SS, Swartz JB, Bailar J, Bingham E, Dahlsten DL, Infante PR, Landrigan PJ, Nicholson WJ, Lappé M, Moreno M, Legator M, Mirer F, Moure R, Silverstein M, Ozonoff D, Paigen B, Warren J: April 17, 1987 Ames Article. (Letter) *Science* 240:1043-1045, 1988.
93. Landrigan PJ, Perera FP: Controversy in the regulation of formaldehyde. (Editorial) *Am J Ind Med* 14:375-377, 1988.
94. Baker D, Levin SM, Landrigan PJ, Frumin E, Brathwaite M, Towne W: Testicular cancer, industrial bronchitis, and dermatitis among leather tanning workers. (Abstract) Proceedings of Annual Meeting, American Public Health Association, Boston, Nov. 13-17, 1988.
95. Lilis R, Landrigan PJ: Renal and Urinary Tract Disorders. (Chapter) In: Occupational Health-Recognizing and Preventing Work-Related Disease. Levy BS, Wegman DH (eds). Boston: Little, Brown and Co., 2nd edition, 1988, pp. 465-476.
96. Landrigan PJ: Epidemiologic assessment of lead absorption associated with incineration of municipal waste. (Abstract) Proceedings of Annual Meeting of American Public Health Association, Nov. 13-17, 1988.
97. Landrigan PJ: Assessment of the health hazards of lead. In: Proceedings of a One Earth Forum on Managing Hazardous Materials, René Dubos Center for Human Environments. New York City, May 25-26, 1988.
98. Landrigan PJ: Critical review of epidemiology studies on the human carcinogenicity of formaldehyde. Proceedings of the Annual Meeting of the Collegium Ramazzini, Carpi, Italy, December 1, 1988.
99. Landrigan PJ: Lead: Assessing its health hazards. *Health and Environ Digest* 2:1-3, July 1988.
100. Frumin E, Brathwaite M, Towne W, Levin SM, Baker DB, Monaghan SV, Landrigan PJ, Marshall EG, Melius JM: Testicular cancer in leather workers - Fulton County, New York. MMWR 38:105-114, 1988.
101. Rinsky RA, Hornung R, Landrigan PJ: Benzene and leukemia: A review of the literature and a risk assessment. (Letter) *Am J Epidemiol* 129:1084-1086, 1989.
102. Morawetz JS, Landrigan PJ: A cluster of traumatic occupational deaths at a foundry, 1974-1986. *MMWR* 38:293-297, 1989.

EPA-HQ-2018-000065-0001167

103. Landrigan PJ: The incompletely studied hazards of waste incineration. (Editorial) *Am J Ind Med* 15:243-244, 1989.
104. Landrigan PJ: The toxicity of lead at low dose. (Editorial) *Br J Ind Med* 46:593-596, 1989.
105. Jackson RJ, DiLiberti JH, Landrigan PJ, Nathenson G, Needleman HL, Brown AK, Etzel RA, Falk H, Miller RW, Rogan W: American Academy of Pediatrics, Committee on Environmental Hazards: Radon exposure: A hazard to children. *Pediatrics* 83:799-802, 1989.
106. Herbert RH, Luo J, Marcus M, Landrigan PJ: The failure of workers compensation statistics to monitor work-related illness in garment workers. (Abstract) Proceedings of Annual Meeting of the American Public Health Association, Chicago, Illinois, October 1989.
107. Landrigan PJ: Improving the surveillance of occupational disease. (Editorial) *Am J Public Health* 79:1601-1602, 1989.
108. Landrigan PJ: Does formaldehyde cause cancer? A review of the evidence. *Health & Environ Digest* 3:1-3, 1989.
109. Landrigan PJ: Occupational Health in New York State. Proceedings of the Julia M. Jones Preventive Medicine Day. New York: New York Lung Association, October 18, 1989, pp 10-12.
110. Landrigan PJ: Critical assessment of epidemiologic studies on the human carcinogenicity of 1,3-butadiene. *Environ Health Perspect* 86:143-147, 1990.
111. Landrigan PJ: Prevention of toxic environmental illness in the twenty-first century. *Environ Health Perspect* 86:197-199, 1990.
112. Baker DB, Landrigan PJ: Occupationally related disorders. *Med Clin North Am* 74:441-460, 1990.
113. Landrigan PJ: Current issues in the epidemiology and toxicology of occupational exposure to lead. *Environ Health Perspect* 89:61-66, 1990.
114. Pollack SH, Landrigan PJ, Mallino DL: Child Labor in the 1990: Prevalence and Health Hazards. *Ann Rev Public Health* 11:359-375, 1990.
115. Landrigan PJ: Health effects of environmental toxins in deficient housing. *Bull New York Academy of Medicine* 66:491-499, 1990.
116. Landrigan PJ: Housing and Health: Conclusions and challenges for the future. *Bull New York Academy of Medicine* 66:587-591, 1990.
117. Ehrlich RI, Kattan M, Saltzberg DS, Grimm KT, Landrigan PJ, Lilienfeld DE: Passive smoking and urinary cotinine levels in acute and non-acute asthmatics. (Abstract) Proceedings of the American Pediatric Society/Society for Pediatric Research, 1990.
118. Kraut A, Chan E, Landrigan PJ: Comparison of cost of searching for data on deaths: National Death Index vs. Social Security Administration. (Abstract) Proceedings of the 118th Annual Meeting of American Public Health Association, New York, 1990.
119. Pollack S, Belville R, McConnell R, Landrigan PJ: Rates of work-related injury requiring hospitalization among teenagers in New York City. (Abstract) Proceedings of the 118th Annual Meeting of American Public Health Association, New York, 1990.
120. Pollack S, McConnell R, Gallelli M, Schmidt J, Obregon R, Landrigan PJ: Pesticide exposure and working conditions among migrant farmworker children in Western New York State. (Abstract) Proceedings of the 118th Annual Meeting of American Public Health Association, New York, 1990.

EPA-HQ-2018-000065-0001168

OTHER PUBLICATIONS:
REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS (cont)

121. Landrigan PJ: Proposal for reduction of the case definition for childhood lead poisoning. (Abstract) Proceedings of the 118th Annual Meeting of American Public Health Association, New York, 1990.
122. Nicholson WJ, Johnson EM, Harington JS, Melius JM, Landrigan PJ: Mesothelioma in the Quebec chrysotile mining and milling area. (Letter) *Science* 248:796-799, 1990.
123. Levin SM, Landrigan PJ: Tollbooth Syndrome. (Letter) The New York Times, Tuesday, April 1, 1990.
124. Landrigan PJ, Silbergeld E, Froines JR, Pfeffer RM: Lead in the Modern Workplace. (Editorial) *Am J Public Health* 80:907-908, 1990.
125. Pollack S, Landrigan P, McConnell R, Belleville R: Epidemiologic studies on the health hazards of child labor. (Abstract) Proceedings of the 23rd International Congress on Occupational Health, Montreal, 1990.
126. Tamblyn PB, Landrigan PJ, Nelson M, Kerndt P, Kronoveter K, Zack MM: Lead exposure in stained glass workers. *J Environ Pathology, Toxicology and Oncology*, 10:63-66, 1990.
127. Markowitz SB, Landrigan PJ: Occupational Lung Disease: Diagnosis, Surveillance, and Prevention. *Current Issues in Respiratory Public Health: II.* 3:219-232, 1990.
128. Landrigan PJ: Out Sick, Toxins at Work. *Harvard Medical Alumni Bulletin.* Summer: 42-47, 1990.
129. Landrigan P, Kazemi H: Asbestos and cancer. (Letter) *The Economist* 316:7670, September 1, 1990.
130. Lilienfeld DE, Perl DP, Landrigan PJ, Chan E, Godbold JH, Marsh G, Ehland J: Increasing mortality from motor neuron disease in the United States during the past two decades. New Advances in Toxicology and Epidemiology. F. Clifford Rose & Forbes H. Norris (Eds). Smith-Gordon, 1990.
131. Lilienfeld DE, Sekkor D, Simpson S, Perl DP, Ehland J, Marsh G, Chan E, Godbold J, Landrigan PJ: Parkinsonism death rates by race, sex and geography: A 1980s update. *Neuroepidemiology* 9:243-247, 1990.
132. Landrigan PJ: Child labor law violations. *California Pediatrician*, Fall 1990, pp. 35-36.
133. Landrigan PJ: Recent developments in the toxicology and epidemiology of lead. *Tokyo J Med Sc* 97:170-172, 1990.
134. Landrigan PJ, Baker DB: Workers. In: Occupational Health. Vol. 3, 2nd Ed., Chapter 27, Oxford Textbook of Public Health. Holland WW, Detels R, Knox G (Eds) Oxford University Press: Oxford, New York, Toronto, pp 449-465, 1991.
135. Landrigan PJ: Strategies for epidemiologic studies of lead in bone in occupationally exposed populations. *Environ Health Perspect* 91:81-86, 1991.
136. Landrigan PJ, Campbell CC: Chemical and Physical Agents. Chapter 17. In Fetal and Neonatal Effects of Maternal Disease. (Editors) Avron Y. Sweet and Edwin G. Brown. St. Louis: 1991, Mosby Year Book, pp 414-447.
137. Landrigan PJ: Current issues in the epidemiology and toxicology of occupational exposure to lead (in Russian). *Gigiena Truda* 6:25-29, 1991.
138. Pollack SH, Landrigan P, Mallino DL: Child Labor in the 1990's: Prevalence and Health Hazards. *Ann Rev Public Health* 11:359-375, 1990.
139. Silbergeld EK, Landrigan PJ, Froines JR, Pfeffer RM: The occupational lead standard: A goal unachieved, a process in need of repair. *New Solutions* 1:20-30, 1991.

EPA-HQ-2018-000065-0001169

140. Gerr F, Letz R, Landrigan PJ: Upper-extremity musculoskeletal disorders of occupational origin. *Annu Rev Public Health* 12:543-566, 1991.
141. Pollack SH, Landrigan PJ, Rubinstein H: Child Labor. Chapter in III. Environmental Health, Maxcy-Rosenau-Last Textbook of Public Health, 13th edition, 1991, pp. 576-583.
142. Landrigan PJ, Baker DB: Using Occupational History to Pinpoint the Diagnosis. *Geriatrics* 46:61-67, 1991.
143. Landrigan PJ, Baker DB: The recognition and control of occupational disease. *JAMA* 266:676-680, 1991.
144. Belville R, Pollack SH, Landrigan PJ: Adolescent work-related injury award rates in New York State. (Abstract). Proceedings of Annual Meeting of the American Public Health Association, 1991.
145. Pollack SH, Belville R, Landrigan PJ: Work-related head injuries in children. (Abstract). Proceedings of Annual Meeting of the American Public Health Association Meeting, 1991.
146. Landrigan PJ: Preface. In: The Third Wave of Asbestos Disease: Exposure to Asbestos in Place. PJ Landrigan, H Kazemi, IJ Selikoff IJ (Eds). *Ann NY Acad Sci* 643:xv-xvi, 1991.
147. Landrigan PJ: A Population of Children at Risk of Exposure to Asbestos in Place. In: The Third Wave of Asbestos Disease: Exposure to Asbestos in Place. PJ Landrigan, H Kazemi, IJ Selikoff IJ (Eds). *Ann NY Acad Sci* 643:283-286, 1991.
148. Markowitz S, Garibaldi K, Lilis R, Landrigan PJ: Asbestos Exposure and Fire Fighting. In: The Third Wave of Asbestos Disease: Exposure to Asbestos in Place. PJ Landrigan, H Kazemi, IJ Selikoff (Eds). *Ann NY Acad Sci* 643:573-577, 1991.
149. Landrigan PJ: Occupational Surveillance -- Needs and Priorities. Presented at Occupational Surveillance Conference, University of Massachusetts, Amherst, MA, April 29, 1991.
150. Landrigan PJ: Current Issues in the Epidemiology and Toxicology of Occupational Exposure to Lead. *Toxicol Ind Health* 7:9-14, 1991.
151. Mendelson MH, Short L, Schechter C, Meyers BR, Rodriguez M, Cohen S, Lozada J, Button G, Sacks H, Decambre M, Landrigan P, Hirschman SZ: Comparative cross-over study of a needleless heparin lock system vs. a conventional heparin lock: impact on complications, sharps injuries and cost (Abstract). Accepted for presentation at 32nd Interscience Conference on Antimicrobial Agents and Chemotherapy. American Society of Microbiology. Anaheim, CA, October, 1992.
152. Landrigan PJ: Arsenic. Chapter 59. In: Environmental and Occupational Medicine, 2nd Edition. Rom WN (Editor). Boston: Little, Brown & Company, 1992, pp. 773-779.
153. Landrigan PJ: Benzene. Chapter 67. In: Environmental and Occupational Medicine, 2nd Edition. Rom WN (Editor). Boston: Little, Brown & Company, 1992, pp. 861-871.
154. Landrigan PJ: Formaldehyde. Chapter 68. In: Environmental and Occupational Medicine, 2nd Edition. Rom WN (Editor) Boston: Little, Brown & Company, 1992, pp. 867-871.
155. Landrigan PJ: Ethylene Oxide. Chapter 87. In: Environmental and Occupational Medicine, 2nd Edition. Rom WN (Editor) Boston: Little, Brown & Company, 1992, pp. 1033-1039.
156. Landrigan PJ, Pollack SH, Belville R: Child Labor. Chapter 118. In: Environmental and Occupational Medicine (Second edition): A Guide to their Recognition. Rom WN (Ed). Boston: Little, Brown & Co., 1992, pp.1365-1370.

EPA-HQ-2018-000065-0001170

157. Selikoff IJ, Landrigan PJ: The third epidemiological revolution. (Editorial) *J Occup Med and Toxicol* 1:vii-viii, 1992.
158. Bertin JE, Ashford NA, Bellinger D, Landrigan PJ, Legator MS, Mattison DR, McBeath WH, Rosen JF, Stellman JM: The Goal: Safety and Equality. (Editorial) *Am J Ind Med* 21:463-465, 1992.
159. Landrigan PJ: Environmental disease - a preventable epidemic (Commentary). *Am J Public Health* 82:941-943, 1992.
160. Landrigan PJ: Current status of occupational disease in the United States (Editorial). *J Occup Med Toxicol* 1:97-100, 1992.
161. Kraut A, Chan E, Landrigan PJ: The costs of searching for deaths: National Death Index vs Social Security Administration. (Letter) *Am J Public Health* 82:760, 1992.
162. Landrigan PJ: Risk assessment for 1,3-butadiene. (Letter) *Science* 257:1330-1331, 1992.
163. Landrigan PJ, Markowitz SB: The case for OSHA reform (Guest Editorial). *New Solutions* 3:3-7, 1992.
164. Bates DV, Gotsch AR, Pharm D, Brooks S, Landrigan PJ, Hankinson JL, Merchant JA: Prevention of occupational lung diseases. *Chest* (Supplement) 102:257S-276S, 1992.
165. Selikoff IJ, Landrigan PJ: The third epidemiological revolution. (Letter), *Eur J Epidemiol* 8:625-626, 1992.
166. Landrigan PJ: Assessment of the Health Hazards of Lead. In: Management of Hazardous Agents. Eds. LeVine DG and Upton AC. Industrial and Regulatory Approaches, Vol. 1, pp1992.
167. Kraut A, Chan E, Abe T, Hall NEL, Landrigan PJ: Completeness of Case Ascertainment of the State Cancer Registry. *J Med Soc NJ* 89:772-773, 1992.
168. Landrigan PJ: Environmental pollution and health. (Letter), *Lancet* 340:1220, 1992.
169. Landrigan PJ, Pollack SH, Belville R, Godbold JG: Child labor in the United States: Historical Background and Current Crisis. *Mount Sinai J Med* 59:498-503, 1992.
170. Landrigan PJ, Curran A: Lead - A Ubiquitous Hazard. *Environ Res* 59:279-280, 1992.
171. Landrigan PJ: Summary of Workshop: Prevention Strategies for Neurotoxicology. *Environ Res* 60:63-64, 1993.
172. Baker DB, Landrigan PJ: Occupational Exposures and Human Health. In: Critical Condition: Human Health and the Environment. Chivian E., McCally M, Hu H, Haines A., Editors. Cambridge: MIT Press, 1993.
173. Landrigan PJ: Protecting children from pesticides. (Letter) Washington Post, April 9, 1993.
174. Landrigan PJ, Pollack SH, Belville R, Godbold JH: Health Hazards of Child Labor. Wallace Public Health and Preventive Medicine, 14th edition. Public Health and Preventive Medicine pp. 697-698.
175. Landrigan PJ: Protecting our nervous system from toxic chemicals. Headline News, Science Views II, Ed. Jarmul D., Washington, D.C. National Academy Press, pp. 56-58, 1993.

176. Todd AC, Landrigan PJ, Bloch P: Workshop on the X-ray fluorescence of lead in bone: Conclusions, recommendations and summary. *Neurotoxicology* 14:145-154, 1993.
177. Landrigan PJ, Belville R: The dangers of illegal child labor. (Editorial). *Am J Dis Child* 147:1029-1030, 1993.
178. Landrigan PJ: Child Labor: A re-emergent threat. (Editorial). *Am J Ind Med* 24:267-268, 1993.
179. Landrigan PJ: Asbestos anxiety. Op-Ed Page, The New York Times, September 7, 1993.

179.1 Landrigan PJ: Health Risks of Creosotes. Questions & Answers. *JAMA* 269:1309, 1993.

180. Todd AC, Landrigan PJ: X-ray fluorescence analysis of lead in bone. *Environ Health Perspect* 101:494-495, 1993.
181. Landrigan PJ: Critical assessment of epidemiological studies on the carcinogenicity of 1,3-butadiene and styrene. In: Butadine and Styrene: Assessment of Health Hazards, IARC Scientific Publication No. 127, Sorsa M, Peltonen K, Vainio H and Hemminki K (eds.). Lyon, International Agency for Research on Cancer, pp. 375-388, 1993.
182. Committee on Environmental Health, American Academy of Pediatrics: Ambient Air Pollution: Respiratory hazards to children. Needleman HL, Jackson RJ, Landrigan PJ, Lipsett M. *Pediatrics*, 91:1210-1213, 1993.
183. Landrigan PJ, Graham DG, Thomas RD: Strategies for the prevention of environmental neurotoxic illness. *Environ Res* 61:157-163, 1993.
184. Landrigan PJ: Overview of Industrial Chemical Exposures. Environ Res 63:1-15, 1993.
185. Landrigan PJ, Pollack SH, Belville R, Godbold JH: Child Labor: Epidemiology and Health Risks. Maternal and Child Health. Wallace H (Editor). Third Party Publishing Co., pp. 73-81, 1994.
186. Landrigan PJ: Lead poisoning. Chapter in Current Diagnosis in Neurology. (Ed. Feldmann E). Mosby-Year Book, Inc., St. Louis, pp. 206-209, 1994.
187. Landrigan PJ, Baker DB, Markowitz SB, Nicholson WJ: Cancer Prevention in the Workplace. (Chapter 22) In: The Science and Practice of Cancer Prevention and Control. Greenwald P, Kramer BS, Weed DL, Editors. New York: Marcel-Dekker, 1994, pp. 393-410.
188. Lilis R, Landrigan PJ: Renal and Urinary Tract Disorders. Chapter for Occupational Health (3rd ed). Wegman DH and Levy B, Editors. Boston: Little, Brown & Co., 1994, Chapter 31, pp. 599-616.
189. Landrigan PJ, Graham DG, Thomas RD: Environmental neurotoxic illness: Research for Prevention. *Environ Health Perspect* 102(suppl 2):117-121, 1994.
190. Landrigan PJ, Todd AC: Lead poisoning. Conferences and Reviews. *West J Med* 161:153-159, 1994.
191. Landrigan PJ, Pollack SH, Godbold JG, Belville R: Child Labor: Risks and Prospects for Prevention. In: The Identification and Control of Environmental and Occupational Diseases. Mehlman MA and Upton A (eds), A Tribute to Professor Irving J. Selikoff (1915-1992), pp. 559-569.

OTHER PUBLICATIONS:
REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS (cont)

192. Landrigan PJ, Pollack SH, Godbold JG, Belville R: The health and safety hazards of child labor. In Child Labor in the United States, ed. Newman J. New York: National Child Labor Committee, pp. 13-15, 1994.
193. Landrigan PJ: Principles of Occupational and Environmental Medicine. In Cecil Textbook of Medicine, 20th ed., Bennet JC, Plum F, eds. Philadelphia: WB Saunders Co., 1994, pp. 56-59.
194. Landrigan PJ, Todd AC: Direct measurement of lead in bone: A promising biomarker. (Editorial). *JAMA* 271:239-240, 1994.
195. Landrigan PJ: Perspective on Pesticides. Encyclopaedia Britannica, Medical and Health Annual, pp. 250-254, 1994.
196. McCally M, Chivian E, Landrigan PJ: More on critical condition: Human health and the environment. (Letter) *New Engl J Med* 330:1161-1162, 1994.
197. Nicholson WJ, Landrigan PJ: The carcinogenicity of chrysotile asbestos. Advances in Modern Environmental Toxicology, Mehlman M and Upton A (eds.). Princeton Scientific Publishing Co., Princeton, NJ, pp. 407-423, 1994.
198. Nicholson WJ, Landrigan PJ: Human health effects of polychlorinated biphenyls. In: Dioxins and Health. Schecter A., Editor. Plenum Publishing Corp., New York, NY, pp. 487-524, 1994.
199. Landrigan PJ: Disclosure of interest: A time for clarity. (Editorial) *Am J Ind Med* 26:281-282, 1994.
200. McDiarmid MA, Collins MD, Landrigan PJ: G. II. "Environmental Toxins in Child Health." In Proceedings of "Child Health in the Inner-City IV:" Issues and Answers for the `90s. Washington, D.C.: Department of Pediatrics and Child Health, Howard University College of Medicine, 1994, pp. 283-288
201. Chisholm J, Goldstein G, Cory-Slechta D, Weiss B, Landrigan P, Mushak P, Needleman HL, Rice D, Rosen J, Silbergeld E: Lead Debate Goes On. (Letter) *Pediatrics* 84:408-410, 1994.
202. Wolff MS, Landrigan PJ: Environmental Estrogens. (Letter) *Science* 266:525-528, 28 Oct., 1994.
203. Landrigan PJ, Golden AL, Markowitz SB: Occupational Cancer in New York City Firefighters. New York: United Firefighters Association and United Fire Officers Association, 1994.
204. Landrigan PJ, Rowe JW, Fahs MC, Silver A, Cornbill R: The Mount Sinai Health of the Public Program. Abstract. Proceedings of the Annual Meeting of the American Public Health Association, 1994.

204.1 Landrigan PJ: Lead. Chapter 30.9 Textbook of Clinical Occupational and Environmental Medicine, 2nd edition. (Eds) Cullen M, Rosenstock L, 1994, pp. 745-754.

205. Markowitz SB, Li AK, Landrigan PJ: In: Reply: Lead poisoning due to Hai Ge Fen. (Letter). *JAMA* 273:24-25, 1995.
206. Landrigan PJ, Pollack SH, Belville R, Godbold J: Child labor. *Pediatric Annals* 24:657-662, 1995.
207. Landrigan PJ, Pollack SH, Godbold JH, Belville R: Occupational injuries--epidemiology, prevention, treatment. In: Adolescent Medicine. *State-of-the-Art Reviews* 6:207-214, 1995.
208. Landrigan PJ, Pollack SH: Committee on Environmental Health. American Academy of Pediatrics. Statement on the Hazards of Child Labor. *Pediatrics* 95:311-313, 1995.
209. Landrigan PJ, Baker D: The clinical recognition of occupational and environmental disease. The *Mount Sinai J Med* 62:406-411, 1995.

EPA-HQ-2018-000065-0001173

OTHER PUBLICATIONS:
REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS (cont)

210. Landrigan PJ, Todd AC: Lead poisoning alert--False alarm? (Letter). *West J Med* 162:474-475, 1995.
211. Herbert R, Landrigan P: When Work is a Health Hazard. New York Newsday, Op-Ed, Thursday, April 27, 1995.
212. Landrigan PJ: Disclosure of interest: responses from our readers. (Editorial). *Am J Ind Med* 28:581-582, 1995.
213. Landrigan PJ: Risk assessment and cost/benefit analysis for new regulations. *New Solutions* 5:85-91, 1995.
214. Landrigan PJ: Book Review: Environmental Medicine, Integrating a Missing Element into Medical Education, by Rall DP and Pope AM. *Nature Medicine* 1:709, 1995.
215. Landrigan PJ: Pesticides in the Diets of Infants and Children: The Report from the National Academy of Sciences Two Years Later. *EPA Journal*, fall 1995.
216. Landrigan PJ: Comments on a "Survey of Lead Exposure Around a Closed Lead Smelter." (Letter) *Pediatrics* 95:550-554, 1995.
217. Landrigan PJ, Carlson JE: Environmental Policy and Children's Health. *The Future of Children* 5:34-52, 1995.
218. Brandt-Rauf PW, Landrigan PJ: Budget cuts are grave to NIOSH. (Editorial). *Am J Ind Med* 28:457-458, 1995.
219. Landrigan PJ, Todd AC, Wedeen RP: Lead poisoning. *Mount Sinai J Med* 62:360-364, 1995.
220. Landrigan PJ: Childhood leukemias. (Letter) *New Engl J Med* 333:1286, 1995.
221. Golden AL, Markowitz SB, Landrigan PJ: The risk of cancer in firefighters. *Occupational Medicine: State of the Art Reviews* 10:803-820, 1995.
222. Todd AC, Wetmur JG, Moline JM, Godbold JH, Levin SM, Landrigan PJ: Unraveling the chronic toxicity of lead: an essential priority for environmental health. *Environ Health Perspect* 104 (Supplement I):141-146, 1996.
223. Landrigan PJ: Public health. The Amicus Journal. Washington, D.C.: Natural Resources Defense Council, Winter 1996, pp. 37-40.
224. Landrigan PJ: Risk. (Letter) Smithsonian, p. 18, January 1996.
225. Landrigan PJ: Benzene and blood: one hundred years of evidence. (Editorial) *Am J Ind Med* 29:225-226, 1996.
226. Needleman HL, Landrigan PJ: Toxins at the pump. New York Times, Op-Ed, March 13, 1996.
227. Nicholson WJ, Landrigan PJ: Asbestos: a status report. *Current Issues in Public Health* 2:118-123, 1996.
228. Landrigan PJ: Asbestos-related cancer. (Letter) *CA* 46:254-255, 1996.
229. Landrigan PJ: Occupational Illness (Commentary). Abstracts of Clinical Care Guidelines, 8:15-18, 1996.
230. Claudio L, Wetmur, JG, Landrigan PJ: Genetic susceptibility to lead neurotoxicity. (Abstract). Presented at the 124th Annual Meeting of the American Public Health Association, New York, November, 1996, Session 2019, p. 155.
231. Landrigan PJ: Risk assessment, risk management, and right to know - the three R's of child-centered environmental health policy. (Abstract). Presented at the 124th Annual Meeting of the American Public Health Association, New York, November, 1996, Session 3084, p. 426.
232. Landrigan PJ: Lead levels, home dust, and proximity to lead smelters (Letter). *Pediatrics* 97:603-604, 1996.

EPA-HQ-2018-000065-0001174

OTHER PUBLICATIONS:
REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS (cont)

233. Landrigan PJ: The prevention of occupational cancer (Editorial). *CA* 46:67-69, 1996.
234. Baker D, Landrigan PJ: Workers. In: The Practice of Public Health. Vol. 3, Chapter 20. Detels R, Holland WW, McEwen J, Omenn GS (Eds) Oxford University Press: Oxford, New York, Toronto, pp 1413-1430, 1997.
235. Landrigan PJ: Angiosarcoma of the liver among polyvinyl chloride workers - Kentucky. (Editorial). *MMWR* 46:99-101, 1997.
236. Smith DA, Ness K, Herbert R, Schechter C, Phillips R, Diamond J, Landrigan P: Saggital abdominal diameter/thigh circumference and waist hip ratio highly correlated. *Mount Sinai J Med* 64:32, 1997.
237. Smith D, Herbert R, Schechter C, Phillips R, Diamond J, Dahms TE, Landrigan P: Occupational coronary heart disease among Bridge and Tunnel Officers. (Abstract) *Can J Cardiology* Vol. 13, Supplement B, p. 76B, June 1997.
238. Smith D, Herbert R, Schechter C, Phillips R, Diamond J, Dahms TE, Landrigan P: Occupational coronary heart disease among Bridge and Tunnel Officers. (Poster) Fourth International Conference on Preventive Cardiology, Montreal, Canada, June 1997.
239. Landrigan PJ, Needleman HL: Environmental neurotoxins and children's development. *NCJW Journal* 20:22-27, 1997.
240. Landrigan PJ: Identification of Gulf War Syndrome: Methodological Issues and Medical Illnesses. (Letters in reply). *JAMA* 278:383-387, 1997.
241. Landrigan PJ, Clark NL: Unions help reduce lead risk among workers. Forum for Applied Research and Public Policy, p 151, summer 1997.
242. Landrigan PJ, McCammon JB: Child labor still with us after all these years. *Public Health Rep* 112:466-473, 1997.
243. Landrigan PJ: Children's Health and the Environment – The First Herbert L. Needleman Award Lecture. *Maternal and Child Health Journal* 1:61-64, 1997.
244. Landrigan PJ: Recent Developments in the Toxicology and Epidemiology of Lead. (eds.) Araki S, Yokoyama K, Journal Public Hygiene 50 years in Tokyo University, pp. 45-47, 1997.
245. Landrigan PJ, McCally M: Public health education at universities in the United States. Ibid, pp. 206-207, 1997
246. Landrigan PJ: Illness in Gulf War veterans: causes and consequences. (Editorial). *JAMA* 277:259-261, 1997.
247. Landrigan PJ, Claudio L: Heart rate variability: a new physiologic marker of autonomic neurotoxicity. (Editorial). *J Pediatrics* 130:725-729, 1997.
248. Landrigan PJ: Illness in Gulf War Veterans: Causes and Consequences. The Journal of the American International Health Council 1:49-51, 1998.
249. Landrigan PJ: Environmental hazards for children. Report of the Twenty-Seventh Ross Roundtable on Critical Approaches to Common Pediatric Problems in Collaboration with the Ambulatory Pediatric Association. Environmental Health, November 19, 1996, Int J Occup Med and Environ Health 11:189-194, 1998.

EPA-HQ-2018-000065-0001175

250. Rall D, Landrigan PJ: Of Apples and Alar. Letter to the Editor, Washington Post, January 13, 1998.
251. Osinubi OYO, Landrigan PJ: Book Review: Occupational, Industrial and Environmental Toxicology. Eds. Greenberg MI, Hamilton RJ and Philips SD. *Am J Ind Med* 33:99, 1998.
252. Landrigan PJ, Claudio L, McConnell R: Pesticides. Chapter. In: Environmental Toxicants-Human Exposures and Their Health Effects, Lippmann M (ed). New York: Van Nostrand Reinhold, 1998.
253. Landrigan PJ: Asbestos--still a carcinogen. (Editorial) *New Engl J Med* 338:1618-1619, 1998.
254. Landrigan PJ, Etzel R: Chemical Pollutants. Chapter 719 In: Nelson Textbook of Pediatrics, 16th edition, Behrman R et al., Editors. Philadelphia: WB Saunders Co., 1998, pp. 2152-2154.
255. Landrigan PJ, Carlson JE, Bearer CF, Cranmer JS, Bullard RD, Etzel RA, Groopman J, McLachlan JA, Perera FP, Reigart JR, Robison L, Schell L, Suk, WA: Children's Health and the Environment: A New Agenda for Prevention Research. *Environ Health Perspect* 106:787-793, 1998.
256. Landrigan PJ, Goldman LR: Response to the Report of the Canadian Ad Hoc Panel on Pesticides and Cancer Risk. (Letter to the Editor). *Cancer* 83:1057-1058, 1998.
257. Landrigan PJ, Lashof JC, Hamburg DA: Gulf War Syndrome Illness in veterans. (Letter). *Am J Epidemiol* 148:404-407, 1998.
258. Landrigan PJ, Costa Dias E, Sokas RK: Health hazards of child labor demographics. Chapter 32 - Vulnerable Populations. In: International Occupational and Environmental Medicine. Eds. Herzstein JA, Bunn WB, Fleming LE, Harrington JM, Jeyaratnam J, Gardner IR. pp. 531-542.
259. Landrigan PJ: Is Gulf War Syndrome due to stress? The evidence reexamined" (letter to editor). *Am J Epidemiol* 148:404-405, 1998.
260. Landrigan PJ: Pesticides Harm Kids (letter to editor), New York Times, July 7, 1998.
261. Galson SK, Carroquino MJ, Landrigan PJ: Introduction to Conference on Preventable Causes of Cancer in Children. *Environ Health Perspect* 106:865, 1998.
262. Carroquino MJ, Galson SK, Licht J, Amler RW, Perera FP, Claxton LD, Landrigan PJ: The U.S. EPA Conference on Preventable Causes of Cancer in Children: A Research Agenda. *Environ Health Perspect* 106:867-873, 1998.
263. Landrigan PJ, Etzel RA: Children. Chapter 35. In: Primary Care Guide to Occupational and Environmental Medicine. Eds: Hashimoto D, Atkins S, Christiani D, Davis A, Leiken J, St. Louis: Mosby, 1998.
264. Landrigan PJ: Risk Assessment for Children and other Sensitive Populations. (Abstract) Presented at Collegium Ramazzini Conference on Risk Assessment, Bologna, Italy, Sept. 25-26, 1998.
265. Landrigan PJ: Nonoccupational exposure to chrysotile asbestos and the risk of lung cancer (letter to the editor). *New Engl J Medicine* 339:999-1002, 1998.
266. Landrigan PJ: Foreword: Occupational and Environmental Medicine. In Occupational and Environmental Neurotoxicology (Ed. Feldman, RG), Lippincott-Raven, Philadelphia-New York, p. ix, 1998.
267. Landrigan PJ: Exposure to dimethylmercury (letter to the editor). *New Engl J Med* 339:1243-1244, 1998.
268. Landrigan, PJ: Illness in Gulf War Veterans: Causes and Consequences. *The Journal of the American International Health Council* 1:49-51, 1998.
269. Landrigan PJ, Nicholson WJ, Suzuki Y, LaDou J: The hazards of chrysotile asbestos: A critical review. *Ind Health* 37:271-280, 1999.

OTHER PUBLICATIONS:
REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS (cont)

270. Landrigan PJ: The impact of environmental toxins on children's learning and behavior. The Aspen Institute Congressional Program, May 6, 1999.
271. Landrigan PJ: ACPM, Mount Sinai to Tackle Children's Environmental Health Issues. *ACPM Newsletter*, Spring 1999.
272. Landrigan PJ: Child Labor. Chpater 10. In: Ambulatory Pediatrics 5th Edition. M Green, RJ Haggerty, M Weitzman (eds). W.B. Saunders Company, 1999 pp. 28-31.
273. Landrigan PJ: Asthma in American children. Congressional staff briefing: Asthma and the Environment: Protecting Our Children, Washington, D.C., May 27, 1999.
274. Landrigan PJ: Why Not Use It All? (Letter to the editor). *Environ Health Perspect* 107:A546, 1999.
275. Landrigan PJ: Malathion may be a necessary evil. (Op-Ed) Newsday, Sept. 14, 1999.
276. Moline J, Landrigan PJ: Insights on asthma at work. (Book Review) *The Lancet* 354:1217, 1999.
277. Landrigan, PJ: Pesticides. Chapter 20. In: Handbook of Pediatric Environmental Health. R Etzel, S Balk, (eds). Elk Grove, Illinois: American Academy of Pediatrics, 1999. pp. 193-214.
278. Landrigan, PJ: Doctor's orders: healthy kids need a healthy planet. *Creation Care.* Spring, 1999, pp.6-7, 17-18.
279. Landrigan, PJ: Children's health and the environment. *Eur J Oncol* 4:661-664, 1999.
280. Landrigan PJ, Claudio L, McConnell R: Pesticides. Chapter 21. In: Environmental Toxicants: Human Exposures and Their Health Effects, Lippmann M (ed). New York: John Wiley & Sons, Inc., 2000 pp. 725-739.
281. Herbert R, Landrigan PJ: Work-related death: a continuing epidemic. (Editorial) *Am J Public Health* 90:541-545, 2000.
282. McChesney R, Marcus M, O'Connor JF, Golden A, Landrigan P: The determination of early pregnancy loss using measurement of human chorionic gonadotropin (hCG) – related forms with a modified urine specimen collection protocol. (Abstract) *Am J Epidemiol* 151:S49, 2000.
283. Weiss B, Landrigan P: The developing brain and the environment: an introduction. *Environ Health Perspect* 108 (Supplement):373-374, June 2000.
284. Landrigan PJ, Boffetta P, Apostoli P: The reproductive toxicity and carcinogenicity of lead: a critical review. *Am J Ind Med* 38: 231-243, 2000.
285. Landrigan PJ: Principles of Occupational and Environmental Medicine. In: Cecil Textbook of Medicine, 21st edition. Goldman L, editor. Philadelphia: W.B. Saunders Co, 2000.
286. Moline JM, Golden AL, Bar-Chama N, Smith E, Rauch ME, Chapin RE, Perreault SD, Schrader SM, Suk WA, Landrigan PJ: Exposure to hazardous substances and male reproductive health: A research framework. *Environ Health Perspect* 108:803-813, 2000.
287. Landrigan PJ, Martiney JA: Fleet Hospital Fort Dix Battles West Nile Virus. *Naval Reserve Association News* 47:28, 2000.
288. Carpenter DO, Chew FT, Damstra T, Lam LH, Landrigan PJ, Makalinao I, Peralta GL, Suk WA: Environmental Threats to the Health of Children: The Asian Perspective. *Environ Health Perspect* 108:989-992, 2000.
289. Landrigan PJ, Wolfe S, Oakley GP Jr: Bad Policy, Worse Medicine. (Commentary) *Pediatrics* 106(6):1482-1483, 2000.
290. Landrigan, PJ, et al: Gesundheit von Kindern und Umwelt: Eine neue Agenda für präventive Forschung. *Kinder-Gesundheit-Umwelt-Krankheit* 47-73, 2000.

290.1 Landrigan PJ: A year of passage. Am J Ind Med 38:483-484, 2000.

EPA-HQ-2018-000065-0001177

291. Landrigan PJ: Pediatric Lead Poisoning: Is There a Threshold? (Commentary). *Public Health Reports* 115:530-531, 2000.
292. Landrigan PJ: Pesticides, PCBs, and the Risk to Children. *Contemporary Pediatrics* 18(2):110-126, 2001.
293. Landrigan PJ: Pesticides and polychlorinated biphenyls (PCBs): An analysis of the evidence that they impair children's neurobehavioral development. *Molecular Genetics and Metabolism* 73:11-17, 2001.
294. Landrigan PJ: Bernardino Ramazzini: perpetuating the lesson of the Master. The diagnosis and prevention of occupational and environmental illness. (Editorial). *Eur J Oncol* 6:235-237, 2001.
295. Landrigan PJ: Pesticides and polychlorinated biphenyls (PCBs): An analysis of the evidence that they impair children's neurobehavioral development. *Jap Journal of Occup Med and Traumatology* 49:89-97, 2001.
296. Landrigan PJ, Markowitz S, Baker DB: Cancer Prevention in the Workplace. In: Cancer Prevention and Control, eds, Greenwald P, Kramer BS, Weed DL. 2nd Edition. New York: Marcel Dekker, 2001.
297. Landrigan PJ, Golden AL: Hudson River bass pose danger to fetuses (Letter to the editor). *The Journal News* (Westchester County, NY) 2001.
298. Landrigan PJ, Crain E, Etzel R, Gitterman B, Oberg C, Scheidt P: The need for a new subspecialty in environmental pediatrics. (Abstract) Presented at Global Forum for Children's Environmental Health, Washington DC, 7-11 September 2001.
299. Landrigan PJ, Golden A, Berkowitz G, Wolff M, Godbold J: Body Burdens of Persistent Pollutants in Hudson River Anglers. (Abstract) Presented at Global Forum for Children's Environmental Health, Washington DC, 7-11 September 2001.
300. Forman J, Satlin L, Amler RW, Winston JA, Fleissner ML, Toal B, Landrigan PJ: Environmental Uranium Contamination of Well Water Associated with Beta-2-Microblobulinuria. (Abstract) Presented at Global Forum for Children's Environmental Health, Washington DC, 7-11 September 2001.
301. LaDou J, Landrigan P, Bailar JC III, Foa V, Frank A: A call for an international ban on asbestos. (Commentary). *Can Med Assoc J* 164:489-490, 2001.
302. Landrigan PJ: Children's Environmental Health: An Overview. Washington DC: Population Reference Bureau, 2001.
303. Todd AC, Carroll S, Landrigan PJ: Key issues in childhood lead exposure in the USA. *Urban Health and Development Bulletin of the South African Medical Research Council*, 2001.
304. Mehlman MA, Soffritti M, Landrigan PJ: In: Memoriam: Professor Cesare Maltoni (1930-2001). *Am J Ind Med* 40:1-2, 2001.
305. Landrigan PJ: MMT, déjà vu and national security. *Am J Ind Med* 39:434-435, 2001.
306. Landrigan PJ: PCB cleanup must begin now (Letter). *The Journal News*, (Westchester County, NY) August 2, 2001.
307. Landrigan PJ, Mattison DR, Boardman B, Bruckner JV, Jackson RJ, Karol MH, Krewski D, Weil WB: Children's Health, Susceptibility and Regulatory Approaches to Reducing Risk from Chemical Carcinogens. (Letter to the Editor). *Environ Health Perspect* 109:A412-A413, 2001.
308. Mehlman MA, Landrigan PJ, Soffritti M: In Memoriam Professor Cesare Maltoni (1930-2001) *Int J Occup Environ Health* 7:254, 2001.
309. Landrigan PJ: Health Consequences of the September 11 Attacks. (Editorial) *Environ Health Perspect* 109:A514-A515, 2001.

310. Sonawane B, Landrigan P, Olin S: Children's Environmental Health Risk Assessment: Issues and Challenges. (Abstract) Presented at Society for Risk Assessment, 2001.
311. Landrigan PJ: Children's Environmental Health: Lessons from the Past and Prospects for the Future. *Pediatr Clin North Am* 48:1319-1330, 2001.
312. Wolff MS, Landrigan PJ: Organochlorine Chemicals and Children's Health. (Editorial). *J Pediatr* 140:10-13, 2002.
313. LaDou J, Landrigan P, Bailar III, JC, Foa V, Frank A: A call for an international ban on asbestos. *Public Health Rev* 29:241-246, 2001.
314. Landrigan PJ, Sonawane B, Mattison D, McCally M, Garg A: Chemical Contaminants in Breast Milk and their Impacts on Children's Health: An Overview. *Environ Health Perspect* 110:A313-A315, 2002.
315. Landrigan PJ, Garg A: Chronic Effects of Toxic Environmental Exposures on Children's Health. Presented at the WHO/AAPCC Symposium on Children's Health and Environmental Toxicology: New Challenges for Toxicologists and Poison Centers. Montreal, Canada. *Clin Toxicol* 40:449-456, 2002.
316. Claudio L, Garg A, Landrigan PJ: Addressing Environmental Health Issues. In: Terrorism and Public Health. Levy B, Sidel V, eds., Oxford University Press, New York, pp. 69-79, 2002.
317. Landrigan PJ: Confronting the health consequences of the World Trade Center attacks (Abstract). Presenting at the Environment of the 130th Annual Meeting, Philadelphia PA, 9-13 November 2002.
318. Garg A, Landrigan PJ: Children's Environmental Health: New Gains in Science and Policy. *Annals of the American Academy of Political and Social Science* 584:135-144, 2002.
319. Landrigan PJ, Garg A: Public Health: What's Next? *The Green Guide* 90:4, 2002.
320. Landrigan PJ, Garg A: Climate Change and Infectious Diseases. *The Green Guide* 91:4, 2002.
321. Landrigan PJ: New Year, New Faces. *Am J Ind Med* 42:164-166, 2002.
322. Landrigan PJ: Foreword: Pest Control in Public Housing, Schools and Parks: Urban Children at Risk. In: State of New York, Attorney General Eliot Spitzer. Environmental Protection Bureau, 2002.
323. Landrigan PJ: Strong Chemicals, Strong Action, Strong Control. *The CHEC Report*, issue #8, 2002.
324. Landrigan PJ: The Worldwide Problem of Lead in Petrol. (Editorial). *Bull World Health Organ* 80(10):768, 2002.
325. Landrigan PJ, Garg A: Vulnerable Populations. In: _. McCally M., ed., The MIT Press, Cambridge, Massachusetts, pp. 257-271, 2002.
326. Eskenazi B, Landrigan PJ: Environmental Health Perspects and children's environmental health. (Editorial) *Environ Health Perspect* 110:A559-A560, 2002.
327. Landrigan PJ: Lessons Learned: Worker Health and Safety Since September 11, 2001. *Am J Ind Med* 42:530-531, 2002.
328. Etzel RA, Landrigan PJ: Letter from the Guest Editors. *Ambulatory Pediatrics* 3:16-17, 2003.
329. Adamu M, Morland K, Golden A, Godbold J, Moshier E, Wolff M, Landrigan P: Body Burden of Pollutants from Fish Consumption (Abstract). In: Proceedings of the 2003 Annual Meeting of the Society of Epidemiologic Research; *Am J Epidemiol* 157:S085, 2003.

330. Landrigan PJ: Indoor Air Quality: A Doctor's Viewpoint. *The CHEC Report*, issue #9, 2003.
331. Galvez M, Brenner B, Rivera M, Teitelbaum S, Moskowitz H, Claudio L, Berkowitz T, Wolff M, Forman J, Landrigan PJ: Exposure Assessment of Environmental Risk Factors for Overweight/Obesity in Urban Children. (Abstract) Presented the annual meeting of Pediatric Academy Societies, Seattle, WA, 2003.
332. Landrigan PJ, McCally M, Oleskey C: Ethics of Pesticide Testing in Humans. *Environ Health Perspectives* 111:A750, 2003.
333. Landrigan P, Garg A, Droller DBJ: Assessing the Effects of Endocrine Disruptors in the National Children's Study. *Environ Health Perspect* 111:1678-1682, 2003.
334. Landrigan PJ, Schechter CB, Lipton JM, Fahs, Schwartz J: Estimated Costs of Environmental Disease: Response to Rigas (Correspondence). *Environ Health Perspect* 111:A145, 2003.
335. Landrigan PJ, Goldman L: Another View of Children's Health. (Editorial). *Chemical & Engineering News* 81:3, 2003.
336. Landrigan PJ, Goldman L: Prenatal methylmercury exposure in the Seychelles – 3rd reply. (Letter) *Lancet* 362:666, 2003.
337. Suk WA, Ruchirawat KM, Balakrishnan K, Berger M, Carpenter D, Damstra T, deGarbino Pronczuk J, Koh D, Landrigan PJ, Makalinao I, Sly PD, Xu Y, Zheng BS: Environmental Threats to Children's Health in southeast Asia and the Western Pacific. *Environ Health Perspect* 111:1340-1347, 2003.
338. Landrigan PJ: A Doctor's Viewpoint: Why Air Pollutants Harm Kids. *The CHEC Report*, issue 12, Fall 2003.
339. Galvez MP, Frieden TR, Landrigan PJ: Obesity in the 21st Century. (Editorial) *Environ Health Perspect* 111:A684-A685, 2003.
340. Edwards ES, Green N, Henry CJ, Landrigan PJ, Swartz D: Tracking Children's Health to Age 21. (Letter) *Science* 302:781, 2003.
341. Landrigan PJ, Droller DBJ: The Burden of Obesity Among Young Urban People. *The Green Guide* 98, 2003.
342. Etzel RA, Balk SJ, Reigart JR, Landrigan PJ: Environmental Health for Practicing Pediatricians. *Indian Pediatrics* 853-860, 2003.
343. The Council of Science Editors and the International Committee of Medical Journal Editors. Correspondence about Publication Ethics and Regulatory Toxicology and Pharmacology. Special Contributions. *Int J Occup Environ Health* 9:386-389, 2003.
344. Landrigan PJ: Principles of Occupational and Environmental Medicine. Chapter 18. In: Cecil Textbook of Medicine, 22nd edition. Eds, Goldman L, Ausiello D. Philadelphia: W.B. Saunders Co, pp 81-85, 2003.
345. Galvez MP, Vanable L, Forman JA, Landrigan PJ, Akeredolu E, Leighton J, Nagin D, Yip W, Simmonds K: A case of childhood lead poisoning from commercially manufactured European ceramic dinnerware, New York City, 2003 (Abstract). Presented at the Annual Meeting of Pediatric Academic Societies, San Francisco, CA, May 2004.
346. Needleman HL, Landrigan P: What level of lead in blood is toxic for a child. (Letter) *Am J Public Health* 94:8, 2004.
347. Landrigan PJ, Slutsky J: Are Learning Disabilities Linked to Environmental Toxins? *Learning Disabilities Journal* 15:7-12, 2004.

348. Landrigan P: Dr. T.K. Joshi and Asbestos in India: A Message from the Collegium Ramazzini. *Am J Ind Med* 45:125-128, 2004.
349. Landrigan PJ: Environmental Factors and Pediatric Disease: New Developments in Research and Education. *J San Francisco Medical Society* 77:18-19 & 26, 2004.
350. Goldman L, Falk H, Landrigan PJ, Balk SJ, Reigart JR, Etzel RA: Environmental Pediatrics and its Impact on Government Health Policy. *Pediatrics* 113:1146-1157, 2004.
351. Landrigan PJ: Children As A Vulnerable Population. *Int J Occup Med Environ Health* 17:175-177, 2004.
352. Landrigan PJ, Steenland K, Richter E: Olav Axelson, MD. *Am J Ind Med* 45:582-583, 2004.
353. Landrigan PJ: New faces. *Am J Ind Med* 45:584-585, 2004.
354. Landrigan PJ, Trasande L: Applying the precautionary principle in environmental risk assessment to children. In: The Precautionary Principle: protecting public health, the environment and the future of our children. Martuzzi M, Tickner JA, eds, 2004. pp. 121-143.
355. Galvez M, Vanable L, Forman JA, Landrigan PJ, Akeredolu E, Leighton J, Nagin D: Childhood Lead Poisoning from Commercially Manufactured European Ceramic Dinnerware – New York City, 2003. *MMWR* 53:585-586, 2004.
356. Landrigan PJ: The WTC Disaster: Landrigan's Response. (Correspondence). *Environ Health Perspect* 112:A607, 2004.
357. Trasande L, Landrigan PJ: The National Children's Study: A Critical National Investment. (Editorial). *Environ Health Perspect* 112:A789-A790, 2004.
358. Landrigan PJ, Garg A: Children are not little adults. Chapter 1. In: WHO Handbook on Children's Health and the Environment. A global perspective. Geneva. Pronczuk-Garbino J, ed, pp. 3-16: *WHO*, 2005.
359. Landrigan PJ: A public health project in Ghana. *African Newsletter on Occupational Health and Safety* 14:47, 2004.
360. Moline J, Landrigan P: Lead. Chapter 39.8. In: Textbook of Occupational and Environmental Medicine, 2nd edition. Rosenstock L, Cullen M, Brodkin D, Redlich C, eds, pp. 967-978, 2005.
361. Landrigan PJ, Trasande L: More kids chronically ill. *Poughkeepsie Journal*, January 2, 2005.
362. Landrigan PJ, Soffritti M: Collegium Ramazzini Statement on Darfur. *Am J Ind Med* 47:193-194, 2005.
363. Landrigan PJ: Environmental Threats to Children's Health – The Promise of the National Children's Study. *New England College of Occupational and Environmental Medicine* (NECOEM Reporter) 2:1-2, 2005.
364. Galvez M, Forman J, Landrigan PJ: Children. Chapter 28. In: Environmental Health: From Global to Local. Frumkin H, ed, pp. 805-845, 2005.
365. Landrigan PJ, Soffritti M: Collegium Ramazzini Call for an International Ban on Asbestos. *Am J Ind Med* 47:471-474, 2005.
366. Landrigan PJ, Soffritti M: Collegium Ramazzini Statement on the Tokyo Declaration Banning Asbestos. *Am J Ind Med* 48:89-90, 2005.
367. Landrigan PJ, Tamburlini G. Children's Health and the Environment: A Transatlantic Dialogue. (Editorial) *Environ Health Perspect* 113:A646-A647, 2005.

368. Landrigan PJ, Newman B. Children and other high-risk workers as a special challenge to occupational health services. *SJWEH Suppl* 1:43-45, 2005.
369. Landrigan PJ. Environmental Exposures and Children's Health Challenges. *Zero to Three* 26:8-10, 2005.
370. Pirisi A. Profile: Philip Landrigan: children's health crusader. *Lancet* 365:1301, 2005.
371. Landrigan PJ, Claudio L. Pesticides. Chapter 21. In: Environmental Toxicants: Human Exposures and Their Health Effects. Lippman M (ed.). 2nd Edition. New York: John Wiley, 2005.
372. Landrigan PJ, Golden AL, Simpson HJ. Toxic substances and their impacts on human health in the Hudson River Watershed. Chaper 28. In: The Hudson River Estuary. Levinton J, Waldman J (eds). Cambridge University Press, 2006.
373. Landrigan PJ, Kotelchuck D, Grandjean P. Principles for Prevention of the Toxicity of Metals. Chapter 16. For inclusion in: Handbook of Toxicity of Metals. Nordberg GF, Fowler BA, Nordberg M, Friberg LT (eds). Academic Press, Inc. 2007.
374. Landrigan PJ, Benbrook CM. Impacts of the Food Quality Protection Act on Children's Exposures to Pesticides. Presented at the AAAS Symposium on Opportunities and Initiatives to Minimize Children's Exposures to Pesticides. St. Louis, Missouri, February 19, 2006.
375. Landrigan PJ. Essays in Public Health and Preventive Medicine. *Mount Sinai J Med* 73:564, 2006.
376. Landrigan PJ. Environmental Pediatrics and the Ecological Imperative. (Editorial) *EcoHealth* 3:75-76, 2006.
377. Landrigan PJ, Trasande L. Economic Implications of Metal Neurotoxicity. Presented at an International Workshop on Neurotoxic Metals: Lead, Mercury and Manganese from Research to Prevention. Brescia, Italy, June 17-18, 2006.
378. Landrigan PJ. Our Most Vulnerable. Chapter 12. In: Child Honouring. How to Turn this World Around. Cavoukian R, Olfman S (eds). Praeger Publishers, 2006.
379. Landrigan PJ, Pronczuk DeGarbino J, Newman B. Introduction. In: Living in a Chemical World. *Ann NY Acad Sci* xvii-xviii, 2006. Framing the Future in Light of the Past. In: Living in a Chemical World. *Ann NY Acad Sci* 1-3, 2006.
380. Landrigan PJ. Ruth Lilis (1926-2006). *Am J Ind Med* 49:607-608, 2006.
381. Landrigan PJ, Forman JA. Chemical Pollutants. Chapter 707. In: Nelson Textbook of Pediatrics. Kliegman, Behrman, Jenson, Stanton (eds.). 18th Edition. Philadelphia, PA: Saunders Elsevier, Inc., pp. 2906-2909, 2007.
382. Landrigan PJ, Nordberg M, Lucchini R, Nordberg G, Grandjean P, Iregren A, Alessio L. The Declaration of Brescia on Prevention of the Neurotoxicity of Metals. *Am J Ind Med* 50:709-711, 2007.
383. Tornheim JA, Morland KB, Landrigan PJ Cifuentes E. Diarrheal Disease Burden Attributable to Water Privatization in Bolivia. (Poster). Presented at CMCA Conference, December 7, 2006.
384. Landrigan PJ. Doctor David V. Bates (1922-2006). *Eur J Oncol* 11:265, 2006.
385. Robbins A, Landrigan PJ. Safer, Healthier Workers: Advances in Occupational Disease and Injury Prevention. Chapter 10. In: Silent Victories. Ward JW, Warren C (eds). Oxford University Press, pp 209-229, 2007.

386. Landrigan PJ. The 2nd ADAO Asbestos Conference Proceedings. Preface. *Am J Ind Med* 50:51, 2007.
387. Landrigan PJ. Valediction. (Editorial) *Am J Ind Med* 50:243-244, 2007.
388. Landrigan PJ. Benzene. Chapter 71. In: Environmental and Occupational Medicine, Fourth Edition, edited by William N. Rom, Lippincott-Raven Publishers, Philadelphia, 2007.
389. Landrigan PJ, Claudio L. Pesticides. Chapter 24. In: Environmental Toxicants. Lippman M (ed.). Third Edition. John Wiley & Sons Inc., 2009.
390. Trasande L, Landrigan PJ, Schechter CB, Bopp RF. Methylmercury and the Developing Brain. (Letter to the editor) *Environ Health Perspect* 115:A396-A397, 2007. PMID: 17687420
391. Grandjean P, Bellinger D, Bergman A, Cordier S, Davey-Smith G, Eskenazi B, Gee D, Gray K, Hanson M, van den Hazel P, Heindel JJ, Heinzow B, Hertz-Picciotto I, Hu H, Huang T T-K, Jensen TK, Landrigan PJ, McMillen IC, Murata K, Ritz B, Schoeters G, Skakkebaek NE, Skerfving S, Weihe P. The Faroes Statement: Human Health Effects of Developmental Exposure to Chemicals in Our Environment. *Basic & Clinical Pharmacology & Toxicology* 102: 73-75, 2008. PMID: 18226057
392. Landrigan PJ, Trasande L, Swanson JM. Genetics, Altruism and the National Children's Study. *Am J of Med Genetics* Part A 146A:294-296, 2008. PMID: 18203190
393. Pollack SH, Landrigan PJ. Health Hazards of Child Labor. Chapter 45. In: Public Health & Preventive Medicine. Wallace RB (ed). 15th Edition. McGraw Hill, 2007.
394. Landrigan PJ. The Unique Vulnerability of the Developing Human Brain to Early Neurotoxic Exposures. Volume 1. In: The Sixth Princess Chulabhorn International Science Congress: The Interface of Chemistry and Biology in the "Omics" Era: Environment & Health and Drug Discovery. Amarin Printing and Publishing Public Company Limited. Plenary Lecture, Bangkok, Thailand, November 2007.
395. Landrigan PJ. Developmental Neurotoxicity of Industrial Chemicals and Pediatric Bipolar Disorder: A Call to Research. Chapter 9. In: Bipolar Children. Olfman, S (ed). Praeger Publishers, 2007.
396. Landrigan PJ, Trasande L. Mercury in sushi. *New York Times.* (Letter to the Editor). January 28, 2008.
397. Brown RC, Bullock MB, Landrigan PJ, Sonawane B. Children's Environmental Health: Issues and Challenges. In: Encyclopedia of Environmental Health. Sonawane B, Brown R (eds). Elsevier Ltd, submitted 2008.
398. Patton RM, Arthur T, Bain EI, Balbus J, Landrigan PJ, et al. Open Letter to Stephen Johnson, Administrator, U.S. Environmental Protection Agency: Ban Endosulfan. *Int J Occup and Environ Health* 14:236-239, 2008.
399. Landrigan PJ. Foreword. Environmental Threats to Healthy Aging With a Closer Look at Alzheimer's & Parkinson's Diseases. *Boston: Greater Boston Physician for Social Responsibility* pp 6-7, 2008.
400. Landrigan PJ. Emerging Technologies. Chapter. In: American Academy of Pediatrics, Pediatric Environmental Health, Third Edition. Etzel, Ruth (ed). Submitted 2008.
401. Landrigan PJ. Artificial Turf Fields Pose Safety Issues. *The Journal News.* (Letter to the Editor). December 11, 2008.
402. Landrigan PJ, Forman J, Galvez M, Newman B, Engel SM, Chemtob C. Impact of September 11 World Trade Center Disaster on Children and Pregnant Women. *Mount Sinai J Med* 75:129-134, 2008.
403. Galvez MP, Forman J, Landrigan PJ. Children. Chapter 25. In: Environmental Health: From Global to Local. Frumkin H (ed). Second Edition, 2009.

404. Landrigan PJ, Bullock M. Integrated Pest Management (IPM) Can Cost-Effectively Reduce Pesticide Exposures in the Urban Environment. (Abstract). Presented at Translating Science to Policy Protecting Children's Environmental Health at The Columbia Center for Children's Environmental Health *In collaboration with* WE ACT for Environmental Justice, New York, NY, March 30, 2009.
405. Sheffield PE, Knowlton K, Kinney PL, Landrigan PJ. The Effect of Climate Change on Pediatric Respiratory Hospitalizations: a Glimpse into the Future. (Abstract). Presented at the Pediatric Academic Societies meeting, Baltimore, MD, May 3, 2009.
406. Schwartz AW. Socio-demographic Predictors of Influenza and Pneumonia Non-Vaccination among Elderly Israelis. INSPIRE final presentations. Mentor: Landrigan PJ: Mount Sinai School of Medicine, November 18, 2009.
407. Stayner LT, Camargo MC, Reina M, Al-Alem U, Straif K, Landrigan PJ. A meta-analysis of the association between asbestos exposure and the risk of ovarian cancer. (Abstract). Presented at the EPICOH meeting, Taiwan, Republic of China, 2009.
408. Landrigan PJ. Foreword: Leadership. In: Leadership Essentials for Emergency Medical Services. American Academy of Orthopaedic Surgeons. Jones and Bartlett Publishers, LLC. Brophy, John R., 2010.
409. Landrigan P. Counting Roaches. Reducing Pesticide Exposures via Integrated Pest Management. San Francisco Medical Society. *Medicine and the Environment*, p 32, April 2010.
410. Landrigan PJ. The Making of a Medical Epidemiologist. In: Medicine Science and Dreams. The Making of Physician-Scientists. Chapter 16. Springer. Schwartz, David A. (ed). 2010.
411. Landrigan PJ, Satlin LM, Boffetta P. Why Are We Subsidizing Childhood Obesity? New York Times, Op-Ed, October 2010.
412. Landrigan PJ, Trasande L. The U.S. National Children's Study: A 21-Year Prospective Study of 100,000 American Children. (Abstract). Presented at the Excellence in Paediatrics conference, London, UK, December 2-4, 2010.
413. LaDou J, Castleman B, Frank A, Gochfeld M, Greenberg M, Huff J, Joshi TK, Landrigan PJ, Lemen R, Myers J, Soffritti M, Soskolne CL, Takahashi K, Teitelbaum D, Terracini B, Watterson A. The case for global ban on asbestos. *Environ Health perspect* 118:897-901, 2010. PMID: 20601329
414. Takaro TK, Davis D, Van Rensburg SJ, Arroyo Aguiliar RS, Algranti E, Bailar JC 3rd, Belpoggi F, Berlin M, Bhattacharya S, Bonnier Viger YV, Brophy J, Bustinza R, Cameron RB, Dement JM, Egilman D, Castleman B, Chaturvedi S, Cherniack M, Choudhury H, Demers PA, Digangi J, Digon A, Edwards JG, Englund A, Erikson B, Corréa Filho HR, Franco G, Frank AL, Freund A, Gee D, Giordano A, Gochfeld M, Kern DG, Keifer M, Khatter K, Kjuus H, Keith M, Koo LC, Kumar A, LaDou J, Landrigan PJ, Lemen RA, Last JM, Lee CW, Leigh J, Levin SM, Lippman A, Madrid GA, McCulloch J, McDiarmid MA, Merchant JA, Monforton C, Morse T, Muir DC, Mukerjee D, Mulloy KB, Myers J, Nuwayhid I, Orris P, Ozonoff D, Paek D, Patra M, Pelclová D, Pepper L, Poje GV, Rahman Q, Reyes B, Robinson BW, Rodriguez E, Rose C, Rosenman KD, Rosenstock L, Ruchirawat M, Rydzyński K, Schneider J, Silverstein B, Siqueira CE, Slatin C, Soffritti M, Soskoline C, Sparer J, Stayner LT, Takaro TK, Tarkowski S, Teitelbaum DT, Tompa A, Trosic I, Turcotte F, Vilela RA, Waterman YR, Watterson A, Wegman DH, Welch LS, Woitowitz HJ, Yanri Z, Zavariz C. Scientists Appeal Tighter to Quebec Premier Charest to stop exporting asbestos to the developing world. *Int J Occup Environ Health* 16:239-246, 2010. PMID 20465068

415. Lee HH, Milam EC, Claudio L, Landrigan PJ, Crane M. Addressing Environmental Health Issues. In: Terrorism and Public Health. 2nd Edition. Levy and Sidel (eds). 2011.
416. Landrigan PJ, Morland K, La Merrill MA. Environment and Heart Disease. In: Hurst's The Heart. 13th Edition. The McGraw-Hill Companies, Inc. Fuster, Walsh & Harrington (eds). 2011.
417. Landrigan PJ, Miodovnik A. Children's Health and the Environment: An Overview. *Mount Sinai J Med* 78:1-10, 2011.
418. Galvez M, Landrigan PJ. Q. and A.: PCBs in School Classrooms. The New York Times, Friday, February 18, 2011.
419. Carroquino MJ, Posada M, Landrigan PJ. Environmental Toxicology: Children at Risk. *Encyclopedia of Sustainability Science and Technology*, DOI 10.1007/978-1-4419-0851-3. 2011
420. Morland KB, Evenson KR, Bordowitz R, Godbold JH, Granieri EC, Spark A, Landrigan PJ. Methods for the Assessment of Food and Physical Activity Environments: Brooklyn Seniors and the Built Environment (BSBE) Study. (Abstract). Presented at the International Society of Environmental Epidemiology (ISEE), Barcelona, Spain 2011.
421. Landrigan PJ, Goldman LR. Protecting Children from Pesticides and Other Toxic Chemicals. J *Expo Sci Environ Epidemiol* 21:119-120, 2011.
422. Landrigan PJ. Tighter Regulations to Protect the Nation's Children. People & Places. *Health Affairs* 30(5):851, 2011.
423. Landrigan PJ, Garcia CE, Neira M. Global Prevention of Environmental and Occupational Cancer. Editorial. *Environ Health Perspect* 119(7):A280-A281, 2011.
424. Landrigan PJ, Forman JA. Chemical Pollutants. Chapter 700. In: Nelson Textbook of Pediatrics. Kliegman, Stanton, Behrman, St. Geme, Schor (eds.). 19th Edition. Philadelphia, PA: Saunders Elsevier, Inc., pp. 2448-, 2011.
425. Landrigan PJ, Espina C, Neira M. In Favor of Controlling Proven, but Not Probable, Causes of Cancer : Landrigan et al. Respond. *Environ Health Perspect* 119(11) :A469-A470, 2011.
426. Crane MA, Milek DJ, Ripp J, Globina Y, Seifu L, Landrigan PJ. The Lessons of September 11. *Ind Health* 49 :673-676, 2011.
427. Chatham-Stephen KM, Mann M, Schwartz AW, Landrigan PJ. First, Do No Harm. Children's Environmental Health in Schools. *American Educator*, pp 22-31, Winter 2011-2012.
428. Lee HH, Milam E, Claudio L, Landrigan PJ, Crane MA. Investigating the Health Consequences of the World Trade Center Attack. Chapter 4. In: Terrorism and Public Health. Levy BS, Sidel VW (eds). 2nd Edition. Oxford University Press, pp. 67-79, 2011.
429. Schwartz AW, Landrigan PJ. Bisphenol A in Thermal Paper Receipts: An Opportunity for Evidence-Based Prevention. *Environ Health Perspect* 120:A14-A15, 2012.
430. Landrigan PJ. Mommy Dearest – Salute, Maloney! *New York Post* (Letter to the Editor). May 13, 2012.
431. LandriganPJ. Emerging Technologies and Materials. In: Pediatric Environmental Health. Chapter 50. Etzel RA (ed). 3rd Edition. American Academy of Pediatrics, pp. 749-755, 2012.
432. Landrigan PJ, Lambertini L, Birnbaum LS. A Research Strategy to Discover the Environmental Causes of Autism and Neurodevelopmental Disabilities. *Environ Health Perspect* 120:A258-A259, 2012.

433. Landrigan PJ, Kellner CH. Lead-Based Paint (image). *Environ Health Perspect* 120; A268, 2012.
434. Landrigan PJ. Chemicals and Bladder Cancer. (Editorial Commentary) *The Journal of Urology* 189: 52, 2013.
435. Straif K, Stayner L, Demers PA, Landrigan PJ. Use of Meta-analyses by IARC Working Groups. (Correspondence). *Environ Health Perspectives* 120:A342-A343, 2012.
436. Landrigan PJ. The hidden costs of environmental contamination. (Editorial). Eur Respir J 40:286-288, 2012.
437. Huey RB, Landrigan P. Recommendation of Crews D and Gore AC: Epigenetic synthesis: a need for a new paradigm for evolution in a contaminated world. (Commentary) F1000 Biol Rep 2012, 4(18). Faculty of 1000, 02 Oct 2012; DOI: 10.3410/f.717957733.793462153. f1000.com/prime/717957733#eval793462153 Epigenet
438. Chatham-Stephens K, Caravanos J, Ericson B, Landrigan P, Fuller R. Burden of Disease from Toxic Waste Sites in India, Indonesia, and the Philippines in 2010. (Poster). 2013 Annual Meeting of the Pediatric Academic Socieities, Washington, DC, May 2013.
439. Solan S, Wallenstein S, Shapiro M, Teitelbaum SL, Stevenson L, Kochman A, Kaplan J, Dellenbaugh C, Kahn A, Biro FN, Crane M, Crowley L, Gabrilove J, Gonsalves L, Harrison D, Herbert R, Luft B, Markowitz SB, Moline J, Niu X, Sacks H, Shukla G, Udasin I, Lucchini RG, Boffetta P, Landrigan PJ. Cancer Incidence in World Trade Center Rescue and Recovery Workers; 2001-2008. (Poster). 2013 Annual Meeting of the council of State and Territorial Eidemiologists, Pasadena, CA, June 2013.
440. Bellinger DC, Burger J, Cade TJ, Cory-Slechta DA, Finkelstein M, Hu H, Kosnett M, Landrigan PJ, Lanphear B, Pokras MA, Redig PT, Rideout BA, Silbergeld E, Wright R, Smith DR. Health Risks from Lead-Based Ammunition in the Environment. (Editorial) *Environ Health Perspect* 121:A178-A179, 2013.
441. Darrah TH, Whiate AM, Campbell ME, Miller RK, CJ, Katzman PJ, Ruffolo L, Weidenborner P, Culhane J, Wadlinger S, Landrigan P, Littman L, Thiex N, Specker B, Swanson J, Dole N, Eucker B, Clark EB, Varner M, Taggart E, Moye J. Understanding the Trace Metal Composition of Human Placenta from the National Children's Study (NCS). (Abstract). Presented at the Teratology Society Meeting, Tucson, Arizona, June 2013.
442. Salafia CM, Dalton JL, Misra D, Stodgell CJ, Katzman PJ, Ruffolo L, Culhane J, Wadlinger S, Torres C, Landrigan P, Littman L, Sheffield P, Leuthner S, Szabo S, Thiex N, Specker B, Swanson J, Dole N, Thorp J, Eucker B, Clark EB, Varner MW, Taggart E, Durkin MS, Sandoval M-N, Moye J, Miller RK. The Chronic Surface Vascular Network in Human Placenta: Quantifying Structure to Estimate Gestational Stressors and Life Course Risks, Autism Spectrum Disorder (ASD) As a Model for Future Analyses: National Children's Study and EARLI. (Abstract). Presented at the Teratology Society Meeting, Tucson, Arizona, June 2013.
443. Alberti A. Taking a History: A profile of Philip Landrigan. *Harvard Medicine Magazine,* May 2013.
444. Landrigan PJ, Goldman LR. Chemical Safety, Health Care Costs and the Affordable Care Act. *Am J Ind Med* (Comment). Published online (wileyonlinelibrary.com) DOI10.1002/ajim.22268;1-3, 2013.
445. Landrigan PJ. State's children deserve health excellence centers. Network would diagnose diseases of environmental orgin, provide outreach. (Op-ed). *Albany Times Union* December 13, 2013.
446. Landrigan PJ, Wright RO, Birnbaum LS. Mercury Toxicity in Children. (Letter to Editor). *Science* 342:1447, 2013.

447. Hao K, Narzo AD, Chen J, Schadt EE, Littman L, Landrigan P, Aagaard Kjersti, Hobbs C, Clark EB, Varner M, Dole N, Culhane J, Swanson J, Thiex N, Murry J, Moye J, Kasten C, Stodgell CH, Miller RK, National Children's Study Placenta Consortium. Expression Quantitative Trait Loci in Placenta Tissues from the National Children's Study Reveal Developmental Origins of Human Complex Diseases. (Abstract). Presented at the IFPA meeting, Paris, France, 2014.
448. Dassanayake PS, Xia Y, Nanes J, Ranasinghe P, Li A, Stodgell CJ, Clark EB, Varner M, Landrigan P, Dole N, Culhane J, Thiex N, Swanson J, Moye J, Miller RK on behalf of the National Children's Study Placenta Consortium. Emerging and Legacy environmental Organic Pollutants in Placenta Specimens collected in the National Children's Study-Human Placenta Project. (Abstract). Presented at the14th Annual Workshop on Brominated and other Flame Retardants, 2014.
449. Boffetta P, Georgopoulos PG, Giacalone J, Wallenstein S, Lucchini R, Lioy PJ, Landrigan P. Cancer Risk in World Trade Center Rescue and Recovery Workers. (Poster). Presented at the 105th Annual Meeting of the American Association for Cancer Research, San Diego, CA, April 5-9, 2014.
450. Stodgell C, Salamone L, Murry J, Chen J, Lambertini L, Schadt E, Littman L, Landrigan P, Aagaard KM, Hobbs C, Clark E, Varner M, Dole N, Culhane J, Swanson J, Thiex N, Busch T, Kasten C, Moye J. Lack of Correlation between Placenta Gene Expression and RNA Integrity Number (RIN) or Time to Collection. (Poster). Presented at International Federation of Placenta Associations, Paris, France, September 9-12, 2014.
451. Friedman A, Friedman M, Miller RK, Stodgell C, Littman L, Landrigan P, Clark EB, Varner M, Dole N, Culhane J, Swanson J, Thiex N, Moye J, National Children's Study Placenta Consortium. Quantitative Analysis of Bisphenol A in Human Placental Tissue from Nine Counties Across the U.S.: National Children's Study (NCS). (Abstract). Presented at International Federation of Placenta Associations, Paris, France, September 9-12, 2014.
452. Miller RK, Darrah TH, Landrigan P, Walker C, Szabo S, Moye J. Environmental Exposures During Pregnancy: A National Children's Study Formative Research Experience. (Abstract). To be Presented at The Teratology Society, Bellevue, Washington, June 28-July 2, 2014.
453. Anandaraja NA, Roth R, Landrigan PJ. Chapter 25: Building a Global Health Education Program in an Urban School of Medicine. In: The Role of Anesthesiology in Global Health: A Comprehensive Guide, eds. Roth R, Frost EAM, Gevirtz C, Atcheson CLH; pp. 331-344, Springer, New York, NY, 2014.
454. Friedman A, Friedman M, Miller RK, Stodgell C, Littman L, Landrigan P, Clark EB, Varner M, Dole N, Culhane J, Swanson J, Thiex N, Moye J, National Children's Study Placenta Consortium. Quantitative Analysis of Bisphenol A in Human Placental Tissue from Nine Counties Across the U.S.: National Children's Study (NCS). (Poster). Presented at International Federation of Placenta Associations, Paris, France, September 9-12, 2014.
455. Nordberg GF, Fowler BA, Nordberg M, Landrigan PJ. Prevention of the Toxic Effects of Metals Contained in Batteries and E-Waste/Waste Electric and Electronic Equipment (WEEE). (Poster). Presented at Annual Meeting of the Collegium Ramazzini, Carpi, Italy, October 24-26, 2014.
456. Landrigan PJ, Fuller R. Environmental Pollution and Occupational Health in a Changing World. (Commentary) *Ann Glob Health* 80:245-246, 2014.
457. Crane MA, Cho HG, Landrigan PJ. Implications of the World Trade Center Health Program (WTCHP) for the Public Health Response to the Great East Japan Earthquake. *Industrial Health* 52:5-12, 2014.

OTHER PUBLICATIONS:
REVIEW ARTICLES, CONFERENCE PROCEEDINGS, BOOK CHAPTERS, COMMENTARIES, EDITORIALS, LETTERS TO EDITOR, ABSTRACTS & POSTERS (cont)

458. Sly PD, Neira M, Collman G, Carpenter DO, Landrigan PJ, Van Den Berg M, Barriga FD, Ruchirawat M, Laborde A, Pascale A, Heacock M, Dalmau MT, Suk WA. Networking to advance progress in children's environmental health. (Commentary) Lancet Glob Health 2:e129-e130, 2014.

458a. Landrigan PJ. The Role of Environmental Exposures in the Aetiology of Autism. A Retrospective View of the Last Decade: New Results and New Frontiers for the Future. Proceedings of the XXIX International Conference, The Person with Autism spectrum Disorders: Animinating Hope-Second Session. New Synod Hall, Vatican City, November 20-22, 2014. Dolentium Hominum N. *Journal of the Pontifical Council for Health Care Workers* 86:35-41, 2014.

459. Landrigan PJ, Narula J. Introducing the Annals of Global Health. *Ann Glob Health* 80:1-2, 2014.

460. Landrigan PJ, Lucchini RG, Kotelchuck D, Grandjean P. Principles for Prevention of the Toxic Effects of Metals. In: Handbook on the Toxicology of Metals. Chapter 24. Nordberg GF, Fowler BA, Nordberg M (Eds). Volume I: General Considerations, 4th Edition. Academic Press, pp. 507-528, 2015.

461. A Report by Greater Boston Physicians for Social Responsibility. In Harm's Way: Toxic Threats to Child Development (Foreword) May, 2000.

462. Nordberg GF, Fowler BA, Nordberg M, Landrigan PJ. Prevention of the Toxic Effects of Metals Contained in Batteries and E-Waste Electric and Electronic Equipment (WEEE). (Abstract). Presented at ICOH Congress in Korea in 2015.

463. Li Q, Kappil M, Li A, Dassanayke DMA, Darrah T, Friedman AE, Friedman M, Lambertini L, Landrigan P, Stodgell CJ, Aagaard K, Schadt E, Murry J, Clark EB, Done N, Culhane J, Swanson J, Varner M, Moye J, Kasten C, Miller RK, Chen J, National Children's Study Consortium. Exploring the associations between microRNA expression profiles and environmental pollutants in human placenta from the National Children's Study (NCS). (Abstract). Presented at the 55th Annual Teratology Society meeting in Montreal, QC, Canada, June 27-July 1, 2015.

464. Landrigan PJ, Suk WA. Jenny Pronczuk de Garbino: AGlobal Champion for Children's Health. (Editorial). *Environ Health Perspect* 123:A52-A53, 2015.

465. Landrigan PJ, Baker DB. The National Children's Study: End or New Beginning? *New Engl J Med*, 372:1486-1487, 2015.

466. Ringen K, Landrigan PJ, Stull O, Duffy R, Melius J, McDiarmid MA. Occupational safety and health protections agains Ebola virus disease. *Am J Ind Med*, 2015. DOI: 10.1002/AJIM.22467. PubMed PMID: 25950864.

467. Landrigan PJ, Forman JA. Chemical Pollutants. Chapter 719. In: Nelson Textbook of Pediatrics. Kliegman, Stanton, St Geme III, Schor (eds). 20th Edition, Volume 2. Philadelphia, PA: Elsevier, pp. 3427-3431, 2015.

468. Landrigan PJ, Fuller R. Global health and environmental pollution. (Editorial). *Int J Public Health* 60:761-762, 2015. DOI: 10.1007/s00038-015-0706-7.

469. Landrigan PJ. Irving J. Selikoff, MD January 15, 1915-May 20, 1992. *Am J IndMed* 58:1015-1016, 2015. doi: 10.1002/ajim.22488. [Epub ahead of print] PubMed PMID: 26333886.

470. Landrigan PJ, Fuller R, Horton R. Environmental pollution, health, and development: A Lancet-Global Alliance on Health and Pollution-Icahn School of Medicine at Mount Sinai Commission. (Comment) *Lancet* 386:1429-1431, 2015.

471. Landrigan PJ, Benbrook C. GMOs, Herbicides, and Public Health. *NEJM* 373:693-694, 2015.

472. Landrigan PJ. Children's Environmental Health: A Brief History. *Acad Pediatr* 16:1-9, 2016; doi: 10.1016/j.acap.2015.10.002.

EPA-HQ-2018-000065-0001188

473. Lucchini RG, Landrigan PJ. Occupational Health and Safety in the Expanding Economies: Severe Challenges and the Need for Action Through Education and Training. (Editorial) *Annals of Global Health* 81:463-464, 2015.
474. Landrigan PJ. Emerging Technologies and Materials. Chapter 52. For inclusion in: American Academy of Pediatrics. Handbook of Pediatric Environmental Health, 4th edition, 2016.
475. Landrigan PJ. Environment and Heart Disease. Chapter 105. For inclusion in: Fuster V. (editor). Hurst's, The Heart, 14th edition, 2016.
476. Miller MD, Marty MA, Landrigan PJ. Children's Environmental Health – Beyond National Boundaries. In: Our Shrinking Globe: Implications for Child Safety. Sheety AK (ed). *Pediatr Clin N Am* 63:149-165, 2016. http://dx.doi.org/10.1016/j.pcl.2015.08.008
477. Landrigan PJ. Eula Bingham, PhD: Former Assistant Secretary for Occupational Safety and Health, US Department of Labor. *Am J Ind Med* 59:81-83, 2016. Doi:10.1002/ajim.22515. PubMed PMID: 26768757.
478. Landrigan PJ. The Effects of Nox On Our Health. Features & Investigations-Car Emissions, It's not just diesel. Expert Review. *Which?* 20-23, February 2016.
479. Portier CJ, Armstrong BK, Baguley BC, Baur X, Belyaev I, Bellé R, Belpoggi F, Biggeri A, Bosland MC, Bruzzi P, Budnik LT, Bugge MD, Burns K, Calaf GM, Carpenter DO, Carpenter HM, López-Carrillo L, Clapp R, Cocco P, Consonni D, Comba P, Craft E, Dalvie MA, Davis D, Demers PA, De Roos AJ, DeWitt J, Forastiere F, Freedman JH, Fritschi L, Gaus C, Gohlke JM, Goldberg M, Greiser E, Hansen J, Hardell L, Hauptmann M, Huang W, Huff J, James MO, Jameson CW, Kortenkamp A,Kopp-Schneider A, Kromhout H, Larramendy ML, Landrigan PJ, Lash LH, Leszczynski D, Lynch CF, Magnani C, Mandrioli D, Martin FL, Merler E, Michelozzi P, Miligi L, Miller AB, Mirabelli D, Mirer FE, Naidoo S, Perry MJ, Petronio MG, Pirastu R, Portier RJ, Ramos KS, Robertson LW, Rodriguez T, Röösli M, Ross MK, Roy D, Rusyn I, Saldiva P, Sass J, Savolainen K, Scheepers PT, Sergi C, Silbergeld EK, Smith MT, Stewart BW, Sutton P, Tateo F, Terracini B, Thielmann HW, Thomas DB, Vainio H, Vena JE, Vineis P, Weiderpass E, Weisenburger DD, Woodruff TJ, Yorifuji T, Yu IJ, Zambon P, Zeeb H, Zhou SF. Differences in the carcinogenic evaluation of glyphosate between the International Agency for Research on Cancer (IARC) and the European Food Safety Authority (EFSA). *J Epidemiol Community Health*, 2016. pii: jech-2015-207005. doi: 10.1136/jech-2015-207005. [Epub ahead of print]PubMed PMID: 26941213.
480. Myers JP, Antoniou MN, Blumberg B, Carroll L, Colborn T, Everett LG, Hansen M, Landrigan PJ, Lanphear BP, Mesnage R, Vanderberg LN, vom Saal FS, Welshons WV, Benbrook CM. Concerns over use of glyphosate-based herbicides and risks associated with exposures: a consensus statement. (Review). *Environmental Health* 15:19, 2016. DOI 10.1186/s12940-016-01177-0.
481. Suk WA, Ahanchian H, Asante KA, Carpenter DO, Diaz-Barriga F, Ha E-H, Huo X, King M, Ruchirawat M, da Silva ER, Sly L, Sly PD, Stein RT, van de Berg M, Zar H, Landrigan PJ. Environmental Pollution: An Under-recognized Threat to Children's Health, Especially in Low- and Middle-Income Countries. (Brief Communication) *Environ Health Perspect* 124:A41-A45, 2016.
482. Landrigan PJ, Fuller R. Pollution, Health and Development: The Need for a New Paradigm. *Rev Environ Health* 31:121-124, 2016. pii:/j/reveh.ahead-of-print/reveh-2015-0070/reveh-2015-0070.xml. doi:10.1515/reveh-2015-0070. [Epub ahead of print] PubMed PMID: 26943599.
483. Landrigan PJ, Bellinger D. How to Finally End Lead Poisoning in America. *Time Magazine*, 2016. http://time.com/4286726/lead-poisoning-in-america/
484. TENDR Statement Authors. Project TENDR: Targeting environmental Neuro-Developmental Risks. The TENDR Consensus Statement. (Brief Communication) *Environ Health Perspect* 124:A118-A122, 2016.

INVITED LECTURES/PRESENTATIONS

Visiting Professorships and Lectureships:

University of Utah, Wallace Stegner Lecturer, 2012

Harvard School of Public Health, The James L. Whittenberger Lecturer, 2009

University of Kentucky, Inaugural John P. Wyatt Lecturer in Environmental Health and Disease, 2008

University of Minnesota, School of Public Health, Richard G. Bond Memorial Lecture, 2007

James P. Keogh, MD Memorial, Lecturer in Occupational Medicine, University of Maryland School of Medicine, 2006

Royal College of Physicians (London), Faculty of Occupational Medicine, Richard Schilling Memorial Lecturer, 2000

University of Rochester, 44th Annual Paul W. Beaven Lecturer, 2000

Centers for Disease Control and Prevention, Langmuir Memorial Lecturer, 1999

Mayo Clinic, Department of Pediatrics, Amberg-Helmholtz Lecturer in Pediatrics, 1998

Duke University Medical School, Visiting Professor, NIEHS Clinical Training Program in Environmental Medicine, 1995

National University of Singapore, Visiting External Examiner in Occupational Medicine, 1994

Medical College of Pennsylvania, Catherine Boucot Sturgis Visiting Professor in Community and Preventive Medicine, March 1992

University of Cape Town Medical School, Visiting Professor, Department of Community Health, March 1992

University of Tokyo, Visiting Professor of the University, July 1990

University of Tokyo, Visiting Professor of the Faculty of Medicine, September 1989

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Exhibit 2

Health Affairs

At the Intersection of Health, Health Care and Policy

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By Philip J. Landrigan and Lynn R. Goldman

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Children's Vulnerability To Toxic Chemicals: A Challenge And Opportunity To Strengthen Health And Environmental Policy

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Lynn R. Goldman is the dean of the School of Public Health and a professor of environmental and occupational health at the George Washington University, in Washington, D.C.

ABSTRACT A key policy breakthrough occurred nearly twenty years ago with the discovery that children are far more sensitive than adults to toxic chemicals in the environment. This finding led to the recognition that chemical exposures early in life are significant and preventable causes of disease in children and adults. We review this knowledge and recommend a new policy to regulate industrial and consumer chemicals that will protect the health of children and all Americans, prevent disease, and reduce health care costs. The linchpins of a new US chemical policy will be: first, a legally mandated requirement to test the toxicity of chemicals already in commerce, prioritizing chemicals in the widest use, and incorporating new assessment technologies; second, a tiered approach to premarket evaluation of new chemicals; and third, epidemiologic monitoring and focused health studies of exposed populations.

Recognition of the unique vulnerability of children, infants, and fetuses to toxic chemicals in the environment was a watershed development for health and environmental policy.[1] This discovery catalyzed two further insights: that early life exposures to toxic chemicals are important causes of disease and dysfunction in children and also in adults,[2–4] and that diseases caused by chemicals can successfully be prevented, thus saving lives, enhancing the quality of life, reducing health care and education costs, and increasing national productivity. A notable example is the nation's experience with removing lead from gasoline. This one change reduced lead poisoning by more than 90 percent[5] and produced an estimated annual economic benefit of $110 billion to $319 billion.[6]

These insights have affected risk assessment, regulation, and law.[7] In this article we explore the implications for health and environmental policy.

Children Are Vulnerable To Toxic Chemicals

The realization that children are uniquely sensitive to toxic chemicals was catalyzed by the publication in 1993 of a National Academies report, Pesticides in the Diets of Infants and Children.[1] Studies cited in the report found that children are quantitatively and qualitatively different from adults in their sensitivity to pesticides and other chemicals.

Prior to the report's publication, virtually all environmental policy in the United States had focused on assessment of risk to the "average adult." Risk assessment had paid scant heed to exposures that diverged from the norm. Little attention was paid to the unique risks of infants, children, or other vulnerable groups within the population.

The report produced a paradigm shift in that approach to health and environmental policy. It led to new legislative and regulatory initiatives to better protect infants and children against environmental health threats and has been especially

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influential in changing the regulation of pesticide and pharmaceutical chemicals.[7]

The report identified four differences between children and adults that contribute to children's heightened susceptibility to chemicals in the environment.

First, children have greater exposures to toxic chemicals for their body weight than adults.[1] A six-month-old infant drinks seven times more water per pound than an adult.[8] Children take in three to four times more calories per pound than adults. The air intake per pound of an infant is twice that of an adult. These differences result in children being disproportionately exposed to toxic chemicals in air, food, and water. Children's hand-to-mouth behavior and play on the ground further magnify their exposures.

Second, children's metabolic pathways are immature,[1] and a child's ability to metabolize toxic chemicals is different from an adult's. In some instances, infants are at lower risk than adults because they cannot convert chemicals to their toxic forms. More commonly, however, children are more vulnerable because they lack the enzymes needed to break down and remove toxic chemicals from the body.[9]

Third, children's early developmental processes are easily disrupted.[1] Rapid, complex, and highly choreographed development takes place in prenatal life and in the first years after birth, continuing more slowly throughout childhood into puberty. In the brain, for example, billions of cells must form, move to their assigned positions, and establish trillions of precise interconnections.[10] Likewise, development of the reproductive organs is guided by a complex and precisely timed sequence of chemical messages and is shaped by maternal and fetal hormones.[11]

Recent research in pediatrics and developmental toxicology has elaborated the concept of "windows of vulnerability."[12] These are critical periods in early development when exposures to even minute doses of toxic chemicals—levels that would have no adverse effect on an adult—can disrupt organ formation and cause lifelong functional impairments.

If, for example, cells in an infant's brain are injured by lead or a pesticide, the consequences can include developmental disabilities in childhood[11,13] and possibly increased risk of neurological degeneration, such as Parkinson's disease, in adult life.[4] If inappropriate hormonal signals are sent to the developing reproductive organs by a synthetic chemical endocrine disruptor—such as certain chemicals commonly found in household products, plastics, and cosmetics (phthalates), and on clothing (flame retardants)—lifelong reproductive impairment may ensue.[11] These windows of vulnerability have no equivalent in adult life.

Fourth, children have more time than adults to develop chronic diseases. Many diseases triggered by toxic chemicals, such as cancer and neurodegenerative diseases, are now understood to evolve through multistage, multiyear processes that may be initiated by exposures in infancy.[1,4] This insight has catalyzed new research to identify how early environmental influences may affect health in childhood and across the human lifespan. Notable research includes the US National Children's Study,[14] the Japan Environment and Children's Study,[15] and the International Childhood Cancer Cohort Consortium.[16]

Rates Of Chronic Diseases In US Children Are Rising

Today in the United States, the principal causes of sickness, disability, and death in children are chronic illnesses. Rates of many of these diseases are high and rising.[2,3] Toxic chemicals in the environment are making important contributions to these disease trends.

Asthma is one of the most common chronic diseases in American children. The prevalence of childhood asthma has more than doubled over the past twenty years, and in 2008, 9 percent of all US children had asthma.[17,18] Asthma is the leading cause of pediatric hospitalization and school absenteeism and a major driver of pediatric health costs.

Birth defects are now the leading cause of infant death and are associated with substantial health and education costs. Certain birth defects, such as those of the male reproductive organs[19] and of the abdominal wall,[20] appear to have increased in frequency.

Neurodevelopmental disorders, including dyslexia, mental retardation, attention deficit hyperactivity disorder, and autism, affect 5–10 percent of the babies born in the United States each year.[21] Autism spectrum disorder is currently diagnosed in one of every 110 American children.[22] The prevalence of attention deficit hyperactivity disorder has also risen, and today 14 percent of US children have been diagnosed with this condition; two-thirds of them also have learning disabilities.[23]

The incidence of leukemia and brain cancer in children younger than age eighteen increased steadily from the 1970s through the 1990s, despite declining mortality.[24] Testicular cancer in males ages 15–30 has increased in incidence by more than 50 percent.[24]

Obesity in children has tripled in prevalence over the past twenty years, from 5 percent to

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17 percent.[25] One of its consequences, type 2 diabetes, is occurring earlier in life and at epidemic rates.

Children And The Chemical Environment

The environment in which American children live has changed greatly in the past fifty years, especially in terms of the chemicals to which they are routinely exposed. During this time, more than 80,000 new synthetic chemicals have been invented and are used today in millions of consumer products, ranging from foods and food packaging to clothing, building materials, cleaning products, cosmetics, toys, and baby bottles.[26] Some of these chemicals may pose risks for children's health. The Environmental Protection Agency has identified 3,000 "high–production-volume" chemicals—chemicals produced in quantities of more than a million pounds per year—that are in widest use and therefore have the greatest potential for human exposure. Children are especially at risk for exposure to these chemicals.

In national surveys conducted by the Centers for Disease Control and Prevention, measurable quantities of 200 high–production-volume chemicals have been detected in the blood and urine of virtually all Americans,[27] including pregnant women.[28] The significance of this finding for human health is not fully understood. But it is worrisome, because most of these chemicals have not undergone even minimal assessment for potential toxicity, and only about 20 percent of them have been screened for their potential to disrupt early human development or to cause disease in infants and children.[26] Even less is known about the potential effects of exposure to several of these chemicals simultaneously, or how they may interact with one another in the human body, possibly causing synergistic adverse effects on health.

The absence of information about the possible risks associated with routine exposure to untested synthetic chemicals is fraught with risk for disease and dysfunction. Unless studies are conducted to specifically seek ill effects associated with chemical exposures, dysfunctions can go unrecognized for many years.

The "silent epidemic" of childhood lead poisoning[6,13] is a dramatic case in point. Millions of American children were exposed to excessive levels of lead from the 1940s to the 1970s, when lead was an additive to gasoline. Many suffered unrecognized brain injury before sufficient evidence could be marshaled to mandate removing lead from gasoline, household paint, and consumer products.[5,6]

Failure to evaluate chemicals for potential toxicity reflects the failure of the Toxic Substances Control Act of 1976.[29] At the time of its passage, the act was intended to be pioneering legislation that would require testing chemicals already in commerce for potential toxicity, and would also require premarket evaluation of all new chemicals. The act never fulfilled these intentions. A particularly egregious lapse was a decision by Congress to "grandfather in" 62,000 chemicals already on the market without any toxicity testing requirement.[29,30] These chemicals were presumed to be safe and allowed to remain in commerce, unless and until the Environmental Protection Agency made a finding that they posed an "unreasonable risk."[30]

The "unreasonable risk" standard identified in the Toxic Substances Control Act has created a substantial barrier to the regulation of industrial and consumer chemicals. This standard has been so burdensome that the Environmental Protection Agency has not been able to remove chemicals from the market except when there is overwhelming evidence of potential harm. The result is that only five chemicals have been controlled under the act in the thirty-five years since its passage. These chemicals were polychlorinated biphenyls (PCBs), chlorofluorocarbons, dioxin, asbestos, and hexavalent chromium. Only two of these five were totally banned: PCBs, which were eliminated by an act of Congress and not because the Environmental Protection Agency exercised its authority, and asbestos, a chemical for which there is overwhelming evidence of serious hazard to human health.

Further barriers to enforcement of the Toxic Substances Control Act have resulted from the federal courts' interpretation of the "unreasonable risk" standard. Thus, in a 1991 opinion on the asbestos ban in Corrosion Proof Fittings v. EPA, the Fifth Circuit found that the Environmental Protection Agency had failed to show that it was taking the "least burdensome" approach required under the act in formulating its final rule banning asbestos. The court thus overturned the agency's rule. This interpretation has made it virtually impossible since 1991 for the Environmental Protection Agency to regulate dangerous chemicals under the act.[30]

Toxic Chemicals And Disease In Children

Evidence is strong and continuing to accumulate that toxic chemicals are important causes of disease and dysfunction in children. This recognition first arose in studies of lead and mercury.[31–36] In recent years, as research strategies in environmental pediatrics have become more refined, the

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pace of scientific discovery has quickened and a series of new associations has been discovered. Examples include the following.

Prenatal exposure to PCBs is associated with reduction in children's intelligence.[37] PCBs are an environmentally persistent class of chemicals that accumulate to high levels in certain species of fish. Human exposure is principally the consequence of maternal consumption of contaminated fish before and during pregnancy. Although PCBs are no longer manufactured in the United States, they were used extensively for many years in manufacturing electrical equipment such as transformers, and they continue to be important contaminants today because they are highly persistent in the environment and because they become concentrated in the tissues of organisms in the food chain.

Prenatal exposure to the commonly used insecticide chlorpyrifos is associated with reduced head circumference at birth [38] and with developmental delays.[39] Small head circumference at birth is an indicator of delayed brain growth during pregnancy. Chlorpyrifos is also linked to pervasive developmental disorder, a form of autism.[39,40]

Baby boys exposed in the womb to phthalates—a chemical compound found in plastics, cosmetics, and many common household products—appear to be at increased risk of behavioral abnormalities that resemble attention deficit hyperactivity disorder.[41] Prenatal exposure to bisphenol A, a synthetic chemical used to manufacture polycarbonate plastics, is linked to behavioral abnormalities in girls.[42] Prenatal exposure to brominated flame retardants is linked to cognitive impairments,[43] and prenatal exposures to arsenic and manganese is associated with neurodevelopmental impairment.[44,45]

Rates of asthma are increased in children exposed to secondhand cigarette smoke and to fine particulate air pollution.[17,18] Risk of respiratory death is increased in infants exposed to fine particulate air pollution.[46]

Prenatal exposure to phthalates has also been linked to shortening of the ano-genital distance in baby boys, a finding indicative of feminization.[47] Prenatal exposure to perfluorinated chemicals (perfluorooctanic acid and perfluorooctane sulfonate) used to make nonstick pans and stain repellents has been linked to decreased birthweight and reduced head circumference in newborn infants.[48]

Diseases Associated With Chemicals Are Costly

Preventing exposures to chemicals can yield great savings. To estimate the contribution of environmental pollutants to the prevalence and costs of disease in American children, investigators at Mount Sinai School of Medicine examined four categories of illness: lead poisoning, asthma, cancer, and neurobehavioral disorders.[49] Based on prevalence, the environmentally attributable fraction of each disease, and national economic data, they calculated that the total annual costs of these diseases attributable to environmental exposures is $54.9 billion (range $48.8 billion to $64.8 billion): $43.4 billion for lead poisoning, $2.0 billion for asthma, $0.3 billion for childhood cancer, and $9.2 billion for neurobehavioral disorders. Because of the difficulties inherent in assessing the full economic consequences of neurobehavioral impairments, it is likely that these estimates are low.

Disease and dysfunction caused by toxic chemicals can be prevented. Prevention is most effectively achieved by assessing chemicals for toxicity through laboratory and human studies and using the data gained in those assessments to guide evidence-based prevention of exposure. Great cost savings can result.

Again, we use the example of phasing out the use of lead in gasoline. This phase-out began in the United States in 1976, was 50 percent accomplished by 1980, and virtually complete by 2000.[5] Prior to 1976, 100,000 tons of tetraethyl lead was added to the US gasoline supply each year to improve engine performance and fuel efficiency. Widespread environmental contamination resulted.

The average US blood lead level peaked in the mid-1970s at 17 micrograms per deciliter,[5] a level significantly above the current Centers for Disease Control and Prevention guideline of 10 micrograms per deciliter and now known to be associated with significant toxic injury to the developing brain. These elevated blood lead levels, found in epidemiologic studies, were associated with reduced intelligence, shortened attention span, and disruptive behavior in children.[33,34] Each increase of 3 micrograms per deciliter in mean blood lead level was shown to be associated with a decline of 0.5–1.0 points in intelligence quotient (IQ).[6] These effects occurred in the absence of any clinical symptoms or obvious illness and were thus termed "silent" lead poisoning.[34]

The discovery that lead could erode children's intelligence even at relatively low levels was not the original justification for the Environmental Protection Agency's decision to remove lead from gasoline. In fact, the decision to remove lead was made in the first instance to protect catalytic converters from damage by lead. However, the discovery did play an important role in reinforcing the decision and in sustaining it over

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time. A result of the phase-out was that between 1976 and 1990 the mean blood lead level of American children decreased by more than 90 percent (to below 2 micrograms per deciliter today).[5] The incidence of childhood lead poisoning also fell by more than 90 percent.[5]

A further consequence of the reduction in exposure to lead was that the mean IQ of American children has increased.[6] Children born in the United States today are estimated to have IQ scores that, on average, are 2.2–4.7 points higher than those of children born in the early 1970s.[6] And because each 1-point gain in population mean IQ is associated with an estimated 2 percent increase in productivity over a lifetime,[50] the gain in population IQ is estimated to have produced a national economic benefit of $110–$319 billion in each annual cohort of babies born in the United States since the 1980s.[6]

Consequences For Environmental Policy

The recognition of children's unique vulnerability to toxic chemicals has had far-reaching consequences.

Legislative Consequences Recognition of children's susceptibility to toxic chemicals strongly influenced the Food Quality Protection Act of 1996, the major federal law governing the use of pesticides. This act became the first federal environmental statute to contain explicit provisions for protecting children's health.

This recognition led also to passage of the Best Pharmaceuticals for Children Act of 2002. This act requires that drugs labeled for use in children undergo studies to specifically examine children's susceptibilities.

Consequences For Risk Assessment And Regulation A key provision of the Food Quality Protection Act is a requirement that federal pesticide standards ("tolerances") be health-based and that they explicitly consider the effects of pesticides on children's health.[30,51] This requirement represents a diametric change from the previous regulatory regime, in which the health risks of pesticides were balanced against the costs of regulation to agricultural producers in setting standards. This provision of the act forced reexamination of all extant pesticide tolerances to ensure that they met the standard of public health protection. As a result, many uses of pesticides were reduced or dropped altogether.

For example, agricultural use of organophosphate insecticides, a class of pesticide chemicals toxic to brain development, was reduced.[52] The review led also to bans on residential applications of two widely used insecticides—chlorpyrifos and diazinon—that had been used for household pest control.[52]

The Food Quality Protection Act mandates realistic consideration of exposures to multiple pesticides via multiple routes to assess potentially synergistic effects.[53] The law also mandates consideration of exposures to pesticide chemicals that are endocrine disruptors. These are chemicals that exert their toxicity through interactions with the endocrine system, disrupting function of the thyroid or pituitary glands, the ovaries, or the testes, or changing levels of hormones by changing their metabolism.[11]

The new approaches to risk assessment mandated by the Food Quality Protection Act have not yet extended beyond pesticides to include industrial or consumer chemicals.

Consequences For Biomedical Research Recognition of children's vulnerability led to establishment of the Office of Children's Health Protection within the Environmental Protection Agency.[7] It catalyzed a 1997 executive order requiring federal agencies to consider children's special susceptibilities in all policy and rule making.[54] And it led to the creation of a White House Task Force on Children's Health and Safety.

Those programs have, in turn, stimulated substantial investments in children's health research.[7] The resulting initiatives include the following: a national network of Centers for Children's Environmental Health and Disease Prevention Research, supported by the National Institute of Environmental Health Sciences and the Environmental Protection Agency;[55] a network of Pediatric Environmental Health Specialty Units supported by the Centers for Disease Control and Prevention and the Agency for Toxic Substance and Disease Registry;[56] fellowship training programs in environmental pediatrics;[57] and the National Children's Study, a prospective epidemiologic study that will follow a nationally representative sample of 100,000 children from early pregnancy to age twenty-one.[14]

Consequences For Health Policy

The finding that children are uniquely vulnerable to synthetic chemicals indicates the need for fundamental revision of US chemical policy. By default, current policy presumes chemicals to be safe and permits them to enter and remain on the market with minimal evaluation of potential toxicity unless and until they are proved to be overwhelmingly hazardous by the Environmental Protection Agency, using the Toxic Substances Control Act's standard of "unreasonable risk." This policy is neither protective of human health nor consistent with current scientific

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understanding of children's vulnerability.

The credible possibility exists that among the hundreds of untested chemicals currently in wide commercial use, there are synthetic chemicals whose toxicity to early childhood development has not yet been discovered.[13] The late David Rall, former director of the National Institute of Environmental Health Sciences, once stated, "If thalidomide [a drug widely used in the 1950s and 1960s to treat morning sickness in early pregnancy] had caused a ten-point loss of IQ instead of obvious birth defects of the limbs, it would probably still be on the market."[58]

To protect human health, and especially the health of infants and children, the paradigm for regulating industrial and consumer chemicals needs to become health-based. The Toxic Substances Control Act's "unreasonable risk" standard needs to be replaced with a new standard that explicitly considers effects of industrial and consumer chemicals on children's health. Such a move would align the strategy used to regulate industrial chemicals with the strategy used under the Food Quality Protection Act to regulate pesticides. It would mark a dramatic change in the current regulatory regime.[30]

A New US Chemical Policy

The linchpin of a new, health-based chemical policy would be a legally mandated requirement that chemicals already on the market be systematically examined for potential toxicity. Such testing will not be an easy task, but it is necessary. It will be far more challenging than updating the tolerances for pesticides proved to be.

To evaluate tens of thousands of chemicals currently in commercial use would require new legislation that directed the Environmental Protection Agency to first address those classes of chemicals that are in the widest use and the most likely to confer risk. Data on the use of chemicals in consumer products, especially products used by young children and pregnant women; data on discharges of chemicals into the air and water; and data on chemicals already widely detectable in the bodies of Americans[27] would help to target the chemicals that most urgently need to be evaluated.[30]

Enhanced evaluation of chemical toxicity would require new, more efficient approaches to toxicity testing. Such approaches are already in development at the National Institute of Environmental Health Sciences and the Environmental Protection Agency.[59] These approaches should incorporate new technologies identified through research in developmental toxicology and consider such complexities as which endpoints to assess, which doses to administer, and which mixtures to evaluate.[59]

A second critical component of a health-based chemical policy would be a legally mandated, strictly enforced requirement that all new chemicals be assessed for potential toxicity before they enter the market. Such assessment could be undertaken in tiered fashion, making use of new rapid assessment methods in computational and in vitro toxicology, taking into account the proposed use patterns of new chemicals, and giving the Environmental Protection Agency latitude to require less extensive evaluation of chemicals and chemical uses judged to be less hazardous to health.[30,59]

As has happened with pesticides, the new approach to the evaluation of industrial chemicals that we propose here would be more likely to result in continued approval for certain uses and withdrawal of approval for others, rather than outright bans of chemicals. For example, the United States, Canada, and the European Union have all recently taken action to ban polycarbonate plastics containing bisphenol A from baby bottles. However, in all of these regions, polycarbonates are still permitted in the manufacture of compact discs, eyeglasses, and other consumer products in which the potential for human exposure is judged to be lower than in uses where the bisphenol A can migrate into foods.

One model approach to health-based chemical policy can be found in the European Union's Registration, Evaluation, Authorisation and Restriction of Chemical Substances legislation, enacted in 2007.[60] This legislation, commonly referred to by its acronym, REACH, places the responsibility on industry to generate substantial amounts of data on potential risks of commercial chemicals and to register this information in a central database that is housed in the European Chemical Agency in Helsinki.[61] The European Chemical Agency not only manages this central database but also coordinates the in-depth evaluation of suspicious chemicals. It is also developing a public database to house and make accessible hazard information relevant to consumers and health and environmental professionals. The first cycle of REACH registrations closed in January 2010 and in February 2011 the European Chemical Agency released its first list of six dangerous substances that are to be phased out by the European Union, through a process that involves scientific analysis and consultation with member states. The European Union is using this information to craft regulations that protect the health of European children, and it has led to bans and restrictions of certain potentially toxic products.[61]

Much of the information collected by the Euro-

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pean Union under REACH is claimed as confidential business information and is therefore not available to the US government or to any other entities outside of European Union regulatory authorities. A new, health-based US chemical policy could mandate that industry provide similar data to US regulators. Because these data are already being produced for use in Europe, the marginal costs of providing them to the Environmental Protection Agency should not be great.

A third pillar of a health-based chemical policy would be continued research to examine the impact of chemicals on children's health.[14,55,56] Such research, which includes epidemiologic monitoring of exposed populations as well as specific studies of the effects of particular chemicals, is an essential complement to toxicity testing. It provides direct evidence of the effects of chemicals on human health. It also provides an evidentiary basis for assessing the impact on children's health of policy interventions.

The argument will probably be made that any additional controls on chemicals would cost jobs and harm the economy. However, there is little evidence that environmental protection has to date been harmful to the US economy or to business.[62] To the contrary, there is compelling evidence that the high costs of diseases caused by toxic chemicals are a major, but potentially avoidable, drag on the US economy.[49,63]

Conclusion

Recognition of children's unique vulnerability to toxic chemicals, a vulnerability that receives scant consideration in current US chemical policy, challenges existing policy and creates an opportunity for change.

Creating a new chemical policy explicitly protective of health could prevent disease and dysfunction in childhood and across the lifespan, reduce health and education costs, increase national productivity, and promote better health and well-being for all Americans. ▪

NOTES

1 National Research Council. Pesticides in the diets of infants and children.Washington (DC): National Academies Press; 1993.
2 Woodruff TJ, Axelrad DA, Kyle AD, Nweke O, Miller GG, Hurley BJ. Trends in environmentally related childhood illnesses. Pediatrics. 2004;113(4 Suppl):1133–40.
3 Landrigan PJ, Miodovnik A. Children's health and the environment: an overview. Mt Sinai J Med. 2011; 78:1–10.
4 Landrigan PJ, Sonawane B, Butler RN, Trasande L, Callan R, Droller D. Early environmental origins of neurodegenerative disease in later life. Environ Health Perspect. 2005; 113:1230–3.
5 Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey [Internet]. Atlanta (GA): CDC; [cited 2011 Apr 4]. Available from: http://www.cdc.gov/nchs/about/major/nhanes/datalink.htm#NHANESIII
6 Grosse SD, Matte TD, Schwartz J, Jackson RJ. Economic gains resulting from the reduction in children's exposure to lead in the United States. Environ Health Perspect. 2002;110(6):563–9.
7 Goldman L, Falk H, Landrigan PJ, Balk SJ, Reigart JR, Etzel RA. Environmental pediatrics and its impact on government health policy. Pediatrics. 2004;113(4 Suppl):1146–57.
8 Ershow AB, Cantor KP. Total water and tapwater intake in the United States: population-based estimates of quantities and sources. Bethesda (MD): Federation of American Societies for Experimental Biology; 1989.
9 Atterberry TA, Burnett WT, Chambers JE. Age-related differences in parathion and chlorpyrifos toxicity in male rats: target and nontarget esterase sensitivity and cytochrome P450-mediated metabolism. Toxicol Appl Pharmacol. 1997; 147:411–18.
10 Rodier PM. Developing brain as a target of toxicity. Environ Health Perspect. 1995;103(Suppl 6):73–6.
11 Diamanti-Kandarakis E, Bourguignon JP, Giudice LC, Hauser R, Prins GS, Soto AM, et al. Endocrine-disrupting chemicals: an Endocrine Society scientific statement. Endocr Rev. 2009;30:293–342.
12 Barker DJ. The developmental origins of chronic adult disease. Acta Paediatr Suppl. 2004;93(446): 26–33.
13 Grandjean P, Landrigan PJ. Developmental neurotoxicity of industrial chemicals: a silent pandemic. Lancet. 2006;368:2167–78.
14 Landrigan PJ, Trasande L, Thorpe LE, Gwynn C, Lioy PJ, D'Alton ME, et al. The National Children's Study: a 21-year prospective study of 100,000 American children. Pediatrics. 2006;118:2173–8.
15 Kawamoto T, Tsukamoto N, Tanto M, Nitta H, Murata K, Kayama F, et al. Japan Environment and Children's Study. Epidemiol. 2011; 22:S157–8.
16 Brown RC, Dwyer T, Kasten C, Krotoski D, Li Z, Linet MS, et al. Cohort profile: the International Childhood Cancer Cohort Consortium (I4C). Int J. Epidemiol. 2007; 36:724–30.
17 Environmental Protection Agency. America's children and the environment (ACE), measure D1: percentage of children with asthma [Internet]. Washington (DC):EPA; 2010 Nov 19 [cited 2011 Apr 4]. Available from: http://www.epa.gov/economics/children/child_illness/d1-graph.html
18 Federal Interagency Forum on Child and Family Statistics. America's children in brief: key national indicators of well-being, 2010 [Internet]. Merrifield (VA): The Forum; [cited 2011 Apr 4]. Available from: http://www.childstats.gov/americaschildren/health.asp
19 Paulozzi LJ, Erickson JD, Jackson RJ. Hypospadias trends in two US surveillance systems. Pediatrics. 1997;100:831–4.
20 Vu LT, Nobuhara KK, Laurent C, Shaw GM. Increasing prevalence of gastroschisis: population-based study in California. J Pediatr. 2008;152: 807–11.
21 Boyle CA, Decoufle P, Yeargin-Allsopp M. Prevalence and health impact of developmental disabilities in US children. Pediatrics. 1994;93: 399–403.
22 Centers for Disease Control and Prevention. Prevalence of autism spectrum disorders: Autism and Developmental Disabilities Monitoring Network, United States, 2006. MMWR Surveill Summ. 2009;58(SS10):1–20.
23 Pastor PN, Reuben CA. Diagnosed attention deficit hyperactivity disorder and learning disability: United

Downloaded from http://content.healthaffairs.org/ by Health Affairs on September 1, 2016 by HW Team

EPA-HQ-2018-000065-0001199

States, 2004–2006. Vital Health Stat 10. 2008;(237):1–14.
24 National Cancer Institute. Surveillance epidemiology and end results [home page on the Internet]. Rockville (MD): NCI; [cited 2011 Apr 4]. Available from: http://seer.cancer.gov/
25 Centers for Disease Control and Prevention. Overweight and obesity: US obesity trends. Trends by state 1985–2009 [Internet]. Atlanta (GA): CDC; 2011 Mar 3 [cited 2011 Apr 4]. Available from: http://www.cdc.gov/obesity/data/trends.html
26 Goldman LR. Chemicals and children's environment: what we don't know about risks. Environ Health Perspect. 1998;106(Suppl 3): 875–80.
27 Centers for Disease Control and Prevention. National report on human exposure to environmental chemicals [Internet]. Atlanta (GA): CDC; 2011 Feb 28 [cited 2011 Apr 4]. Available from: http://www.cdc.gov/exposurereport/
28 Woodruff TJ, Zota AR, Schwartz JM. Environmental chemicals in pregnant women in the US: NHANES 2003–2004. Environ Health Perspect. 2011 Jan 14. [Epub ahead of print].
29 Environmental Protection Agency. Summary of the Toxic Substances Control Act [Internet]. Washington (DC): EPA; 2011 Mar 30 [cited 2011 Apr 4]. Available from: http://www.epa.gov/regulations/laws/tsca.html
30 Goldman LR. Preventing pollution? US toxic chemicals and pesticides policies and sustainable development. Environ Law Report News Analysis. 2002;32:11018–41.
31 Gibson JL. A plea for painted railings and painted walls of rooms as the source of lead poisoning amongst Queensland children. Public Health Reports. 2005;120:301–4.
32 Harada H. Congenital Minamata disease: intrauterine methylmercury poisoning. Teratology. 1978;18: 285–8.
33 Landrigan PJ, Whitworth RH, Baloh RW, Staehling NW, Barthel WF, Rosenblum BF. Neuropsychological dysfunction in children with chronic low-level lead absorption. Lancet. 1975;1(7909):708–12.
34 Needleman HL, Gunnoe C, Leviton A, Reed R, Peresie H, Maher C, et al. Deficits in psychologic and classroom performance of children with elevated dentine lead levels. N Engl J Med. 1979; 300(13):689–95.
35 Canfield RL, Henderson CR Jr, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 micrograms per deciliter. N Engl J Med. 2003; 348:1517–26.
36 Axelrad DA, Bellinger DC, Ryan LM, Woodruff TJ. Dose-response relationship of prenatal mercury exposure and IQ: an integrative analysis of epidemiologic data. Environ Health Perspect. 2007;115:609–15.
37 Jacobson JL, Jacobson SW. Intellectual impairment in children exposed to polychlorinated biphenyls in utero. N Engl J Med. 1996;335: 783–9.
38 Berkowitz GS, Wetmur JG, Birman-Deych E, Obel J, Lapinski RH, Godbold JH, et al. In utero pesticide exposure, maternal paraoxonase activity, and head circumference. Environ Health Perspect. 2004;112: 388–91.
39 Eskenazi B, Marks AR, Bradman A, Harley K, Barr DB, Johnson C, et al. Organophosphate pesticide exposure and neurodevelopment in young Mexican-American children. Environ Health Perspect. 2007;115: 792–8.
40 Rauh VA, Garfinkel R, Perera FP. Impact of prenatal chlorpyrifos exposure on neurodevelopment in the first 3 years of life among inner-city children. Pediatrics. 2006;118: e1845–59.
41 Engel SM, Miodovnik A, Canfield RL, Zhu C, Silva MJ, Calafat AM, et al. Prenatal phthalate exposure is associated with childhood behavior and executive functioning. Environ Health Perspect. 2010;118:565–71.
42 Braun JM, Yolton K, Dietrich KN, Hornung R, Ye X, Calafat AM, et al. Prenatal bisphenol A exposure and early childhood behavior. Environ Health Perspect. 2009;117(12) 1945–52.
43 Herbstman JB, Sjödin A, Kurzon M, Lederman SA, Jones RS, Rauh V, et al. Prenatal exposure to PBDEs and neurodevelopment. Environ Health Perspect. 2010;118:712–9.
44 Wasserman GA, Liu X, Parvez F, Ahsan H, Factor-Litvak P, Kline J, et al. Water arsenic exposure and intellectual function in 6-year-old children in Araihazar, Bangladesh. Environ Health Perspect. 2007; 115:285–9.
45 Wasserman GA, Liu X, Parvez F, Ahsan H, Levy D, Factor-Litvak P, et al.Water manganese exposure and children's intellectual function in Araihazar, Bangladesh. Environ Health Perspect. 2006;114:124–9.
46 Woodruff TJ, Darrow LA, Parker JD. Air pollution and postneonatal infant mortality in the United States, 1999–2002. Environ Health Perspect. 2008;116:110–5.
47 Swan SH. Environmental phthalate exposure in relation to reproductive outcomes and other health endpoints in humans. Environ Res. 2008;108:177–84.
48 Apelberg BJ, Witter FR, Herbstman JB, Calafat AM, Halden RU, Needham LL, et al. Cord serum concentrations of perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) in relation to weight and size at birth. Environ Health Perspect. 2007;115:1670–6.
49 Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J. Environmental pollutants and disease in American children: estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities. Environ Health Perspect. 2002;110:721–8.
50 Salkever DS. Updated estimates of earning benefits from reduced exposure of children to environmental lead. Environ Res. 1995;70:1–6.
51 Landrigan PJ, Kimmel CA, Correa A, Eskenazi B. Children's health and the environment: public health issues and challenges for risk assessment. Environ Health Perspect. 2004;112:257–65.
52 Raffaele KC, Rowland J, May B, Makris SL, Schumacher K, Scaranod LJ. The use of developmental neurotoxicity data in pesticide risk assessments. Neurotoxicol Teratol. 2010;32(5):563–72.
53 Environmental Protection Agency. Aldicarb: revised acute probabilistic aggregate dietary (food and drinking water) exposure and risk assessment incorporating revised FQPA factor. Washington (DC): EPA; 2010.
54 Environmental Protection Agency. Executive order 13045: protection of children from environmental health risks and safety risks [Internet]. Washington (DC): EPA; [cited 2011 Apr 4]. Available from: http://yosemite.epa.gov/ochp/ochpweb.nsf/content/whatwe_executiv.htm
55 Spivey A. Children's health centers: past, present, and future. Environ Health Perspect. 2007;115:A192–4.
56 Wilborne-Davis P, Kirkland KH, Mulloy KB. A model for physician education and consultation in pediatric environmental health—the Pediatric Environmental Health Specialty Units (PEHSU) program. Pediatr Clin North Am. 2007;54: 1–13.
57 Landrigan PJ, Woolf AD, Gitterman B, Lanphear B, Forman J, Karr C, et al. The ambulatory pediatric association fellowship in pediatric environmental health: a 5-year assessment. Environ Health Perspect. 2007;115:1383–7.
58 Weiss B. Food additives and environmental chemicals as sources of childhood behavior disorders. J Am Acad Child Psychiatry. 1982;21: 144–52.
59 National Academy of Sciences. Toxicity testing in the 21st century: a vision and a strategy. Washington (DC): National Academies Press; 2007.
60 European Commission on the Environment. REACH [Internet]. Brussels: European Commission; 2011 Jan 3 [cited 2011 Apr 4]. Available from: http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm
61 European Chemical Agency. ECHA

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[home page on the Internet]. Helsinki: ECHA; [cited 2011 Apr 4]. Available from: http://echa.europa.eu
62 Morgenstern RD, Pizer WA, Shih J-S. Jobs versus the environment: an industry-level perspective. Washington (DC): Resources for the Future; 2000. (Resources for the Future Discussion Paper 99-01-REV).
63 Environmental Protection Agency. Benefits and costs of the Clean Air Act: second prospective study—1990 to 2020 [Internet]. Washington (DC): EPA; [cited 2011 Apr 29]. Available from: http://www.epa.gov/air/sect812/prospective2.html

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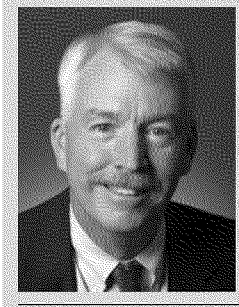

Philip J. Landrigan is the dean for global health and a professor of both preventive medicine and pediatrics at the Mount Sinai School of Medicine.

In Health Affairs this month, Philip Landrigan and Lynn Goldman review findings that children are far more sensitive to environmental toxins than are adults—and on that basis, the authors argue for an overhaul of our system for regulating chemicals. They call for a requirement that all chemicals to be introduced into the market, as well as those already on the market, be tested for toxicity. What's more, they argue that chemicals' actual or potential impact on all exposed populations, including children, should be taken into account in the testing and review process.

Landrigan, who is also the subject of a "People and Places" article in this issue of Health Affairs, is an epidemiologist and pediatrician, and the Ethel Wise Professor of preventive medicine at the Mount Sinai School of Medicine. He is also the school's dean for global health and the director of the Children's Environmental Health Center. He has long been associated with research demonstrating that children are more susceptible than adults to environmental exposures, such as to lead and pesticides.

Landrigan is a recipient of the Meritorious Service Medal of the Public Health Service and a member of the Institute of Medicine. He received his medical degree from Harvard Medical School and a master of science degree in occupational medicine from the University of London.

Lynn R. Goldman is the dean of the School of Public Health and a professor of environmental and occupational health at the George Washington University.

Goldman is the dean of the George Washington University School of Public Health. Previously, she was a professor of environmental health sciences at the Johns Hopkins University's Bloomberg School of Public Health. Before that, she served in the Clinton administration, as assistant administrator for toxic substances in the Environmental Protection Agency. During her time there, the agency overhauled the nation's pesticide laws, expanded right-to-know requirements for release of toxins, reached consensus on an approach to testing chemicals with the potential to disrupt the human endocrine system, developed standards to implement lead screening legislation, and promoted children's health and global chemical safety.

Goldman also worked in environmental health for the California Department of Public Health Services, where she managed a statewide environmental epidemiology program that focused on childhood lead poisoning, birth defects, and occupational health. She is a member of the Institute of Medicine and of the National Academy of Sciences Board on Environmental Sciences and Toxicology.

Goldman earned a master's degree in health and medical science from the University of California, Berkeley; a master of public health degree in epidemiology from the Johns Hopkins University School of Hygiene and Public Health; and a medical degree from the University of California, San Francisco.

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