

Children's Environmental Health

Children's Health At Risk

Elizabeth Hauge Sword, Executive Director, Children's Health Environmental Coalition (CHEC)

It seems as though everywhere we look these days, someone is telling us of new, unseen dangers to our health. It's hard to know who or what to believe. Information about toxic chemicals in our environment and their links to chronic diseases is emerging at a rapid rate. The threat of toxic chemicals grows as more such chemicals are produced and released into our environment. Determining what to worry about and how to protect your family is a challenge. The Children's Health Environmental Coalition (CHEC) provides the most accurate, comprehensive information for parents and caregivers on how to prevent and manage children's exposures to these toxic chemicals in air, food, water and consumer products.



Children are more vulnerable than adults to these environmental risks because of their size, physiology and behavior. Pound for pound, kids eat more food, drink more water, and breathe more air than adults. They play on the ground and put objects in their mouths. There are also stages of development during which children are especially vulnerable to health problems linked to exposure to toxins,

especially in the womb.

Indoor hazards, such as polluted ambient air, lead-based paint, mold, and pesticides, pose significant threats to an unborn or new baby's health. Even environmental exposures that may not be viewed as immediate risks have the potential to trigger chronic disease in adulthood. Using CHEC's tools, parents can begin to make decisions that will provide an immediate and real measure of protection. In fact, people of any age can benefit from reducing their exposure to these hazards.

For example, after learning that second hand smoke can cause sudden infant death syndrome or

(Continued on page 6)



Environmental Threats to Children's Health – The Promise of the National Children's Study

Philip J. Landrigan, MD, MSc

The environment of America's children has changed dramatically over the past 50 years. On the positive side, life expectancy has increased, infant mortality has declined and risks of illness and death from infectious disease have greatly diminished. But more worrisome is that children today are at risk of exposure

to more than 80,000 synthetic chemicals, nearly all of them invented since World War II. Children are especially at risk for exposure to the 2,800 of these chemicals that are produced in quantities of more than 1 million tons per year. These high-production - volume (HPV) chemicals are distributed widely in the environment -in air, food, water and consumer products. They can enter children's bodies by ingestion, inhalation or transdermal

absorption. Pediatricians are especially concerned about the fact that only 43 % of HPV chemicals have been tested for their potential to cause toxicity, and fewer than 20% for their capacity to interfere with children's development.

Children are generally much more susceptible to environmental exposures than are adults.

(Continued on page 2)

(Continued from page 1) NCS

This is because children experience heavier exposures to chemicals per pound of body weight. In addition, children's rapid growth and development can be easily disrupted by toxic exposures and they generally have more future years in which to develop diseases as a result of early these exposures.

The major diseases confronting children in the United States and in other industrially developed nations today are the chronic illnesses of multifactorial origin - asthma, which has doubled in frequency since 1980; birth defects, which remain the leading cause of infant death; developmental disorders such as hyperactivity disorder and autism; acute lymphocytic leukemia whose incidence increased by 61.7% from 1973 to 1999; and primary brain cancer, for which incidence increased by 39.6% from 1973 to 1994. Although genetic factors may account for 10% to 20% of cases of chronic disease in childhood, most of the causes of these diseases are unknown. It is strongly suspected that some pediatric diseases are caused at least in part by exposures to environmental toxins.

Until now, progress in elucidating the role of the environment in chronic childhood disease has been slow and incremental. Nearly all studies have examined relatively small populations of children; have considered only one chemical toxicant at a time; have had little statistical power to examine interactions among chemical, have investigated social and behavioral factors in the environment; have had limited ability to examine gene-environment interactions; and have suffered from brief duration follow-up. Also, many previous studies have been retrospective in design and thus have been forced to estimate past exposures from limited and sometimes biased historical data.

To overcome these problems, and to create a national blueprint for the prevention of chronic disease of toxic environmental origin, the President's Task Force on Environmental Health and Safety Risks to Children has recommended that a large prospective, multi-year epidemiological study of American children be undertaken. In response, the U.S. Congress through the Children's Health Act of 2000 authorized the National Institute of Child Health and Human Development (NICHD) "to conduct a national longitudinal study of environmental influences (including physical, chemical, biological and psychosocial) on children's health and development" (Children's Health Act 2000).

This study, now named The National Children's Study (NCS), will examine how exposure to numerous factors in early life may cause or predispose children to chronic diseases and developmental disorders - asthma, birth defects, learning disabilities, obesity and possibly cancer. It will also track the effects of environmental conditions on children from birth through childhood. Key features of this far-reaching study are that it will follow a representative sample of 100,000 American children from early pregnancy through age 21; a subset may be recruited before conception. Exposure histories and biologic samples will be obtained during pregnancy and from children as they grow, thus avoiding the need for retrospective assessments of exposures. The large sample size will facilitate simultaneous examination of the effects of multiple chemical exposures, of interactions among them, and of interactions among biologic, chemical, behavioral and social factors. Each child will be screened genetically, thus permitting study of gene-environment interactions. The follow-up of the study will extend over decades.

We anticipate that the NCS will yield enormous societal benefits.

Six of the chronic diseases that the study plans to examine - obesity, injury, asthma, diabetes, schizophrenia and autism - cost America \$642 billion per year. If the NCS were to produce a reduction of only 1% in incidence of these diseases, the annual savings would amount to \$6.4 billion, far more than the \$2.7 billion price tag of the study over 25 years. This study will not only lay the groundwork for substantial improvements in children's health but also, for the future of preventative healthcare in the U.S. Delaying the discovery of possible environmental causes of childhood diseases postpones the implementation of preventative measures and possible treatments for future generations.

The National Children's Study will help close a long-standing research gap in that epidemiologic research in children's health and development has lagged well behind other federal health research efforts. Today, although children make up 30% of the U.S. population, the federal investment in research for children represents only 3% of the total research budget. Only a small fraction of this amount is devoted to the study of pediatric diseases of environmental origin.

When completed, the National Children's Study will make unique and significant contributions to our understanding how behavioral, social and environmental factors in early life may cause or predispose individuals to certain chronic diseases or conditions. This study will be the richest information resource for questions related to child health that this country has ever seen and will form the basis of child health guidance and policy for generations to come.

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Occupational Injuries to Teen Workers

from left to right:

Letitia Davis, ScD, Beatriz Pazos, MPH, and Elise Pechter, MPH, CIH

I was doing prep work on the pizzas. The pans used to cover the dough were stacked high to the ceiling and no stepladder was kept around. I'm only 5'3", so in order to reach the pans, I stood on the leg of a huge dough mixer. As I was getting down, I slipped, my leg twisted, and I broke my thighbone and kneecap. I was out of school for three weeks and missed three and a half months of work.

16 year-old prep cook

Note: At the time of interview, almost four months after the injury, the teen reported that she may have permanent leg function limitations.

I was getting ready to degrease the fryolator. I reached up over the fryolator to the shelf to get the cleaner we use and as I brought the one gallon jug down, I realized it was not capped and solution poured into my right eye. They rinsed my eye out at work and told me to go home. When I got home, it still hurt so I drove back to work to get the bottle, then went to the hospital. I later learned only people over 18 years of age are supposed to use this particular cleaner at the restaurant but no one told me this and I had always used it since I started. We also do not use masks, goggles, or gloves when we use the degreaser.

17 year-old fast food restaurant cashier

Work is part of everyday life for millions of teenagers in the US. According to the Bureau of Labor Statistics, 27% of all teens aged 16 and 17—nearly 2.2 million youths—were employed at any given time in 2001. This figure was even higher for Massachusetts where an estimated 34% of 16 and 17 year olds—more than 50,000 youths—were employed. These official labor force estimates do not include workers less than 16 years of age, thousands of whom also work. While work can provide important benefits for

teens it may also pose health and safety risks. Despite child labor laws intended to protect children from hazardous working conditions, each year in the US approximately 230,000 young workers are injured on the job and close to 80,000 are injured seriously enough to seek emergency medical care. Because teens typically work part-time temporary jobs, these numbers translate into a high overall injury rate per hour worked—higher by 70% than the average injury rate for workers of all ages.

In Massachusetts, most working teens are employed in the retail industry – in restaurants, supermarkets and other stores. Many are also employed in the service sector, for example, as aides in nursing homes, and caddies in country clubs. These common teen jobs are often considered safe, yet many pose hazards for workers of all ages – sharp objects, hot liquids, heavy lifting, and workplace violence to name a few. Factors such as inexperience, developmental characteristics, and the need to balance school and work may increase the risks faced by younger workers.

The Occupational Health Surveillance Program (OHSP) in the Massachusetts Department of Public Health (MDPH) has been tracking work-related injuries to teens since 1993. Funded by the National Institute for Occupational Safety and Health, the Teens at Work: Injury Surveillance and Prevention Project is the only project of its kind in the country. State public health regulations require all health care providers and hospitals to report cases of work-related injuries to persons less than 18 years of age to MDPH. Teens at Work, relies primarily on workers' compensation claims for injuries resulting in 5 or more lost workdays and computer generated reports from a sample of 12 emergency departments to identify cases. Since

1993, over 6,500 injury and illness cases have been reported. The largest numbers of injuries involved teens employed in restaurants, followed by grocery stores and nursing homes. Smaller numbers but high rates of injuries were observed in trucking (materials handling not driving) and public sector jobs. During this time period, ten Massachusetts's teens were fatally injured at work.

Teens at Work staff conduct follow-up interviews with injured teens to learn more about their work experiences and the circumstances surrounding their injuries. While the teens interviewed are not necessarily representative of all teens injured at work in Massachusetts, the interviews highlight lack of training, insufficient supervision, and inadequate emergency response as problems to be addressed. Close to half of the 629 injured teens interviewed reported that they had not received health and safety training either at school or on the job. Only 61% reported having the required work permits, and 14% reported that no supervisors were on site at the time of injury. Nine percent of teens reported that they anticipate permanent loss of function as a result of their injuries. In addition, inadequate workplace procedures for responding to injuries appeared to be a problem. Talking with teens also revealed that their job titles often do not tell the full story about the tasks they perform. It appears that young workers are often asked to fill in on jobs for which they have had no preparation. For example, a cashier at a quick service restaurant, in addition to taking orders, may be asked to make fries, or clean the counters

(Continued on page 4)

(Continued from page 3) Teens

or bathrooms. This multiplicity of tasks has important implications for assessing the appropriateness of teen jobs and for health and safety training.

As the second case example illustrates, teens may be exposed to toxic chemicals at work. Skin or inhalation exposure to cleaning products is a growing concern. In a recent study based on nationwide data from poison control centers, workers 15-17 years of age were four times as likely to experience acute occupational disinfectant-related illness as adults. Among the disinfectants identified were bleach and quaternary ammonium compounds used in restaurants, and in kitchens in hospitals and nursing homes. Young workers have also been found to be a high risk of acute pesticide related illness. Other chemical job hazards observed by the Teens at Work industrial hygienist include exposure to lead while scraping paint, to nicotine and pesticides in tobacco farming, and to wood dust and polyurethane foam insulation in residential construction.

More research is needed to examine the potential long-term consequences of teen worker exposures to health hazards. Current exposure limits assume an 8-hour working day and a 40 hour week over a lifetime. Because young workers typically work part-time temporary jobs, their exposures may not exceed existing standards. These exposures nevertheless raise important scientific questions about whether young people may be more susceptible to workplace health hazards, and the impact of age at first exposure. They also raise policy questions about what should be considered acceptable risks for working adolescents.

A number of factors raise special concern about teen workers. Like all new workers teens are at increased risk as a result of inexperience. They

may be unfamiliar with job requirements, less likely to recognize hazards and unaware of their legal rights - underscoring the need for training and supervision. Developmental factors - physical, cognitive and psychological - may also place them at increased risk. For example, smaller teen workers may not be able to reach parts of machines or lack the strength required to do certain tasks. Some organ systems such as the musculoskeletal, immunological and endocrine systems, which undergo rapid change or increased activity during adolescence, may be more vulnerable to harm from chemical or ergonomic hazards at work. Psychological immaturity may be obscured by the physical appearance of teens who may be asked to do tasks for which they are not prepared.

Adolescence is also a time of exploration and risk taking, and these behaviors are frequently used to explain why teens are injured at work. Yet interviews with injured teens conducted by Teens at Work suggest that it is often young workers trying to act responsibly and to do what adults have asked of them who are injured. Many of teens' positive traits, their energy and enthusiasm and willingness to do what is asked, coupled with reluctance to ask questions, may result in their taking on tasks that they are not capable of doing safely.

The Teens at Work project uses the injury data it collects to guide and promote prevention activities in Massachusetts. Findings have been used to develop recommendations for changes in equipment and job design. For example, a series of burn injuries led to redesign of brew baskets on coffee pots in a large retail bakery chain. The Teens at Work staff also collaborate with other agencies and organizations to develop educational materials and provide training for teens, parents, employers and health care providers. A three-hour health and safety curricu-

lum for young workers has been developed and disseminated both locally and nationally, and train-the-trainer courses offered. The OSHA ten-hour course is now being taught to many vocational education students in Massachusetts. Information about the child labor laws is now available on the DOS website where teens access applications for work permits. Several community organizations have developed teen peer health and safety leadership programs.

In Massachusetts, health care providers must sign-off on work permits for 14 and 15 year-olds. They can play a role in protecting young workers by learning more about the child labor laws, asking teens questions about the work they are planning to do and encouraging them to tell someone (parent, boss, teacher, older co-worker) if they encounter problems or have any questions at work. Occupational health care providers who work with companies that employ teens should also know the child labor laws and work with these employers to assure that teens are assigned appropriate tasks and adequately trained and supervised. Health care providers should report work-related injuries to teens to MDPH.

Teens who experience poor working conditions face yet another risk. They may experience "damaged expectations." They may be introduced to poor work practices, and the notion that work related health problems are common, and to be expected as part of the job. The challenge that we as occupational health experts face to protect young workers also offers the opportunity to provide teens with health and safety knowledge and skills that they will carry with them as working adults.

Call 617-625-5632 or email Teens.atwork@state.ma.us



“Metal Mixtures and Children's Health”

Center for Children's Environmental Health and Disease Prevention,

The Center for Children's Environmental Health and Disease Prevention Research at the Harvard School of Public Health (HSPH; see <http://www.hsph.harvard.edu/niehs/children>) began in June of 2004 and is the newest of such Centers supported by the National Institute for Environmental Health Sciences and the Environmental Protection Agency. The Center draws on a group of 21 scientists and trainees from many disciplines based at HSPH and several other area institutions, including the Channing Laboratory of the Brigham and Women's Hospital; Children's Hospital; and the Massachusetts College of Pharmacy. The Center's field work is also being conducted in close collaboration with a non-governmental community-based organization, Local Environmental Action Demanded (L.E.A.D.) Agency, and the Integris Baptist Regional Hospital in Miami, OK.

The Center is designed to address the concerns of a community living in the Tar Creek Superfund site of Oklahoma—an area highly contaminated by metals (lead, cadmium, iron, arsenic, manganese, and others) in mining waste populated by many residents of Native American descent. The Center's goal is to take an innovative and integrated approach to addressing a "real world" problem, i.e., the potential of the mixtures of metals that are present in the "chat" (mining waste) to interact with each other in terms of exposure, absorption, dose, and adverse effects on the development of children.

Although the focus and inspiration of the Center derive from a specific mining waste site, the findings of this research will have broad implications for pregnant women and children living in other communities dealing with mixtures of metals from mining waste and other sources. It will also pioneer new multidisciplinary approaches to understanding the general problem of mixtures—a ubiquitous environmental health problem that carries the potential for unexpected and catastrophic interactions between toxicants, but for which little is known regarding mechanisms of interactions or how to predict their occurrence.

Project 1 of our Center is being led by Dr. Robert Wright, a pediatrician-toxicologist and Assistant Professor at HSPH and Harvard Medical School (HMS). The Project is a community-based participatory epidemiologic study that examines biological markers of fetal and early childhood exposures to metals, their impact on measures of mental development, and their response to a quasi-experimental randomized trial of nutritional and behavioral interventions. Project 2, led by Dr. Jim Shine, Assistant Professor at HSPH, is examining the relative transport of different metals from the parent mine waste into exposure media in the surrounding community. Changes in the geochemical form and bioavailability of metals are being examined as a function of 'travel distance'. Project 2 also includes a nested case-control study of determinants of high metals exposure amongst children participating in Project 1 that will use detailed information on personal risk factors as well as sophisticated geographic information systems data to develop predictive risk profiles. Project 3, led by Dr. Joseph Brain, Professor and Chair of the HSPH Department of Environmental Health, aims to rank the importance of routes of exposure (e.g., food, water, air,

or hand to mouth contamination) through a series of experiments at our laboratories at HSPH. It is also investigating the expression of binding and transporter molecules for metal transport and the corresponding pharmacokinetics of metals from the lung and gut to the blood, CNS and other organs as they relate to pregnant rats and their weanlings. Project 4, led by Dr. Timothy Maher, Professor at the Massachusetts College of Pharmacy, is examining the effect of pre- and neo-natal exposure to metals on neurochemical changes and neurobehavioral outcomes in rats. The effect of simple mixtures of metals is being compared with the effect of "homogenized chat" in both Projects 3 and 4. The potential effect of stress from living near toxic waste is being explored in Project 1 and the potential modifying effect of stress on metals neurotoxicity is being explored in Project 4.

Other major faculty involved include Dr. David Bellinger (HMS Professor of Neurology), Dr. Marianne Wessling-Resnick (HSPH Professor of Nutritional Biochemistry), Dr. Jack Spengler (HSPH Professor of Environmental Health), Dr. Joel Schwartz (HSPH Professor of Environmental Epidemiology) and three junior "Center Scientists", Dr. Marc Weisskopf, Dr. Adrienne Ettinger, and Dr. David Senn. All four projects are supported by Administrative, Analytical Chemistry, and Biostatistics Cores. A Community Outreach and Translation Core is implementing an innovative portfolio of outreach activities to develop awareness and influence behaviors and thus prevent adverse health ef-

(Continued on page 9)

(Continued from page 1) CHEC

asthma attacks, parents can decide to ban smoking in the home or car. After learning that breathing large amounts of volatile organic compounds (VOCs) can cause headaches, fatigue, dizziness or difficulty breathing and that long-term exposure to some VOCs may cause cancer and/or brain damage parents can switch to low- or no-VOC paints, or water based paints. Low- and no-VOC paints are available from a range of national brands; however, they need to be specifically requested.

Buying an organic cotton mattress and bedding for your baby or child can reduce their exposure to at least two toxic chemicals that are used in the U.S. as flame-retardants. Organic also has the added benefit of being pesticide free., reducing your baby's exposure to developmental neurotoxins. Many organic mattresses contain wool fill, which is naturally flame retardant.

You may say to yourself, "My mother didn't childproof against environmental hazards and I turned out fine." That may be, but we are raising our children in an increasingly different world than the one our parents and grandparents knew. The universe in which our children live today is a chemical universe. For example, roughly 85,000 new chemicals have been invented since WWII; of those, roughly 3,000 are produced in quantities of greater than 1 million pounds per year. Of those that are most widely disseminated in foods, cleaning solutions, pesticides, and in the air and water, only 43% have ever been tested to determine whether they have the potential to cause any form of toxicity. Only about 10% have ever been tested with fetuses, infants, and young children in mind.

What about disease? Hu-

man health is the result of a combination of genetics, behavior and lifestyle. For some diseases there is no microorganism to blame. An individual may be genetically predisposed to disease, but the predisposition is just that - a potential for disease - until everyday life experiences and environmental exposures set the disease in motion. Judith Stern at the University of California at Davis described the situation as "Genetics loads the gun, but environment pulls the trigger."

Current research addresses how genetic factors influence human susceptibility to environmental health risks present in food, consumer products, water and air. In recent years the patterns of disease have changed a great deal in America's children. Today the leading cause of death in U.S. children is injuries, but the second leading cause of death is cancer. The leading cause of hospitalization for children is asthma, which is also the leading cause of school absenteeism (13 million school days are missed each year). The incidence of asthma has doubled, and childhood brain cancer has increased in frequency. Certain birth defects of the reproductive tract in baby boys have more than doubled. Learning and developmental disabilities are estimated to affect one in six children in the U.S. and appear to be increasing.

"The problem becomes a huge detective game, trying to figure out where chemicals are used, how people are exposed and how we can control exposure to a level that is safe," says John Wargo, professor of environmental policy and risk analysis at Yale University. He is co-author of "The State of Children's Health and Environment 2002". This report, released by CHEC in early 2002, offered recommendations for both parents and policy makers on reducing environmental threats. The report highlighted several chronic illnesses to address concerns regarding the failure of law to adequately protect children from these threats.

CHEC's web-based HealthHouse can help by providing the results of research and reviews of how toxic chemicals threaten the health and lives of children. The site (chechnet.org) receives almost 30,000 visitors every month - parents, teachers, health care professionals - all seeking information on a wide range of environmental health topics. The site is constantly updated with the very latest in scientific information summarized in a manner that is understandable, accessible, and useable.

To address the growing concern of prenatal exposures to environmental toxins CHEC launched First Steps. This free email program is a road map to guide parents through the maze of chemical and environmental dangers facing their baby. This is especially important since the developing fetus is extremely vulnerable to the potential of toxic chemicals to derail normal development.

They offer realistic, practical, common sense steps that focus on the highest priority risks. Examples of topics covered include avoiding the most dangerous pesticides, choosing safer cleaning products, healthy home renovations and remodeling; and why taking these steps are so important to your baby's health. The consequences of harmful prenatal events are often permanent. Alerting pregnant women to these issues as early as possible in their pregnancy can make a meaningful difference to their baby's lifetime health and well-being.

Two members of CHEC's current Board of Directors are celebrity mothers.

Child health advocates Erin Brockovich (subject of the Julia Roberts film) and Olivia Newton-John use their celebrity to help draw media attention to these important issues. Through the wonderful volunteer efforts of Olivia and former national

(Continued on page 10)

The Alliance for a Healthy Tomorrow

Legislative Priorities and an Executive Order Campaign for 2005!

Susan Roll, Associate Executive Director, MA Breast Cancer Coalition

The Alliance for a Healthy Tomorrow is a coalition of citizens, scientists, health professionals, workers, and educators seeking preventive action on toxic hazards. Our goal is to correct fundamental flaws in government policies that allow harm to our health and environment. We will create proactive policies to prevent harm before the damage is done, and to choose the safest alternatives. We invite you to be a part of this critical effort! Currently, we are supporting three key pieces of legislation as well as launching a campaign asking Governor Romney to issue an executive order requiring the substitution of certain chemicals found in hundreds of toys, cleaning products, cosmetics and pesticides.

1) Legislative Priorities 2005

AN ACT FOR A HEALTHY MASSACHUSETTS: SAFER ALTERNATIVES TO TOXIC CHEMICALS

Sponsors: Senator Steven Tolman, Representative Jay Kaufman

Purpose: Protect Our Health and Develop a Healthy Economy

Choosing safer alternatives will not only help prevent widespread suffering, it will reduce the burden on our economy of preventable high health care, special education costs and lost productivity. Innovative industries and "green chemistry" can create the safer products and sustainable jobs that are increasingly demanded in today's economy. The European Union and other countries have already adopted more health protective requirements for products, and over 37% of Massachusetts trade is with the European Union's member states. This Safer Alternatives program will assist Massachusetts businesses in competing in the global marketplace.

AN ACT TO REDUCE ASTHMA BY USING SAFER ALTERNA-

TIVES TO CLEANING PRODUCTS

Sponsors: Rep. Frank Smizik, Senator Dianne Wilkerson

Purpose: The purpose of this bill is to reduce asthma and other health threats from emissions of toxic chemicals from cleaning products used in schools, hospitals, day care centers and public buildings.

AN ACT RELATIVE TO SAFER ALTERNATIVES FOR MERCURY-CONTAINING PRODUCTS

Sponsors: Senator Susan Tucker, Rep. Douglas Petersen

Purpose: Passage of this bill supports the regional strategy, set by all New England Governors, to reduce mercury emissions 75% by 2010 and for eventual zero mercury emissions in New England. Similar legislation has been enacted in Maine (2003), Rhode Island (2001) & Connecticut (2002).

2) SAFER Massachusetts Executive Order: Overview

The central concept of this Executive Order is to enforce existing regulations that could replace toxic chemicals with safer alternatives wherever feasible.

We call for substitution policies to be implemented in three areas:

- Consumer products through existing Department of Public Health regulations.
- Industry through full implementation of the Toxics Use Reduction Act (TURA).
- State agency purchasing standards for healthier cleaning products and integrated pest management to eliminate the use of pesticides.

Safer Products

The scientific evidence is overwhelming that common ingredients in consumer products are linked to human illness and disabilities. Yet, consumer products remain a largely unregulated

route of exposure to toxic chemicals. Based on research on toxic chemicals in products, existing state statutes, and policies adopted in other states or countries, we propose that the Department of Public Health take regulatory action to protect public health from toxic chemicals in cosmetics, pesticide products, and polyvinyl chloride (PVC) products.

Substitution in Industry

While the TURA program has been extremely successful at helping industries in the Commonwealth to reduce the use and emission of toxic chemicals, often through substitution, many opportunities to replace toxic chemicals with proven safer alternatives have not been utilized. We propose the full implementation of the TURA law to reduce or eliminate the use of five of the high hazard chemicals identified by the TURA Science Advisory Board: Hexavalent Chromium, Formaldehyde, Lead, Trichloroethylene (TCE) and Perchloroethylene (Perc), through substituting safer alternatives.

Healthier State Agency Practices
State agencies' use of toxic chemicals puts both their employees and the public at risk. State agencies can build on their own model programs and adopt exemplary standards that favor healthier cleaning products and integrated pest management to eliminate the use of pesticides.

If you are not already a member of the Healthy Tomorrow network, sign up at healthytomorrow.org. Your activism is instrumental in achieving success with this legislation and executive order. By joining our network, we will keep you posted on our progress and let you know when your voice will be most helpful as we work together towards a healthy tomorrow!



Occupational and Environmental Medicine: What's Pediatrics Got to do with it?

Rose Goldman, MD, MPH

Most of us who trained in Occupational Environmental Medicine come from an Adult Medicine training background, and see predominantly adult patients. Pediatric Environmental Health is truly coming into its own, and we in Occupational and Environmental Medicine need to be part of the equation. Why is that?

As our attention to environmental exposures has grown, we have seen that one of the most vulnerable groups affected are children. Previously, we referred to workers as the canaries for society. When it comes to environmental exposures children are among the more vulnerable members of society, and may be the canaries. With their developing nervous and other growing systems, they are more sensitive to the effects of many toxins. Young children, who live lower to the ground, and are also frequent tasters of their physical environment, can get greater exposures per

surface area.

In our assessments of adult patients for environmental exposures, we are sometimes asked questions about exposures to the rest of the family, including the children. In 1995 EPA acknowledged the appreciation of children's risks by passing a law that mandated inclusion of children in environmental risks assessment. Children's environmental health topics have included exposures to lead, mercury, pesticides, hazardous waste sites, indoor air contaminants, as well as asthma exacerbations from air pollution—just to name a few.

Where can we get more information about Pediatric Environmental Health? Pediatric Environmental Health Specialty Units – there's one in Boston!

You can call one of the Pediatric Environmental Health Specialty Units (PEHSU) –located in each of the 10 United States Environmental Protection Agency (EPA) regions. As part of its ongoing cooperative agreements

with the Agency for Substances and Disease Registry (ATSDR) and the EPA, the Association of Occupational and Environmental Clinics (AOEC) has established a network of Pediatric Environmental Health Specialty Units (PEHSUs). Each PEHSU is based at an AOEC member clinic at an academic center and is a collaboration between the pediatric clinic and the (AOEC) occupational and environmental clinic at each site. These PEHSU's provide education and consultation for health professionals, public health professionals and others about the topic of children's environmental health, including reproductive and developmental toxicity. Contact information for the sites can be found at:

<http://www.aoec.org/pesu.htm>. The PEHSU in Boston is a collaboration between the Occupational and Environmental Health Center at Cambridge Hospital, and the Pediatric Environmental Health Center at Children's Hospital. The number to call here is 1-888-child14.

With this added information, we can expand our horizons in addressing the "E" part of NE-COEM.

The Past, Present and Future of Pediatric Environmental Health Centers

Michael Shannon, MD, MPH

Children's Environmental Health is typically thought of as a relatively new clinical specialty. However, when one considers the history of childhood lead poisoning and its treatment, the clinical discipline of children's environmental health has existed for more than 50 years. Concern about the health effects of environmental agents on children has risen concomitantly with the scientific advances demonstrating that exposure to very small amounts of environmental poisons such as lead, mercury

or arsenic can have significant clinical consequences.

The Children's Hospital Boston Pediatric Environmental Health Center (PEHC) is a case in point. The Children's Hospital environmental health program was established in 1971 as the Lead Poisoning Clinic. During its first 20 years the program had more than 2000 visits annually, consisting exclusively of lead-poisoned children who came for outpatient treatment of their plumbism. Staffed by pediatricians, toxicologists, nurses, health educators and social workers, The Lead Clinic also offered a training site for pediatric and occupational medicine residents. Children who came to the Clinic were given chela-

tion therapy. Visits by children with blood lead levels of 40-60 ug/dl were routine, in stark contrast to the current population of lead poisoned children under care, who have a mean lead level of 20-25 ug/dl.

In 1989, the first child to come to the Lead Treatment Program for something other than lead poisoning was seen. This child was referred after the discovery that she had been exposed to arsenic-contaminated well water for several years. The parents sought information on risks which the pediatrician was unable to provide. Shortly after that first case, we were asked to

(Continued on page 9)

(Continued from page 8) PEHC

evaluate a child with a chronic mercury exposure, followed by a child with a chronic carbon monoxide exposure, a child with chronic benzene exposure and then a child with chronic exposure to hazardous wastes from a nearby Superfund site. Changing our name to the Lead and Toxicology Program, the Clinic for the next 5-6 years began evaluating children who: (1) had a documented exposure to an environmental agent with concerns about potential future health effects, (2) had a suspected exposure to an environmental agent and an illness, with the question of whether the two were correlated, or (3) had an unexplained illness with the question of an environmental etiology. The program quickly grew, offering the unique expertise provided by its team of pediatricians, toxicologists and occupational medicine physicians.

In the 1990s, Children's Environmental Health began to develop at an increasingly rapid pace. Across the na-

tion, important environmental rules were being promulgated, specifically designed to protect children from the threat of environmental agents. These included revision of the lead standard in the Clean Water Act in 1991, passage of the Food Quality Protection Act of 1996, and creation by the EPA of the Office of Child Health Protection in 1997. Collectively, these events raised the issue of children's environmental health to prominence. The American Academy of Pediatrics Committee on Environmental Health, established in 1947, became increasingly visible in efforts to educate parents and pediatricians about environmental threats to children, while simultaneously advocating for children in the policy arena.

In 2001, the most important next step on the development of Children's Environmental Health occurred, that is, the creation of clinical fellowships. Spawned by a grant from the Ambulatory Pediatric Association

(APA), fellowships in Children's Environmental Health have been established in Boston, New York, Washington, DC and Cincinnati. The need for such fellowships is clear; there are very few experienced children's environmental health specialists in the US today. Those who are currently in practice learned evaluation and treatment principles through their direct patient encounters rather than any formal training. The three-year fellowships offer a rigorous curriculum which includes completion of a Master's of Public Health degree, clinical care in the Pediatric Environmental Health Program, advocacy, risk communication and regular meetings with EPA and ATSDR. The creation of the fellowships and their hoped-for longevity will help to assure the availability of children's environmental health experts in years to come.

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(Continued from page 5) Metal Mixtures

effects in children from exposure to metals in mining waste. The Center is also being advised by a broad-based Community Advisory Board, a Native American Tribes committee, an External Advisory Board of distinguished outside scientists, and liaisons with the EPA, ATSDR, and local government. These Projects, Cores, and Boards function as a cohesive unit.

Although the Center's work is only at a very preliminary stage (with much of the field work still being designed), pilot studies have been completed suggesting that (1) an inverse relationship exists between umbilical cord blood manganese levels and infant birthweight; (2) there are wide fluctuations amongst metals in Tar Creek "chat" with respect to sequential extractability (and thus, likely bioavailability); (3) in rodent studies using different routes of administration, during

the initial 4 hour period, 54-Mn is absorbed much faster via intranasal than intratracheal instillation and ingestion. 54Mn accumulated most significantly in the brain of intranasally-instilled rats.

More broadly, establishment of this Center is intended to serve as a springboard for developing and launching other initiatives related to environmental health and children. For example, the Center has already begun background research examining the feasibility of adding environmental health components to a recent epidemiologic study that recently began at Boston Children's Hospital of children with autism spectrum disorders (led by Drs. Janice Ware and Leonard Rappaport). Center investigators have also received a seed grant from the Critelli Family Foundation for examining the potential impact on children's health of consuming food

grown with the help of fertilizer contaminated by cadmium from recycled sludge—a problem that is apparently widespread in many parts of the U.S.

The Center also intends to work very closely with other health professionals who are working on children's environmental health issues in the Boston area (as well as in the area of our field site, the Tar Creek Superfund site of Oklahoma). For example, the Children's Center will be a resource for clinicians working in the Pediatric Environmental Health Center at Boston Children's Hospital and will serve as a potential research site for trainees in Boston Children's Hospital Pediatric Environmental Health Fellowship program.

The Center welcomes examination of its activities, comments, and suggestions.

<http://www.hsph.harvard.edu/niehs/children>

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NECOEM

NECOEM is a not-for-profit, regional component society of the American College of Occupational and Environmental Medicine, the pre-eminent organization of occupational and environmental physicians in the United States.

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(Continued from page 6)

spokesperson, Kelly Preston, CHEC produced a 17-minute video, **Not Under My Roof: Protecting Your Baby from Toxins at Home**, reviewing simple steps parents can take to protect children from chemical exposures at home. This video raises awareness of the common hazards easily eliminated from the home.

CHEC envisions a future of healthy children and livable communities. How we preserve and protect our environment will affect how we live our lives. CHEC visualizes a world where the air we breathe, the water we drink, the consumer products we purchase and the food we eat are clean and safe, especially for our children. The health of children depends on the vigilance of the adults that manage the environments in which they live, play and learn. We can all choose to have a healthier, less toxic, less-allergenic household. As Sandra Steingraber says in her book **Having Faith, An Ecologist's Journey to Mother-**

hood, "If the world's environment is contaminated, so too is the ecosystem of a mother's body. If a mother's body is contaminated, so too is the child who inhabits it. These truths should inspire us all - mothers, fathers, grandparents, doctors, midwives, and everyone concerned about future generations - to action."

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