

## Rachel's Environment & Health News

### #764 – Children's Health is Declining, Says American Chemical Society

#### March 06, 2003

by Bette Hileman\*

Over the past few decades, various disturbing trends have led researchers to believe that environmental exposures are contributing to children's declining health status in the U.S. Federal and private health programs are just beginning to realize the extent of the problem and to seek solutions.

Scientists are concerned that environmental exposures cause a wide range of health threats to kids, including birth defects, cancer, and asthma. According to a recent study from the National Institute of Environmental Health Sciences (NIEHS), childhood cancer incidence has risen 1% a year since the early 1970s, the prevalence of asthma has gone up sharply, the incidence of attention-deficit hyperactivity disorder (ADHD) may be increasing, a growing percentage of boys are born with defects in their reproductive tracts, and the prevalence of autism is rising dramatically....

[In late February the National Institute of Environmental Health Sciences sponsored a meeting to examine a number of specific environmental health risks to children, address ways to translate science into action to protect children, and to identify research gaps.]

...Former U.S. Public Health Service director Philip R. Lee gave the keynote speech at the meeting. He described the types of exposures likely to affect the health of the fetus and children and some things that can be done to mitigate these exposures. Lee is professor emeritus of social medicine at the University of California School of Medicine.

Children are especially vulnerable to environmental insults, Lee said. "At birth, their nervous, respiratory, reproductive, and immune systems are not yet fully developed. They are in a dynamic state of growth with cells multiplying and organ systems developing at a rapid rate," he explained. Also, pound for pound, children take in more air, food, and liquids than do adults.

The impact of neurodevelopmental disorders such as ADHD on children and their families is immense, Lee said. Children with ADHD are at greater risk for dropping out of school early, drug abuse, and suicide. Environmental exposure to any of a number of known and suspected developmental neurotoxicants could contribute to ADHD, including lead, mercury, manganese, tobacco smoke, dioxins, polychlorinated biphenyls (PCBs), certain pesticides, and solvents, he said.

One of the exposures society could easily reduce, Lee said, is to manganese. Its effects include inattention, impulsivity, and hyperaggression. Manganese -- an essential nutrient -- occurs at very low levels in breast milk, but it is added to infant formula made from cow's milk and occurs naturally at even higher levels in soy formula. It is dangerous for infants to consume more manganese than they would get from breast milk because infants have no capacity to excrete excess amounts until they are older, he said....

David O. Carpenter, director of the Institute for Health & the Environment at the State University of New York, Albany, discussed the effects of exposures to lead, mercury, and PCBs. Children with higher lead exposures are more easily distracted, less organized, and apt to be hyperactive, impulsive, aggressive, and easily frustrated, he said. "Blood lead levels as low as one microgram per deciliter are associated with harmful effects on children's learning and behavior. There may be no lower threshold for some of the diverse effects of lead in children," he observed.

Low-dose prenatal exposure to mercury, Carpenter said, also affects a broad range of skills -- motor, attention, and language for instance. It decreases IQ and increases impulsivity. "Children of women who consume large amounts of fish and seafood during pregnancy" are at highest risk of problems from mercury, he said. Immigrants, Native Americans, and others who obtain much of their protein from subsistence fishing are likely to be overexposed to mercury. Blood levels of mercury in one-tenth of U.S. women of childbearing age exceed the reference dose, the safe level, he noted.

Early life exposure to PCBs has similar effects, Carpenter said. Infants with the highest exposure, as shown in cord blood and breast milk, have abnormal reflexes and less developed attentiveness to visual and auditory stimuli. Even 3.5 years after birth, they have multiple behavioral problems, as well as impaired thyroid and immune systems. What is totally unknown, he explained, are the adverse effects if a child is exposed to two or three of these substances--lead, mercury, and PCBs.

Exposure to air pollution such as ozone or nitrogen oxides is associated with a wide array of health problems, said Jonathan Samet, epidemiologist at Johns Hopkins University Bloomberg School of Public Health. Prenatal exposures can cause pregnancy loss and reduced birth weight. Postnatal exposures are associated with cancer, sudden infant death syndrome, and respiratory symptoms, he explained.

It is important, Samet continued, to look at the air quality of the microenvironments where children spend a lot of time. For example, most children spend time at home, at school, on playgrounds, in school buses (an average of 40 minutes per day) and parents' vehicles, and outside in neighborhoods, he said. Inside the home, key exposures include tobacco smoke, nitrogen oxides, wood smoke, radon, biological agents, volatile organic compounds, and particles from outdoors, he said. Outdoor exposures are to particles (especially from diesel smoke), ozone, biological agents, and hazardous air pollutants.

"We know that high levels of combustion-related pollution increase mortality and morbidity, including acute respiratory illness," Samet said. "But increases in the incidence of asthma cannot be explained solely by outdoor air pollution," he observed.

"More research is needed, but we do know something," Samet concluded. One is that children who live within 90 meters of a main road have an increased risk of wheezing illness. Another is

that children who play team sports outside in areas with high levels of ozone are much more likely to develop asthma than those who play in clean areas. This is from a cohort study of 3,522 children in Southern California with no history of asthma. Also, among asthmatic children, the number of acute events requiring emergency care goes down dramatically when air quality improves. Emergency care and hospitalizations for asthma declined 42% during the 1996 summer Olympic Games in Atlanta when driving was sharply curtailed.

Peyton A. Eggleston, professor of pediatrics at Johns Hopkins Bloomberg School of Public Health, noted that acute asthma was more than twice as prevalent among black children (7.2%) as among white children (3.0%) and that the annual death rate from asthma among black children is more than twice as high (38.5 per million) as it is for white children (15.1 per million).

A study of hospitalizations for acute asthma in Baltimore from 1989 to 1999 shows that the number is lowest in summer and peaks during September and October. Ozone levels outdoors are highest in July and August, so this means "we need to look at air quality indoors," as a causal factor, Eggleston said. Also, he noted, "I think viral infections are important in causing asthma problems in the fall."

In a National Cooperative Inner City Asthma Study, researchers went to the homes of 1,528 asthmatic children in eight urban centers, Eggleston said. They found that smoking occurs in 69% of these inner-city homes, elevated nitrogen dioxide in 24%, leaky roofs with water damage--which means mold is probably present--in 29%, and excess roach allergen in the dust in 77%. Children who were sensitized to mold, cockroaches, and dust mites had many more emergency visits to the hospital. As a group, the 1,528 children averaged 3.3 wheezing days every two weeks and one emergency room visit every six months.

The 1% annual increase in the incidence of childhood cancer since 1974 is primarily due to increases in leukemia and central nervous system tumors, said Leslie L. Robison of the department of pediatrics at the University of Minnesota. With leukemia, however, "it is less clear whether we are looking at an artifact or a true increase over time," he said. For central nervous system tumors, better diagnostic techniques may explain the increase, he said.

In any event, Robison said, one individual in every 600 is diagnosed with cancer before the age of 15, about 8,500 children are diagnosed annually with cancer, and about 2,500 die each year. The highest incidence of cancer is in the first year of life. "It is quite obvious these cancers are caused by something that happened prior to birth," he explained.

A second peak of tumors occurs during the latter part of adolescence. The most common cancers during this period are Hodgkin's disease, bone and thyroid cancer, and melanoma....

There are known risk factors for some cancers, but they do not explain the extent of the increase, Robison said. For example, brain tumors and acute lymphoblastic leukemia can be caused by ionizing radiation in utero. Acute myeloid leukemia can be caused by ionizing radiation in utero or by chemotherapy, he said. But there are no known risk factors for many childhood cancers, such as neuroblastoma, retinoblastoma, Wilm's tumor, hepatoblastoma, Ewing's sarcoma, and germ cell tumors.

Some of the environmental risk factors that may play a role in childhood cancer include the pregnant mother's exposure to tobacco, alcohol, cured meats, topoisomerase II inhibitors (a class of cancer drugs), and improper doses of vitamins. Postnatal exposures to pesticides and electromagnetic fields, and parental occupations in agriculture, aircraft, pesticide, painting, and pulp and paper industries may also contribute, Robison said. It is likely that genes and environment are both important in most childhood cancers, he said. "It is very unlikely there are any cancers driven by genetics or environment alone," he explained. But, he added, gene-environment interactions have been investigated hardly at all....

At this point, "studies should focus on what actually we can do to prevent childhood cancer," said Michael Thune of the American Cancer Society. Much progress has been made in treating cancer, but few advances have been made in identifying cancer causes, he said.

Even though cancer clusters get a lot of media attention, few scientific discoveries have been made from studying them, said Tom Sinks of CDC's National Center for Environmental Health. A confirmed cancer cluster can be the result of chance or a miscalculation in the expected cancer rate.

However, a cluster of leukemia in Fallon, Nev., is interesting, Sinks said. Fifteen cases of childhood acute lymphocytic leukemia were diagnosed there when less than one would be expected. "Fallon was warned for years about high levels of arsenic in its drinking water," which remain very high, he said. High tungsten levels have also been found in Fallon. When compared with mean levels in CDC's latest national survey, 85% of the people in Fallon have elevated tungsten levels, he said.

Godfrey Oakley, visiting professor of epidemiology at Rollins School of Public Health at Emory University, pointed out there is more about the environment than just contaminants that can affect children's health, including vitamin deficiencies, drugs, and maternal diseases. He said, for example, that folate deficiency is known to cause birth defects, especially neural tube defects. Folate deficiency is cheap and easy to solve by fortifying flour and cereal with folate and taking vitamins. In the U.S. since 1998, flour and some cereals have been fortified with folate, but they are not fortified in Europe. "If you want to make a significant reduction in birth defects, pay attention to old problems," he said. Other known causes of birth defects are the pregnant mother's use of valproic acid, Accutane, and excess amounts of vitamin A; maternal diabetes; and rubella during pregnancy, he said.

Terri Damstra of NIEHS discussed the World Health Organization's global assessment of endocrine-disrupting chemicals (EDCs)--substances that disrupt the endocrine system....

Exposure of the fetus or the young child to EDCs may result in permanent changes in function, Damstra said, but exposure during adulthood may not result in detectable effects. Another feature of EDCs is that exposure to the same level during different life stages may produce different effects.

One observed effect of EDCs is impaired neurobehavioral development in children caused by fetal exposure to PCBs, Damstra said. A weight-of-evidence approach looking at data

from all the relevant research indicates that EDCs in the environment have potential for adverse outcomes on people. "Coordinated international research strategies are urgently needed to address numerous data gaps and uncertainties," she said. "Prevention of exposure is the single most effective means of protecting against environmental threats," she concluded.

Environmental agents can disrupt many cellular events in the neurological development of the fetus, child, and early adolescent, according to Ted Schettler, a physician who is science director for the Science & Environmental Health Network, a think tank that is concerned with the wise application of science to the protection of the environment and public health. These include cell division, migration, differentiation, formation of synapses, pruning of synapses, myelination, and apoptosis.

For example, cell differentiation can be affected by exposure to ethanol, nicotine, mercury, lead, and decreased thyroid hormone, Schettler said. However, there are still many uncertainties when trying to assess the effects of toxicants on nervous system development. One is the "long latent periods between relevant environmental exposures and emergence of evidence of impairments. Therefore, waiting for proof of harm before acting can result in widespread damage," he said.

"We are in the midst of a revolution in scientific understanding of links between exposures and health that promises to provide opportunities for new interventions to protect public health," said John Peterson (Pete) Myers, senior adviser to the United Nations Foundation. This revolution is driven by research funded by many governments.

A result of these research efforts is a torrent of new papers coming out virtually every week showing that many environmental contaminants are biologically active. This research suggests that adult chronic diseases will need fresh examination, particularly with respect to the possibility that environmental contaminants are programming the fetus so that chronic disease develops later in life, he explained.

Despite these research needs, EPA's program on children's environmental health may be scaled back. The agency's Office of Children's Health Protection has been without a director since April 2002, and the executive order creating the Presidential Task Force on Children's Environmental Health & Safety will

expire on April 21. EPA has proposed to cut its annual funding for the Centers for Children's Environmental Health from \$6 million to \$3 million. The centers are jointly funded by EPA and NIEHS. If Congress approves this funding cut, the total number of [children's environmental health] centers will decline from 12 to 10.

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\* Bette Hileman is Senior Editor, Chemical & Engineering News, a publication of the American Chemical Society. This is excerpted from a longer article, "Children's Health," published in Chemical & Engineering News April 7, 2003, pgs. 23-26. The American Chemical Society is a professional association for chemists.

### **American Chemistry Council Will Spend \$50 Million to Improve Its Image Among Women**

From Plastics News March 31, 2003

HOUSTON (March 28, 2003) -- The American Chemistry Council (ACC) may be taking a page from the American Plastics Council's (APC) playbook in an attempt to improve its image. The ACC will make a decision this spring on a communications program that would be "similar in size and scope" [\$50 million] to the one APC launched several years ago, said Nova Chemicals Corp. President and Chief Executive Officer Jeff Lipton, who serves as an ACC board member.

"APC spends most of its money on TV commercials that focus on young, married women," Lipton said.... "The commercials help young, married women feel that they and their families are safer because of plastic products.

"The concept has worked extremely well for plastics and it can work the same way for chemicals."

[On April 4, 2003, Ad Age reported that the American Chemistry Council had selected Ogilvy & Mather, New York, and its public relations unit Ogilvy PR for its \$50 million advertising campaign. The American Chemistry Council is a trade association for chemical corporations. --Peter Montague]

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