



Our Most Precious, Most at Risk

During pregnancy, a baby receives all its nourishment from its mother. The developing baby also receives from its mother her history of chemical exposure as well as her continuing contact with the chemical soup we are exposed to every day.¹ **Each child born today is exposed to hundreds of chemicals even before birth.**

In a U.S. study of umbilical cord blood, 287 chemicals were found to have been circulating in the infant, of which 180 are known to cause cancer in humans or animals, 217 are toxic to the brain and nervous system, and 208 cause birth defects or abnormal development in animal tests.²

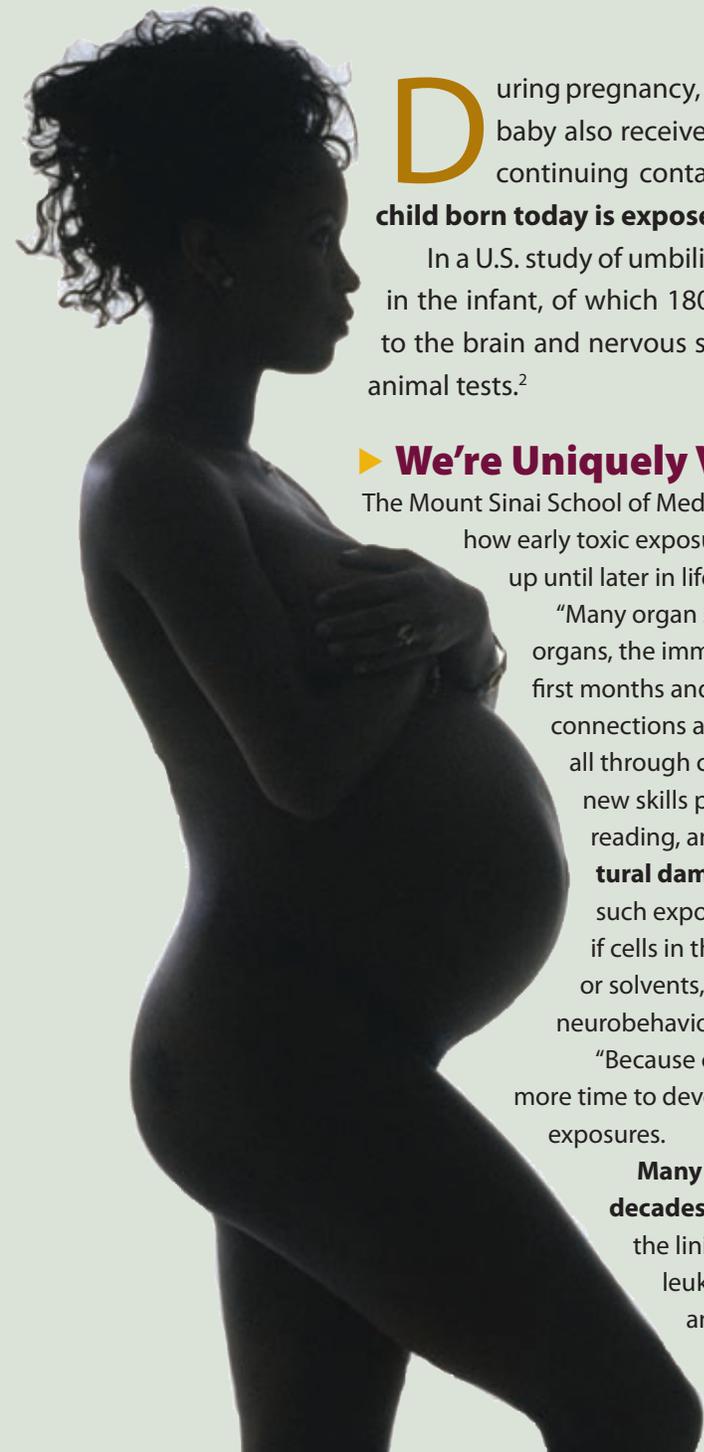
► **We're Uniquely Vulnerable in Early Life**

The Mount Sinai School of Medicine's Center for Children's Health and the Environment describes how early toxic exposures can cause long-term health damage, some of which may not show up until later in life:

"Many organ systems in young children – the nervous system, the reproductive organs, the immune system – undergo very rapid growth and development in the first months and years of life. During this period, structures are developed and vital connections are established. Indeed, development of the nervous system continues all through childhood, as is evidenced by the fact that children continue to acquire new skills progressively as they grow and develop – crawling, walking, talking, reading, and writing. **The nervous system is not fully able to repair any structural damage that is caused by environmental toxins.** The consequences of such exposure include loss of intelligence and alteration of normal behavior. Thus, if cells in the developing brain are destroyed by chemicals such as lead, mercury, or solvents, or if vital connections between nerve cells fail to form, the resulting neurobehavioral dysfunction can be permanent and irreversible."³

"Because children have more future years of life than do most adults, they have more time to develop chronic diseases that may be triggered by early environmental exposures.

Many diseases that are triggered by toxins in the environment require decades to develop. Examples include mesothelioma (malignant tumors in the lining of the lungs, abdomen or heart) caused by exposure to asbestos, leukemia caused by benzene, breast cancer that may be caused by DDT, and possibly some chronic neurological diseases such as Parkinson's



BRAIN DEVELOPMENT EASILY DISRUPTED⁹



Think of brain development as a time when cells get assigned their first job.

If they are exposed to a particular chemical while they're on their way to work, then they may never get there and the job will not be done.

Or they may misunderstand the assignment and not complete it correctly.

Or maybe they won't understand their relationship with "co-workers" – other cells – thus interfering with the integrated functioning of the brain.

In any case, the chemical is interfering with the performance of the cell's duties, which will ultimately affect overall brain development.

One important point about brain development is that various stages of development provide critical "windows of vulnerability" during which exposure to a chemical substance may have lasting adverse effects on brain function.

In other words, there are precise moments in development when a toxic chemical can cause long-term damage to how the brain works.

disease that may be caused by exposure to environmental neurotoxins such as pesticides. Many of those diseases are now thought to be the products of multi-stage processes within the body's cells that require many years to evolve from earliest initiation to actual manifestation of illness. Consequently, certain carcinogenic and toxic exposures sustained early in life appear more likely to lead to disease than do the same exposures encountered later in life."⁴

"The big concern of the phthalates is that they have anti-androgen activity. They get rid of things that are in the testosterone line, the things that make a man a man."

— Jim Pirkle, deputy director for science at the CDC's Environmental Health Laboratory⁵

► From Mother to Child

Several studies that test pregnant women for toxic chemicals and then track the health of their children have found that health problems are linked to exposure during pregnancy.

For example, one recent study tested for phthalates in the urine of pregnant women. Phthalates are chemicals widely used in cosmetics and plastics. The researchers identified **an association between pregnant women's exposure to phthalates and adverse effects on genital development in their baby boys.**⁶ Phthalates have also been shown in animal studies to cause genital abnormalities.

► Children's Changing Environment

The world in which our children grow up today is fundamentally different from that of our grandparents. Traditional infectious diseases have largely been eliminated, infant mortality is greatly reduced, and the expected lifespan of a baby born now in the United States is more than twenty years longer than that of a child born in the early 1900s.⁷

But children today face hazards in the environment that were neither known nor suspected only a few decades ago.⁸ Synthetic chemical compounds have been developed and dispersed into the environment; fewer than half of the tens of thousands of compounds in commercial use have ever been tested for their potential toxicity to humans and fewer still have been assessed for their toxicity to children. Children's exposures to lead, pesticides, PCBs, and toxic air pollutants are widespread.

► Changing Childhood Illness

Children's exposures to these newly developed toxic chemicals, in combination with the triumph of vaccines and control of infectious disease, have changed the face of childhood illness. **For most US children, the classic infectious diseases have been replaced by chronic, complex, debilitating conditions, such as leukemia and other cancers, asthma, developmental disabilities, and birth defects.** For example:

- The number of children and the total number of people with **asthma in the U.S. has more than**

doubled since 1980, affecting about 7.5 million American children in 2001. Asthma is now the most common cause of school absenteeism and the leading cause of hospitalization in children.¹⁰

- **Low birth weight and premature babies**, predictors of long-term health problems, have been rising since 1980.¹¹
- **Brain cancers and other tumors** in children's nervous systems rose by more than 25% between 1973 and 1996.¹²
- **Leukemia**, the most common childhood cancer, increased by about 17% between 1973 and 1996 (from 23 to 27 cases per million children).¹³
- According to the CDC, the number of children with **autism spectrum disorders** has increased in the past decade. While better diagnoses may contribute to this apparent increase, the large jump from 4 to 5 cases in 10,000 children to possibly as high as 70 per 10,000 is cause for concern.¹⁴

► Pesticide Impacts on Children

Dr. Elizabeth Guillette studied children in the Yaqui Valley in Sonora Mexico, comparing pre-school children living in the foothills where pesticide use was avoided, with similar children living in the valley where pesticides were frequently used on agricultural crops.¹⁵ The people from the foothills and the valley share similar genetic backgrounds, diets, water mineral contents, cultural patterns and social behaviors. The exposed

children from the valley showed decreases in stamina, coordination, short-term memory and the ability to draw a person. The drawings show striking differences between the exposed and unexposed children. The pesticide-exposed children drew the figures on the right, whereas the children from the foothills who were less exposed to pesticides drew figures of humans with features that are characteristic of typical four and five year olds.¹⁶ ■

Endnotes

- 1 Environmental Working Group (EWG). (2005) The Pollution in Newborns: Executive Summary. 2005 www.ewg.org/reports/bodyburden2/execsumm.php
- 2 Ibid.
- 3 Mt. Sinai Center for Children's Health and the Environment. (2002) Children's Unique Vulnerability to Environmental Toxins June 2002. www.childenvironment.org/factsheets/childrens_vulnerability.htm
- 4 Ibid.
- 5 Weise, Elizabeth. Are our products our enemy? *USA Today*, August 2005.
- 6 Swan et al. (2005) Decrease in Anogenital Distance among Male Infants with Prenatal Phthalate Exposure. *Environmental Health Perspectives*; 2005; 113(8)
- 7 INFORM, Landrigan, P. (2007) Environmental Health Threats to Children: A Look at the Facts www.informinc.org/fact_children.php
- 8 Ibid.
- 9 Adapted from Greater Boston Physicians for Social Responsibility. (2001) *In Harm's Way: Toxic Threats to Child Development*. <http://psr.igc.org/ihw-download-report.htm>
- 10 American Lung Association. (2006) "About Childhood Asthma." August 2006. www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=22782

GUILLETTE STUDY

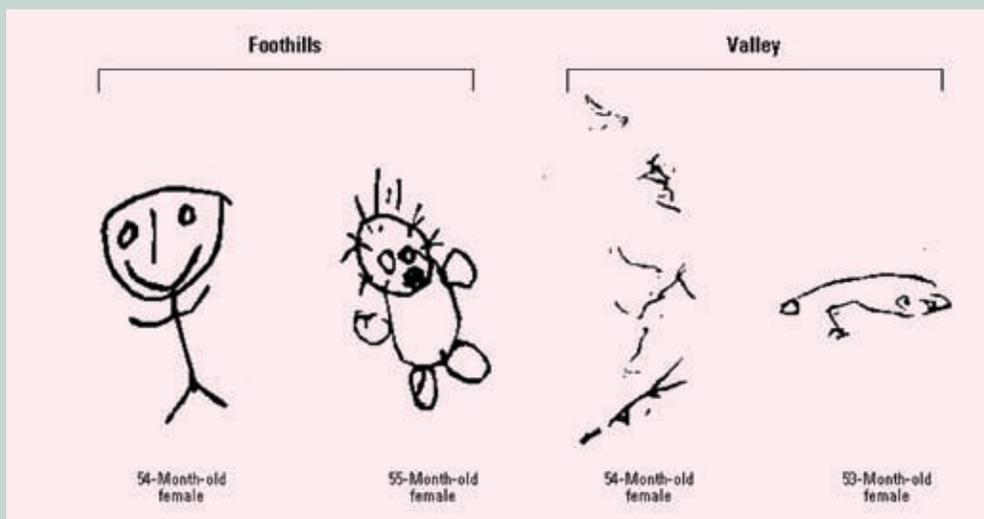


Figure 1.¹⁷ Representative drawings of a person by four-year-old Yaqui children from the foothills where natural agricultural methods are used, and the valley where modern chemical-based pesticides are used.

- 11 Kessenich, M. (2003) Developmental Outcomes of Premature, Low Birth Weight, and Medically Fragile Infants. *Newborn and Infant Nursing Reviews*. September 2003. 3(3):80-87 www.nainr.com/article/PIIS1527336903000333/abstract
- 12 Environmental Protection Agency (EPA). (2000) America's Children and the Environment. A first view of available measures. EPA 240-R-00-006. December 2000. <http://yosemite.epa.gov/oceph/ochpweb.nsf/content/download.htm>
- 13 Ibid.
- 14 Center for Disease Control and Prevention. (2007) Prevalence of the Autism Spectrum Disorders (ASDs) in Multiple Areas of the United States, 2000 and 2002. www.cdc.gov/ncbddd/autism/documents/AutismCommunityReport.pdf
- 15 Guillette, E., et al. (1998) An anthropological approach to the evaluations of preschool children exposed to pesticides in Mexico. *Environmental Health Perspectives*, 1998, 106(6): 347-353. www.ehponline.org/members/1998/106p347-353guillette/guillette-full.html
- 16 Ibid.
- 17 Ibid.

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