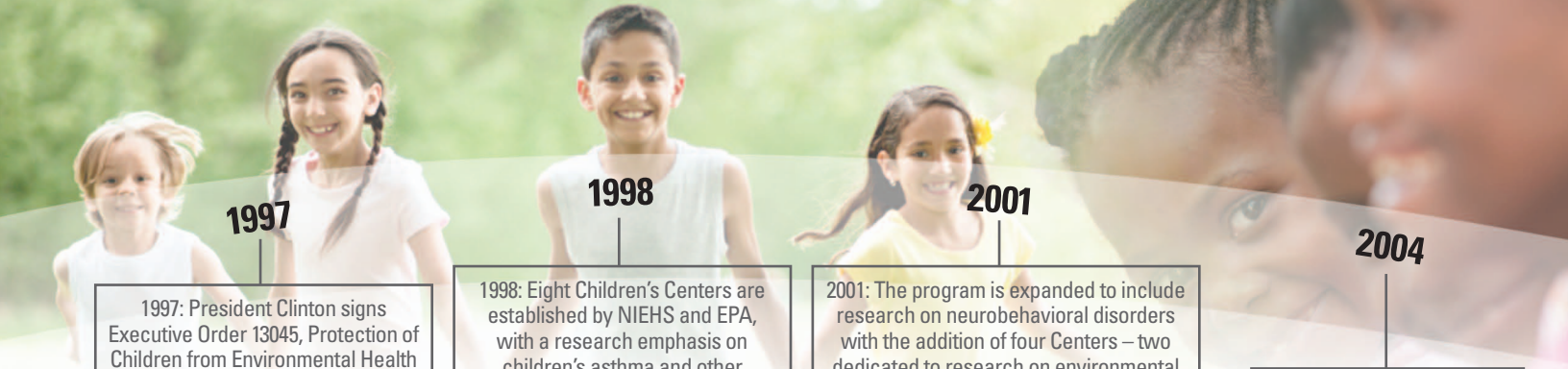
NIEHS/EPA Children's Environmental Health and Disease Prevention Research Centers:

Protecting Children's Health for a Lifetime

National Institute of Environmental Health Sciences
National Institutes of Health
U.S. Department of Health and Human Services

EPA United States Environmental Protection Agency



1997

1997: President Clinton signs Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, which directs federal agencies to identify and assess environmental risks to children's health.

1998

1998: Eight Children's Centers are established by NIEHS and EPA, with a research emphasis on children's asthma and other respiratory diseases, as well as ways to reduce exposure to pesticides for children in agricultural settings.

2001

2001: The program is expanded to include research on neurobehavioral disorders with the addition of four Centers – two dedicated to research on environmental factors potentially related to autism, one on the impact of exposure to mercury and PCBs, and one designed to quantify the impact of low-level environmental toxicants on child development.

2004

2004: Six Centers are awarded a second round of funding and a new Center is added to the program.

The mission of the Children's Centers program is to reduce children's health risks, protect children from environmental threats and promote their health and well-being in the communities where they live, learn and play.

Background

For many reasons, children are likely to be more vulnerable than adults to the effects of environmental contaminants. To better understand the effects of these exposures, the NIEHS/EPA Children's Environmental Health and Disease Prevention Research Centers (Children's Centers) were established to better understand environmental factors affecting children's health and to promote translation of basic research findings into intervention and prevention methods to promote the health of children.

Fourteen Children's Centers are currently funded, 12 of which were funded in 2010, including six five-year Centers and six three-year grants for smaller Formative Centers. The program is designed to foster research collaborations among basic, clinical and behavioral scientists, with participation from local communities.

The Children's Centers program is also part of the NIEHS Partnerships in Environmental Public Health, an umbrella program that brings together scientists, community members, educators, health care providers, public health officials and policy makers in the shared goal of advancing the impact of environmental public health research.

5-Year Grants

These larger grants are awarded to research institutions to assemble teams of multidisciplinary scientists from a range of fields to study complex problems during a five-year period. These Centers are researching questions about children's exposures to a range of pollutants and compounds and their potential effects on development and learning. Environmental factors in diseases such as asthma, immune disorders, autism, and obesity are also being studied. An additional component of these Centers is to administer outreach programs in close collaboration with the local community.

3-Year Grants

Funded for a three-year period, the Formative Centers are exploring new and emerging areas of science in children's environmental health, while pioneering innovative techniques and approaches. Areas of research include health effects of exposure to air pollutants, endotoxins, BPA, phthalates, lead and arsenic as related to birth defects, asthma, endocrine-mediated changes, brain development and behavior.

NIEHS/EPA Children's Centers Program Goals

- Promote and accelerate translation of basic research findings into applied intervention and prevention methods and strategies.
- Enhance communication, innovation and research.
- Promote multidisciplinary interactions among basic scientists, clinicians and behavioral and social scientists.
- Generate data from multiple scientific disciplines to understand the persistent effects of chemicals and other exposures on the fetus and child as they relate to brain and organ system development, growth and development of the child through young adulthood.

2006

2006: Another Center receives an additional award and a new Center is funded.

2007

2007: Based on program evaluations, a workshop, and public input, NIEHS and EPA modify the program to include new research areas with both 5-year Centers and 3-year Formative Centers, to increase flexibility and create a more dynamic network.

2010

2010: The revised Children's Center program funds six 5-year Centers and six 3-year Formative Centers. Research at the Formative Centers includes emerging areas of science in children's health, incorporating innovative approaches.

2011

As of 2011, a total of 14 Children's Centers are supported.

Children's Centers Program Successes: Examples

Since the inception of the Children's Centers program, researchers have laid the scientific foundation for a new way of thinking about children's health and the environment. The list below includes just a few of the many important Children's Centers' research findings that are improving the lives and health of children today.

- Children's Centers' research has found that people differ in their ability to metabolize pesticides. This finding is of particular concern during pregnancy and early childhood, as children do not appear to fully develop the ability to metabolize some pesticides even up to age 7, putting them at greater risk of adverse health effects.

- Research conducted in southern California has focused on the health of children living close to major roadways. Studies have shown that childhood exposure to freeway traffic increases the risk for asthma. Also, mothers living near major roadways during pregnancy may be at higher risk of having a child with autism.

- Prenatal exposure to polycyclic aromatic hydrocarbons (PAHs), a component of combustion, such as vehicle exhaust, can lower a child's IQ, and in one study were found to be related to cognitive delay at age 3.

- Children with autism are more likely than normally developing children to have impairments in mitochondrial activity, which may increase susceptibility to environmental exposures. This finding of dysfunction in mitochondrial energy production could lead to new diagnostic tools for autism and other neurodevelopmental disorders.

- Mothers who reported taking prenatal vitamins three months prior to conception, and who continued taking them at least through the first month of pregnancy, were less likely to have a child with autism.

- Maternal exposure to polybrominated diphenyl ether (PBDE) flame retardants is associated with lower thyroid-stimulating hormone levels during pregnancy, which may have implications for maternal health and fetal development.

- Exposures to environmental chemicals, such as polychlorinated biphenyls (PCBs) and lead, are associated with deficits in many neurobehavioral functions that are also impaired in children with attention deficit hyperactivity disorder (ADHD).

- Children's Centers' research has shown that even very low levels of lead exposure can result in intellectual impairment in children. These studies suggest that there is no discernable threshold for the adverse effects of lead exposure and that many more children than previously estimated are affected.

- A series of lessons learned papers from the collective experience of the Children's Centers in areas including asthma, air pollution, neurodevelopment, research methodologies and community-based participatory research were published in *Environmental Health Perspectives* in 2005 in support of the National Children's Study.

- The Mount Sinai School of Medicine Children's Environmental Health Center, a previously co-funded NIEHS/EPA Center, is one of three institutions in the United States to be selected to participate in the puberty study sponsored by the transdisciplinary Breast Cancer and the Environment Research Program, which is co-funded by NIEHS and the National Cancer Institute. The Center will work with its existing cohort of 7- and 8-year-old girls in East Harlem to shed light on environmental and genetic determinants of puberty.

- Two Children's Centers are part of the Disease Investigation Through Specialized Clinically Oriented Ventures in Environmental Research (DISCOVER) Program, which has the long range goal of developing new clinical and public health applications to improve disease prevention, diagnosis and therapy.

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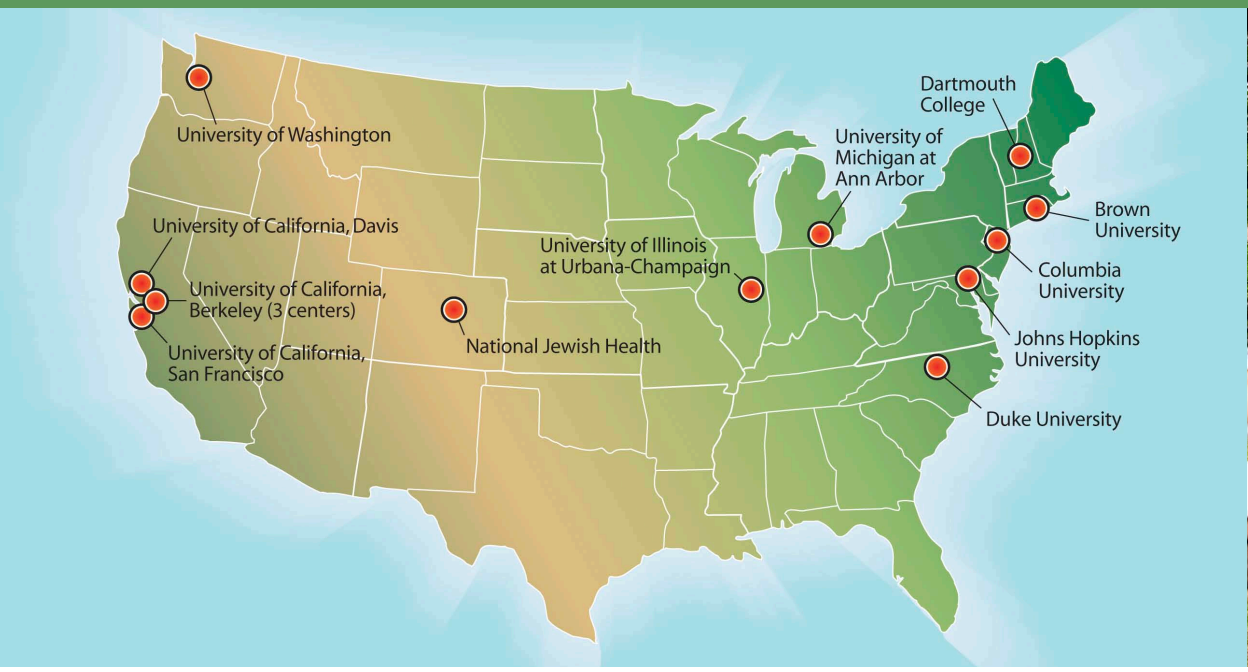

Emerging Areas of Research

Today, the NIEHS/EPA Children's Centers are poised to make more contributions to the scientific understanding of complex interactions between the environment, genetics and other factors and how those interactions affect children's health from preconception to young adulthood. Recently, several new and often interconnected areas of scientific inquiry have emerged, including:

- Obesity: What is the role of environmental factors in the epidemic of obesity among our nation's children?
- Endocrine Disrupting Chemicals: How are widespread exposures to chemicals that interfere with the body's endocrine system affecting children, particularly during vulnerable windows of development?
- Epigenetics: How do modifications to DNA resulting from diet, aging, stress, and/or environmental exposures affect our children or our grandchildren?
- Microbiome: How do helpful microorganisms in the gastrointestinal tract affect children's health? How is the microbiome affected by environmental exposures, including diet, antibiotic use and chemicals?

NIEHS and EPA are committed to protecting the health of children wherever they are – the urban playground, the suburban school or the rural community and are committed to eliminating environmental health disparities and improving the health of all children.

The ultimate goal of the Children's Environmental Health and Disease Prevention Research Centers is to create a healthy and sustainable environment, for every child, at every stage, in every community across the nation.

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