

# Healthy Children, Families, and Communities

## The Children's Environmental Health and Disease Prevention Research Center

Geisel School of Medicine at Dartmouth  
Norris Cotton Cancer Center

*A strategic vision for philanthropic support*



Dartmouth  
GEISEL SCHOOL OF  
MEDICINE

interaction

THE CAMPAIGN FOR DARTMOUTH MEDICINE

## The Challenge

We all want to give our children the best possible start and prepare them for a long, healthy life. At the Children's Environmental Health and Disease Prevention Research Center at Dartmouth, we believe in the power of multi-disciplinary, cutting-edge science to achieve that goal. Our interdisciplinary team of scientists, physicians, and students examines the total impact of genetic, behavioral, dietary, medical, and environmental exposures on children's health and future disease risk and communicates those findings to families, the public, and governments.

### Rising Risks in Children's Health

- 1 in 12 children in the U.S. have asthma (Centers for Disease Control)
- Nearly 1 in 5 children in the U.S. are obese (Centers for Disease Control)
- 1 in 68 8-year-old boys have autism (U.S. National Library of Medicine)
- Leukemia rates in children have risen 30% since 1975 (National Cancer Institute)

## Our Vision

**We will lead the nation in defining how to protect children's health to prevent disease in current and future generations, while providing world-class research opportunities for Dartmouth students at all levels.** By identifying and mitigating risk factors in pregnancy and early childhood, we will catalyze a reduction in the most common chronic diseases affecting children and adults, including cancer, autism, diabetes, obesity, cardiovascular diseases, infections, asthma, and food allergies. By preventing these conditions and prolonging health, we will also decrease the need for treatments that could have undesirable side effects or be detrimental to long-term health and wellness.

## Early Success

Less than 10 years old, the Center has already made impactful contributions to children's health—revealing the effects of environmental contaminants on premature birth, respiratory infections, infants' developing immune systems, and the beneficial and harmful microorganisms that inhabit the gut and lungs. Such discoveries empower individuals, families, and communities to make healthier choices and advocate for better public policies.

The Center's strength lies in its students and faculty, drawn from diverse disciplines—including epidemiology, public health, pediatrics, neonatology, neurodevelopment, ecology, nutrition, bioinformatics, and trace element analysis—and in its scientific resources. It is home to the largest longitudinal study of pregnancy and infant-child health of its kind in the U.S., and Dartmouth students play a pivotal role in maintaining that study. Researchers across Dartmouth and worldwide also use the Center's world-class biorepository and data center. For example, the Center is leading a five-year, multi-million-dollar federal grant in collaboration

with Stanford University and Harvard Medical School, investigating the relationships between lifestyle, medical interventions, environmental exposures, epigenetics, growth, immune function, and neurodevelopment. Key areas of focus include the microbiome of mothers and infants and the sources and effect of toxicants on child development.

### **Opportunity for Impact**

Large federal research awards supported the creation of a now vibrant Center. However, philanthropy is crucial to sustain the Center's work and to extend its impact and ability to respond quickly to scientific breakthroughs and emerging threats to the health of fetuses, infants, and young children. Your support can help protect current and future generations by accelerating the pace of discovery and the translation of scientific findings into public policy and actionable information for families, communities, and society at large.

### **Outcomes**

With philanthropic support, the Children's Environmental Health and Disease Prevention Research Center will achieve the following:

- New opportunities and early interventions to optimize health and minimize lifetime risk of cancer, autism, diabetes, obesity, cardiovascular diseases, asthma, and food allergies.
- Identification of emerging environmental exposures in order to inform families, communities, and policymakers on ways to promote safe drinking water, food, air, and consumer products.
- Scientific findings that empower families, physicians, and communities to foster healthy neurodevelopment in children—thereby enhancing children's IQ, social skills, and motor development.
- Advanced scientific approaches such as novel sensor and molecular technologies that provide individuals, researchers, and populations with up-to-date information about potentially threatening exposures and how to mitigate disease risk early on or prevent it altogether.

### **Research & Impact: How the Center Makes a Difference in the World**

In just 10 years, the Children's Environmental Health and Disease Prevention Research Center has made several important discoveries that have influenced public policy and advanced the science of disease prevention.

#### **Environmental Contaminants and Food Safety**

The Center's findings on the detrimental effects of dietary arsenic on infants led to the following:

- *Consumer Reports* tested infant and baby foods for arsenic levels and published results.
- The FDA proposed new safety standards.
- Pediatricians changed their infant first-food recommendations.

## **The Developing Microbiome**

The Center published the largest studies to date demonstrating that:

- Babies born by cesarean or who are formula-fed have distinct patterns and populations of microorganisms in their gut—shedding light on the link between cesarean delivery and formula feeding and an increased risk of obesity, asthma, diabetes, and other diseases.
- Environmental contaminants may perturb the development of a healthy microbiome—the microorganisms that inhabit the body.

## **Prenatal Exposures and Epigenetics**

Center researchers study the molecular alterations to the placenta associated with various exposures and the adverse outcomes that follow. This allows for early identification of at-risk children and targeted disease-prevention approaches.

- Center researchers discovered that environmentally induced changes to genes critical to the functioning of the placenta may impair fetal development and lower birth weight and that certain nutritional factors may prevent these changes.

## **Community Impact**

The Center's Community Outreach and Translation Core (COTC) brings its research to physicians, communities, and families.

- The Center is assisting primary care practices regionally with water testing to protect children and families from—and to raise awareness about—the harms of arsenic and other common environmental contaminants.
- Center researchers found that by simply providing well-water test results to families, those families reduced their intake of contaminated water for drinking, cooking, and use in baby formula by more than half.

## **Center Research in the News**

- “Should You Be Worried About the Arsenic in Your Baby Food?”—*New York Times*, 2017
- “Could Baby's First Bacteria Take Root Before Birth?”—*Nature*, 2018
- “Kids' Genes May Influence Whether Food Advertising Makes Them Overeat”—*Huffington Post*, 2016
- “Delivery and Feeding Modes as Associated with Infant Intestinal Microbiome”—*NPR's Science Friday*, 2016
- “Lactation and Maternal Chemical Exposures”—*Environmental Health Perspectives*, 2017

## **Gift Opportunities**

### **Named Professorship | \$4,000,000 (endowment)**

Attracting and retaining top leaders in teaching and scholarship is critical to sustaining excellence and building momentum within the Center and to its ability to address immediate and long-term impacts on child health. An endowed professorship will enable the Center to strengthen its impact and extend its influence nationally and globally. An endowed professorship will provide Center faculty with the resources to act upon bold ideas, to offer in-depth mentorship of students and junior faculty, and to advance discoveries by engaging diverse partners.

### **Research Resources Fund | \$4,000,000 (endowment)**

The Center is home to the largest longitudinal study of pregnancy and infant-child health of its kind in the U.S.—in terms of its breadth, depth, and wealth of contemporary specimens. This world-class resource allows researchers to study early life exposures and chronic and infectious disease in children. The Center enrolls women early in their pregnancies and follows them and their children for years to identify the pivotal life experiences that shape health, including factors such as toxic chemicals, stress, diet, physical activity, and medical treatments. The Center's state-of-the-art biorepository contains hundreds of thousands of specimens collected at critical developmental windows—during pregnancy, at birth, in infancy, and in childhood. The samples, which are available to researchers, allow for rapid, cutting-edge analyses to identify the life experiences and early biologic responses associated with chronic disease and disability in children.

This endowment will provide essential support for keeping pace with technological and scientific advances; ensuring data integrity; maintaining specialized equipment; and supporting the skilled personnel who manage the biorepository and coordinate field teams. With such support, we can continue to make this invaluable resource available to Dartmouth researchers and global collaborators, propelling biomedical discovery into healthier futures for children.

### **Innovation Fund | \$1,000,000 (current use and endowment)**

We encounter myriad new products and chemicals every day—in our homes and workplaces and, increasingly, as a result of large-scale natural disasters, such as hurricanes and fires. Fetuses, infants, and children are the most vulnerable, since exposures to some toxic chemicals in early development can lead to lifelong consequences. It's essential for our Center's researchers to have access to seed funding, which provides the flexibility and resources to quickly identify potential adverse exposures at the earliest possible stage. Results from such work can then be leveraged to obtain the larger federal grants needed for large-scale studies. Unlike traditional funding mechanisms, philanthropy enables researchers to respond quickly—both to a rapidly changing world and to new discoveries that will benefit children everywhere.

**Policy and Outreach Fund | \$500,000 (current use and endowment)**

To have the greatest positive impact, we must rapidly share discoveries with the public and provide policymakers and industries with the knowledge they need to take action to protect children's health. This fund will support a wide range of activities to inform policy makers, the public, clinicians, and other key audiences and to inform legislation and public policy that will optimize child and lifelong health.

**Named Visiting Lectureship | \$500,000 (endowment)**

An endowed health lectureship will enable the Center to extend its influence nationally and globally by bringing experts from diverse disciplines to Dartmouth to share their knowledge, learn more about the resources and research at Dartmouth, and spark new collaborations. Dartmouth students will also benefit from opportunities to interact with visiting researchers and policy experts.

## Appendix I: A Brief History of the Children's Environmental Health and Disease Prevention Research Center

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- 2009** Dartmouth launches the **New Hampshire Birth Cohort Study** through a five-year grant from the **National Institute of Environmental Health Sciences**. Engaging over 50 obstetricians, the study investigates the role of environmental factors on pregnancy and newborn outcomes.
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- 2010** The **Children's Environmental Health and Disease Prevention Research Center**, led by Margaret Karagas, PhD, is created through a formative grant. It is later renewed as a full center grant from the U.S. EPA and National Institute of Environmental Health Sciences. The Center begins to track children's neurodevelopment and risk of obesity, infection, food allergies, and asthma, and fill critical gaps in our understanding of infants' exposures early in life.
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- 2012** Margaret Karagas, PhD, receives a 15-year Center of Biomedical Research Excellence award from the National Institute of General Medical Sciences. **A state-of-the art Biorepository and Biospecimen Resource Facility is created at Dartmouth** (which has since processed and archived more than 30,000 biologic samples). This facility accelerates the pace of research, making scientific discovery easier and faster, which ultimately benefits infants and children. The grant leads to the recruitment of new faculty and the formation of a new Department of Epidemiology at the Geisel School of Medicine.
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- 2016** The Center receives a National Institutes of Health award to conduct a long-term study of >50,000 children across the nation (**Environmental Influences of Child Health Outcomes**). The study follows children beginning *in utero* up to young adulthood.
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- 2018** Dartmouth extends its innovative Quantitative Biomedical Sciences Training Program—the first of its kind in the nation—to add a **Master of Science degree with a track in Epidemiology**, including a 4+1 program for Dartmouth undergraduates.
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