Asking Hard Questions About Herbicides and Public Health

Is rising herbicide use in the Midwest triggering more frequent, or more serious reproductive problems and birth defects?

Are prenatal exposures to herbicides damaging DNA and disrupting children’s development?

The Heartland Study is a hospital-based research project designed to find answers.

The Heartland Study will deliver the new and rigorous science needed to drive reform on how herbicides are regulated and the way weeds are managed.

This cutting-edge research will require a large team of doctors, clinicians, and nurses, and thousands of families willing to help.

Help Us Grow -- www.heartlandstudy.org/support-the-study
We will work with partner hospitals in the Midwest to enroll at least 2,000 pregnant women and track the developmental and health of their babies through at least age three.

"Pesticides are not merely a regulatory issue or an environmental problem...in fact these potent chemicals can have powerful effects on human health that need to be intelligently confronted." ---Dr. Phil Landrigan, Science Advisory Board Chair

In "Pesticides and Human Reproduction," JAMA Internal Medicine, 2017

**WHY WORRY?**

- Weeds resistant to most herbicides have driven a doubling in herbicide use on corn and soybeans in the Midwest since 2003. And, 2,4-D and dicamba -- two older high-risk herbicides -- account for much of the increase. Further increases are inevitable.
- Both previous epidemiological studies and our preliminary urinary biomonitoring data suggest that prenatal herbicide exposures can cause adverse reproductive and birth outcomes.
- The two most widely used herbicides in the Midwest -- atrazine and glyphosate -- may be triggering heritable epigenetic changes that impair development or increase the risk of adult-onset disease.
- Risk assessment for pesticides in the U.S., including herbicides, has been undermined on many fronts. Heartland Study science will be a powerful factor for reconstruction of regulation that protects public health.

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**The 13-State Heartland Study Project Area**

The Heartland Study will determine whether rising herbicide exposures are impairing the ability of women to give birth to healthy babies.

Current herbicide-dependent systems are failing across the Midwest, but viable options are thriving on many farms. This research is vital in order to guide Midwestern farmers toward these safer and more sustainable ways to manage weeds.

**WHAT WE WILL DO**

- WE WILL work with partner hospitals in the Midwest to enroll at least 2,000 pregnant women and track the developmental and health of their babies through at least age three.
- WE WILL collect 10,000 urine samples from pregnant women, babies, and young children to quantify herbicide exposure levels and trends.
- WE WILL determine whether women more heavily exposed to herbicides during pregnancy were more, less, or equally likely to give birth to underweight or preterm babies, or infants with birth defects or developmental problems.
- WE WILL conduct the world’s first-ever study of epigenetic changes from prenatal herbicide exposure in a human population. This vital research will reveal whether herbicide exposure can cause heritable changes that impact future generations.
- WE WILL actively disseminate the science and results to farmers, media, policy makers, and parents to inspire and inform systemic change in our agricultural systems.
OUR SCIENTISTS

The Heartland Study
Science Advisory Board

Dr. Phil Landrigan, Chair
Boston College
Director of the Program in Global Public Health and the Common Good, and Director of the Global Observatory on Pollution and Health

Dr. Melissa Perry
George Washington University; Chair, Dept. of Environmental and Occupational Health

Dr. Paul Winchester
Franciscan Health Indianapolis
Medical Director of the Neonatal Intensive Care Unit

Science Advisory Board Members:

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- Charles Benbrook, PhD; Heartland Study Project Coordinator
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- Dr. Richard Jackson; Professor Emeritus at the Fielding School of Public Health at UC Los Angeles
- Dr. Bruce Lanphear; Professor of Health Sciences at Simon Fraser University, Clinician Scientist at the BC Children's Hospital Research Institute
- Dr. Routt Reigart; Professor Emeritus and former Director of the Division of General Pediatrics for the Medical University of South Carolina
- Plus Dr. Perry and Dr. Winchester, our Principal Investigators

OUR PARTNERS

Franciscan HEALTH FOUNDATION

LEARN MORE

Visit www.heartlandstudy.org for the full organization chart, details on research objectives and study design, and to learn about what is new and different -- and so important -- about the Heartland Study.

HELP US GROW!

Make a tax-deductible donation via our fiscal sponsor the Franciscan Health Foundation at www.heartlandstudy.org/support-the-study

The Heartland Study
Supporting Children's Health in the Heartland - and Beyond

www.heartlandstudy.org