



NIEHS Superfund Research Program (SRP) & Small Business Innovation Grants

Heather Henry, Ph.D.

SRP Health Scientist Administrator

October 28, 2024

National Institutes of Health (U.S. Dept. of Health & Human Services)

National Institutes of Health (NIH)



Bethesda, MD

National Institute of Environmental Health Sciences (NIEHS) Superfund Research Program (SRP)



Research Triangle Park, NC

SRP Mandates Drive the SRP Program

Integrating Health and Environmental/Engineering Sciences

Health
Effects

- Advanced techniques to detect, assess, and evaluate the human health effects of hazardous substances

Assessing
Risk

- Methods to assess the risks posed by hazardous substances on human health

Detection

- Methods and technologies to detect hazardous substances in the environment

Remediation

- Basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances



Multi-Project Centers (P42)

Designed to integrate basic and application-oriented research across disciplines:

- Biomedical and Environmental Science and Engineering research.
- Community Engagement, Research Translation, Data Science, and Training.

Occupational Training (R25)

Emerging issues in EHS training.

Time-Sensitive Grants (R21)

Research on unpredictable events with a limited window to collect samples or data.

Conference Grants (R13)

Funding for conferences related to SRP mandates.

Individual Research Projects (R01)

Designed to complement the multi-project research program by tackling specific issues of emerging concern for Superfund.

Small Business Research Grants (SBIR) (R43-44)

Foster commercializing technologies relevant to hazardous substance clean-up and monitoring.

ViCTER (R01)

Virtual Consortium for Translational Transdisciplinary Environmental Research supports cross-disciplinary research teams.

What SRP Grant Recipients Study

What people are exposed to
Organic and inorganic contaminants, **metals**, PFAS, emerging contaminants, etc.

How to reduce exposures
Remove and degrade contaminants

How to prevent disease
Interventions, nutrition, therapies

How people are exposed
Air, water, soil, food

Effects on health
Inflammation, cardiovascular disease, metabolic outcomes, neurological outcomes, cancer

Other factors
Microbiome, stress, built environment, complex exposures



SRP Research Addresses Lead & Other Metals from Many Angles



Columbia: Discovered [epigenetic biomarkers](#) in blood can serve as indicators of cumulative lead exposure and heart disease risk; identified potential [risk factors](#) for metal exposure.



U Arizona: Host “[soilSHOPS](#)” to provide an opportunity for community members to bring in soil samples for lead and arsenic testing; learn how to reduce metal exposures to protect their health.



Texas A&M: Worked with Houston residents to [address their concerns](#) about lead in drinking water by conducting surveys and testing water samples for the toxic metal.



Harvard: Use [portable x-ray fluorescence](#) to assess exposure to lead and other metals at the population level.



UNC: Created the [Toxic Metal Environmental Justice Index](#) to identify areas in NC where low-income and minority individuals are at risk of exposure to lead and other metals via private well contamination.

Lead (Pb) Resources Developed by SRP Grant Recipients

UNDERSTANDING BIOAVAILABILITY of ARSENIC and LEAD in Soils at Superfund Sites

THE PROBLEM
Soil at a Superfund site is contaminated with arsenic and/or lead.

Arsenic and lead are elements naturally found in soil at levels that vary depending on the region. Natural processes such as weathering, or human processes such as mining, agriculture or manufacturing, may result in exposure to levels of arsenic or lead that are unsafe for human health.

Bioavailability refers to how much of a contaminant is absorbed into the body following contact (exposure) with contaminated soil. Ingestion (swallowing) of soil is the most common way a contaminant enters the body.

HOW CAN THIS AFFECT ME AND MY FAMILY?
Exposure to contaminated soil could cause health problems. Children may be more likely to develop health problems since they have smaller bodies than adults and are still growing, and engage in behaviors that may make them more susceptible to harm from contaminants.

Arsenic and lead present in soil must be bioavailable in order to pose a risk to your health.

Contaminated soil often contains different forms of arsenic or lead that have different bioavailability.

Bioavailable forms of arsenic and lead will be absorbed into the body and processed or stored following ingestion of contaminated soil.

Bioavailable arsenic or lead (light circle ○)

Non-bioavailable arsenic or lead (dark circle ●)

A contaminant that is not bioavailable is not absorbed, and leaves the body.

BIOAVAILABILITY FACT SHEET

Factsheet by UNC

LEAD in the garden

Summary for Gardeners

- Garden-related lead exposure is generally low and there are simple steps you can take to limit exposure.
- Unless you have unusually high levels of lead in your soil, most of your lead exposure likely comes from non-garden sources like lead paint and drinking water.
- No amount of lead exposure is considered safe, but it is important to remember that there are many health benefits to home and community gardening.

Sources of lead exposure

Lead exposure can occur in the garden, but non-garden sources including lead paint and drinking water are likely bigger concerns. Still, urban soils in particular may contain hotspots of lead contamination.

Once lead is in the environment, we can be exposed in a few different ways (see exposure section to the right). Below are some of the main sources that release lead into the environment.

- housing** Houses built before 1978, especially those built before 1960, may contain lead-based paint. When paint weathers, particles of lead end up in house dust. Outdoor paint and home demolition can contaminate nearby soils.
- drinking water** Some metal pipes may contain lead solder. Under certain conditions, this lead can enter drinking water. Older cities with aging infrastructure are more likely to have issues with lead in drinking water.
- traffic** Past car emissions from busy roads may mean higher lead levels in undisturbed soil nearby. In 1976, leaded-gasoline began to be phased out.
- agriculture** Up until the 1960s, some pesticides used in orchards, vineyards, and gardens contained lead.

Exposure to lead in the garden

How might I be exposed? Gardeners and children can be exposed to lead by eating contaminated soil particles or produce, and by handling or breathing in contaminated soil particles.

Are my garden plants safe to eat? In general, plants do not take up much lead from contaminated soil, so washed produce is probably not a major source of exposure. One study found that herbs tends to have the highest lead levels, followed by root vegetables, leafy greens, and finally fruits.

Should I be worried? Garden-related lead is likely a small portion of a person's overall lead exposure. However, reducing or limiting exposure to lead in the garden is still important, especially for children.

Limit children's exposure

- Small doses matter. Children breathe, eat, and drink more relative to their size than adults
- Their bodies and brains are still developing
- Children spend more time on the ground and often put things (like dirt) into their mouths
- They have more skin surface area than adults, so skin exposure also matters

January 2020 @DukeSuperfund

Duke UNIVERSITY SUPERFUND PROGRAM NIH National Institute of Environmental Health Sciences Superfund Research Program



Safe gardening resources by Duke: fact sheets, videos, tools.

Other Lead (Pb) and Children's Environmental Health Resources

- [NIEHS Centers in Children's Environmental Health Research and Translation](#)
- [NIEHS Lead \(Pb\) website](#)
- [Community Action Plan Templates for Children's Environmental Health](#)
- [UNICEF's Partnership for a Lead-Free Future Launch Event Recap](#)
- [U.S. Department of Housing and Urban Development \(HUD\) resources to remove lead hazards from homes](#)
- [NIEHS Podcast: Protecting Communities From Lead Exposure](#)

