Superfund Research Program

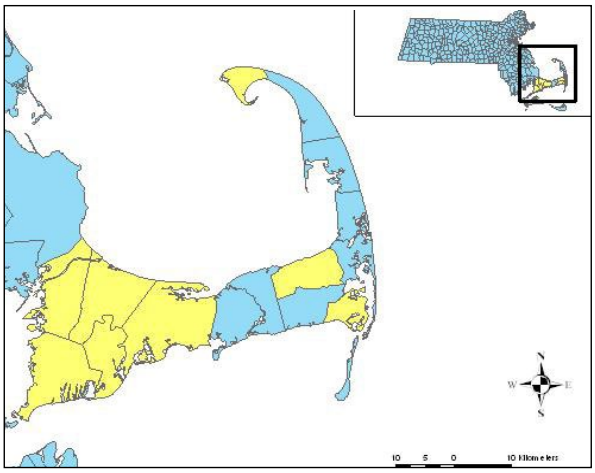
The Superfund Research Program (SRP) supports practical research that creates benefits, such as lower environmental cleanup costs and reduced risk of exposure to hazardous substances, to improve human health. SRP funds colleges, universities, and small businesses, including the Boston University Superfund Research Center (BU SRC), to advance this work across the nation.

Research Highlights

Linking perchloroethylene and health effects

BU SRC researchers, led by Ann Aschengrau, Sc.D., determined that exposure to perchloroethylene (PCE), a commonly used commercial solvent, is linked to a variety of long-term health effects. They studied a group of people from the Cape Cod region of Massachusetts who were exposed from 1968 to 1980 when PCE leached into drinking water from the lining of distribution pipes.

The researchers found links between PCE exposure and an increased risk of breast cancer in women,[1] increased risk for birth defects,[2] and increases in reproductive issues, such as stillbirth, in pregnant women.[3] Additional research revealed that prenatal and early-life exposure to PCE was associated with decreased performance on learning and memory tests,[4] as well as elevated risk of mental illness, including post-traumatic stress disorder and bipolar disorder.[5] These findings continue to provide a sound scientific basis for future risk assessments of PCE and related chemical contaminants.



Eight Cape Cod areas, highlighted in yellow, were in Aschengrau's study. (Figure courtesy of BU SRC)

A new approach to determine cancer risk from chemicals

Researchers at BU SRC, led by Stefano Monti, Ph.D., have shown that computational models of short-term exposure to a chemical can predict long-term cancer risk.[6] The study is a step toward simpler and cheaper tests to screen chemicals.

Current approaches for testing chemicals for cancer risk can cost $2 million to $4 million per chemical to complete. As a result, less than two percent of the approximately 84,000 chemicals in commercial use have gone through standard testing.[6] Work by Monti's group confirms that it is possible to predict the long-term health risks from exposure to a chemical, using computational models. By further developing this model, researchers will be able to better predict what chemicals may cause cancer and understand the biological processes that lead to cancer development.

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BU SRC researchers seek to understand the effects of exposures to hazardous chemicals on reproduction and development in humans and wildlife. They share their research tools and results to help inform decision-making by communities and government agencies, and to better protect human and ecological reproductive health and development.

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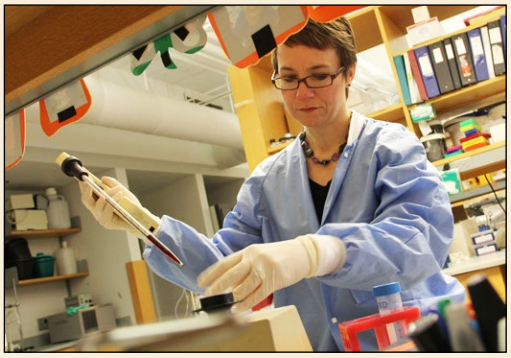
Assessing bone health risks from flame retardant exposure

BU SRC researchers found that a component of a flame retardant, triphenyl phosphate (TPP), may stimulate growth of fat cells in bone marrow. This effect may suppress formation of bone cells and accelerate osteoporosis.[7] Their work suggests that TPP, used in products such as furniture cushions, interacts with a protein that regulates fat cells. Jennifer Schlezinger, Ph.D., BU SRC project leader, noted that TPP is often present in our indoor environment, and the finding that it is biologically active is significant and warrants further investigation. The researchers are continuing to study how environmental toxicants, such as TPP, contribute to obesity and loss of bone health.



Schlezinger is studying how environmental contaminants affect bone health. (Photo courtesy of BU SRC)

Research overview

- Studying risk of birth defects in a population exposed to PCE in drinking water. (Ann Aschengrau, Ph.D., aaschen@bu.edu)
- Developing improved methods for mapping geographic patterns of exposure with health outcomes. (Veronica Vieira, D.Sc., vvieira@uci.edu)
- Determining molecular mechanisms by which complex mixtures of environmental contaminants impair immune system development and accelerate bone aging. (Jennifer Schlezinger, Ph.D., jschlezi@bu.edu)
- Understanding the effects of polychlorinated biphenyls (PCBs) on fish development. (Jared Goldstone, Ph.D., jgoldstone@whoi.edu)
- Unraveling how fish living in waters contaminated with PCBs can thrive. (Mark Hahn, Ph.D., mhahn@whoi.edu)

Sharing results

- BU SRC partners with community advocacy and environmental justice organizations, as well as local boards of health, to educate people on strategies to reduce hazardous substance exposures and prevent adverse health outcomes, and implement training on hazardous material regulations and solid waste reduction resources. (Madeleine Scammell, D.Sc., mls@bu.edu)
- BU SRC offers soil lead testing and educational material to community gardeners in the Boston area, and provides educational activities through the Museum of Science in Boston, and the Collaborative on Health and the Environment. (Wendy Heiger-Bernays, Ph.D., whb@bu.edu)

Other contributions to advance science

- The BU SRC research support facility provides vital access to expertise, research resources, and state-of-the-art instrumentation for its research projects. (Sandor Vajda, Ph.D., vajda@bu.edu)
- The BU SRC integrated, multidisciplinary training experience provides early-career scientists access to teams of diverse professionals and encourages innovation to develop solution-oriented approaches to complex environmental health problems. (Michael McClean, Sc.D., mmcclean@bu.edu)

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For more information on the National Institute of Environmental Health Sciences, visit **www.niehs.nih.gov**.

For more information on the Superfund Research Program, visit **www.niehs.nih.gov/srp**.

For more information on the Boston University Superfund Research Center, visit **www.busrp.org**.

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