

SUPERFUND NEWS

Introduction to the Mount Sinai Superfund Basic Research Program

Dear Reader:

Welcome to the Mount Sinai School of Medicine's Superfund Basic Research Program.

This publication provides information on our research program's latest projects, accomplishments, community outreach efforts, and the history of contamination in our focus area – the Hudson River watershed.

We hope you enjoy it. Thank you for your interest in our program and in the health of the Hudson River.

Sincerely,

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Mount Sinai Superfund Basic
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View of the Hudson River, Westchester County, New York

Hudson River: A Legacy of Beauty and Contamination

In 1946, the General Electric Corp. began leaking polychlorinated biphenyls, or PCBs, directly into the Hudson River as waste from the manufacture of electrical capacitors. The dumping continued unabated until 1976 when the Environmental Protection Agency banned the manufacture of PCBs after evidence showed these chemicals to be hazardous to human health.

Damage had been done. Thirty years of dumping had left its mark, creating the nation's longest Superfund site. It contains an estimated one million pounds of PCBs. Today, indirect leakage of the chemicals continues from now abandoned plants. The

watershed faces other assaults including hundreds of hazardous waste disposal sites, of which 38 in New York and 25 in New Jersey have been placed by EPA on the National Priorities List as Superfund sites.

The toxic legacy persists within a watershed that flows through one of the largest urban areas in the world. The watershed is home to about 12 million people, a third who are members of racial and ethnic minorities. Three million children reside in the Hudson River watershed, and 1.7 million of those children are living in poverty.

In 2002, the EPA announced the decision to dredge PCB contaminated sediment from a 40-mile stretch of the Upper Hudson River. The dredging is scheduled to start in 2006.

VISIT US AT www.mssm.edu/cpm/superfund/community

Goals of the Mount Sinai Superfund Basic Research Program

The Mount Sinai School of Medicine Superfund Basic Research Program works toward understanding everything possible about persistent organochlorines, such as PCBs, in the Hudson River watershed. We use our findings to empower communities to successfully deal with contaminants while we train future scientists from impacted communities, typically urban youth living in poor neighborhoods. Ultimately, we want to create a cleaner and healthier Hudson River. Our diverse projects seek to accomplish the following goals:

- To identify the primary sources of persistent organochlorines.
- To define the environmental fate, transport, and distribution of persistent organochlorines.
- To identify and evaluate associations between these persistent organochlorines and disease.
- To explain biological mechanisms through which persistent organochlorines may cause disease and dysfunction.
- To prevent dysfunction, disease, and environmental degradation that may be caused by persistent organochlorines.

A Chemical Brew

The Mount Sinai School of Medicine Superfund Basic Research Program targets a wide group of industrial chemicals prevalent in the Hudson River watershed. These chemicals can have negative impacts on human health and the surrounding natural world and make up a toxic mix: PCBs, Organochlorines, Dioxins, DDT, Chlordane, Dieldrin, Mercury.

The U.S. Environmental Protection Agency and the Federal Department of Health and Human Services agree that PCBs are a probable human carcinogen. Studies have also suggested that PCBs reduce the body's capacity to fight disease and disrupt its hormonal balance. Children exposed in the womb to PCBs have showed abnormal responses to behavioral tests, including problems with short-term memory and motor skills.

Dioxins and DDT are also considered human carcinogens and dieldrin is considered a probable human carcinogen. Large doses of Dioxins have adverse reproductive and developmental effects and may increase diabetes and heart disease. DDT has been found to affect the nervous and reproductive system of animals. In small amounts, Chlordane has been found to cause nervous system damage in humans. In animals, dieldrin causes liver damage and decreases the ability of the immune system to fight disease. Mercury damages the nervous system and affects brain development of fetuses and young children exposed through breast milk.



The Hudson River PCB Superfund site stretches nearly 200 miles. The forty miles of the Watershed known as the Upper Hudson are the location of the EPA's planned PCB dredging project.

Map Courtesy of EPA: www.epa.gov/hudson/map.htm

RESEARCH PROJECTS

The Mount Sinai School of Medicine Superfund Basic Research Program currently conducts the following four major projects toward the goal of a healthy and clean Hudson River watershed.

Persistent Organochlorines in the Hudson River Watershed

Dr. Richard Bopp is investigating the sources and distribution of organochlorine contaminants such as PCBs in the natural waters of the Hudson watershed. He is analyzing sediment core samples from various sites.

One of the most significant developments of Dr. Bopp's project thus far has been the analysis of pre- and post-9/11 sediment samples from the New York and New Jersey harbor. Innovative collaborations have also developed including sediment analysis of asbestos in Central Park Lake, Manhattan, and historical analysis of alkylphenol ethoxylates levels in Jamaica bay sediments

Regulation of Hormone Activity by Efflux Pumps

Dr. Avrom Caplan is studying the mechanisms of adverse effects of toxins on humans. Specifically, he is targeting polychlorinated biphenyls, DDT, and a variety of pesticides and other organic compounds known to impact the human endocrine system, or hormones. Exposure to these compounds causes adverse effects on the reproductive system of animals, and may affect neurodevelopment in humans. He has found that these toxins affect human cells in very specific ways that can be modified depending on the genetic make up of the individual.

Organochlorine Disruption of the Wnt Gene Pathway in the Female Reproductive Tract

Dr David Sassoon is looking at the effects of organochlorines, such as polychlorinated biphenyls or PCBs, on the female reproductive tract of mice. PCBs are capable of acting as hormone disruptors. Dr. Sassoon has studied how hormone disruptors can disturb the normal development of the female reproductive tract and lead to cancer or other abnormalities.

Exposure Levels of Chlorinated Compounds in Urban Anglers

Dr Kimberly Morland is trying to determine the amount, also called the body burden, of polychlorinated biphenyls, or PCBs, in people who eat fish and shellfish taken from the Hudson River estuary. She is especially interested in understanding degrees of contamination in low income consumers and people of color. The project is also aimed at discovering the association between self-reported consumption of fish and shellfish and levels of exposure.

Preliminary results show that anglers who consume fish caught from the lower Hudson River and adjoining NY-NJ Harbor complex have significantly higher blood levels of mercury than those who do not.

Achievements:

The Mount Sinai Medical Center's Superfund Basic Research Program proudly claims many victories in the ongoing challenge to ensure a clean and healthy Hudson River watershed. Some of our discoveries have lead to new public health initiatives and some have trained the scientists of the future. Through solid research and educational programs, we have:

- Produced the most comprehensive map in existence of PCB contamination and patterns, and heavy metal contamination, in the Hudson River and New York Harbor.
- Shown that those who continue to eat fish caught in the Hudson River watershed have increased levels of PCBs in their bodies.
- Established that there are racial and ethnic disparities in levels of PCBs in people.
- Found that women who were in and near the World Trade Center on September 11 were twice as likely as an unexposed group in northern Manhattan to give birth to babies who were small.
- Taught 158 students, mostly from poor communities, a full environmental health curriculum that included hands-on laboratory experiences at our Mount Sinai labs.
- Completed a detailed study of in situ, reductive dechlorination of PCBs at two sites on the Hudson.
- Discovered an increase in chlordane in the tributaries of the western harbor despite a decades-old ban on the toxin.
- Traced movement of dioxins from the Diamond Alkali Superfund Site in the western harbor up the tidal Hudson.

THE MOUNT SINAI SUPERFUND BASIC RESEARCH PROGRAM OUTREACH CORE

The Outreach Core, directed by Dr. Luz Claudio, seeks to inform and empower stakeholders of the Hudson River watershed to address the problem of persistent chemical contaminants. The Outreach Core translates the results of scientific research into programs that can be useful for communities affected by Hudson River contamination. The Core holds educational workshops, give presentations at community events, and updates residents about scientific findings affecting their communities.

COMMUNITY OUTREACH ACTIVITIES

Towards the goal of informing and empowering neighbors of the Hudson River watershed to address the problem of persistent chemical contaminants, the Mount Sinai Superfund Basic Research Program Outreach Core uses many tools. We implement our communication strategy through schools, the media, the Web site, the newsletter, and through direct community outreach. The following is an overview of some of our effective communications projects.

Community Water Quality Testing

Through ongoing community and government partnerships, the Outreach Core manages community water quality testing and informs communities about combined sewer overflows. Combined sewer overflows occur when untreated wastewater pours directly into the Hudson River watershed during rain events. Together with the New York City Department of Environmental Protection and The River Project, a community-based organization, we developed a field laboratory and provided training and materials to selected students. The students were then empowered to conduct water quality experiments on the Hudson.

Education

Also in collaboration with The River Project, we support a community-based Marine Sciences Internship Program. Students conduct research and direct community outreach through tours, presentations, and seminars. Fifteen high school students per year have completed the internship program during the last three years.

In 2004, we successfully translated the preliminary results of the Urban Angler's Study into an interactive presentation for middle school and high school students in New York City. Together with Mount Sinai investigators, we also held a community seminar teaching members about exposure to persistent chemicals through eating local Hudson River fish.

Direct Community Outreach

We develop informational brochures, factsheets, and presentations on topics relevant to communities affected by the Hudson River. These materials reach Hudson River residents directly to answer questions and to provide updates on study progress.

MOUNT SINAI SUPERFUND BASIC RESEARCH PROGRAM

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