Duke University Superfund Research Center Internship: Summer 2021

The Superfund Research Program (SRP) is a network of grants funded by the National Institute of Environmental Health Sciences (NIEHS) designed to seek solutions to complex health and environmental issues associated with toxic chemicals found at the nation's hazardous waste sites. The Duke University NIEHS-funded Superfund Research Center (SRC) focuses on early, low-dose exposures to toxins and their developmental impacts that are usually only evident during later life stages.

**Project 1: Cholinergic and Monoaminergic Mechanisms of Persistent Neurobehavioral Toxicity.** This project focuses on neurobehavioral function after early developmental exposures of rats and zebrafish to flame retardants, pesticides, and polycyclic aromatic hydrocarbons. A variety of neurobehavioral functions including motor behavior, emotional function, and cognitive function are investigated.

**Project 2: Altering the Balance of Adipogenic and Osteogenic Regulatory Pathways from Early Life Exposure to HPCs and AOPEs.** Project 2 is NOT accepting applicants for Summer 2021.

**Project 3: Persistent Mitochondrial and Epigenetic Effects of Early Life Toxicant Exposure.** Growing evidence suggests that chemicals of interest to Superfund stakeholders can have persistent, toxic effects on mitochondria, and that some individuals may be more sensitive to the effects due to genetic differences. This project aims to test which important Superfund chemicals and chemicals of emerging concern are mitochondrial toxicants; whether effects from exposure are persistent throughout life; whether they exhibit cell-type specific effects; and whether the effects are stronger for individuals from some genetic backgrounds.

**Project 4: Mechanisms and Consequences of Evolved Adaptation to Environmental Pollution.** This project continues the Duke SRC's long-standing research in the Elizabeth River in Virginia. For years, polycyclic aromatic hydrocarbons (PAHs) were discharged into the river from several wood treatment facilities that employed creosote. Duke SRC researchers study a fish species native to the area, the killifish (*Fundulus heteroclitus*) and its response to living in contaminated environments. Their research has found that killifish at contaminated sites exhibit pollution-driven adaptation to high levels of PAHs at these sites. Current research is examining fitness costs associated with this evolved resistance, and with the killifish and zebrafish models, mechanisms of PAH developmental toxicity and later life consequences of embryonic exposures to low levels of PAHs.

**Project 5: Engineering the Physico-Chemical Environment to Enhance the Bioremediation of Developmental Toxicants in Sediment Fungal-Bacterial Biofilms.** Bioremediation is the use of specific microorganisms to remediate contaminated sites. This project investigates bioremediation as an alternative to common remediation techniques that can have negative effects on ecosystems. Such approaches, including excavation or dredging, allow the contaminants to remain in the sediment, which must then be moved to a storage or impoundment location. This project aims to remediate the contaminants on site to limit the long-term impacts of toxic waste.

**Research Translation Core (RTC):** This core uses science communication techniques to share the Center's research results with critical members of the scientific, governmental, and lay community. The RTC works closely with the CEC to support their mission of engaging communities around environmental health. Interns with this core will support research translation projects and activities to communicate research findings to scientists, policy-makers, and interested/affected community stakeholders; they will work on a variety of projects, but typically focus on one project central to their time at Duke. In the past, work has focused on the effectiveness of fish consumption advisories and communicating information about soil contamination to community gardeners. In the coming year, the RTC will begin a communications campaign to share information about environmental health with local communities to reduce exposures and promote environmental health literacy, and the intern will help develop materials and conduct outreach.

**Community Engagement Core (CEC):** This core works with communities across NC affected by chemical environmental contaminants to reduce or prevent exposure. Driven by the CEC's three community-based research projects, the intern will support facilitation of bidirectional communication between communities, researchers, and other interested stakeholders through outreach, education, and participatory research efforts. CEC project topics include working with subsistence fish consumers in southeastern NC to reduce exposure to contaminants in fish, engaging community gardeners to prevent or avoid exposure to soil contaminants, and working with communities near former industrial sites to assess and prevent exposures.
**Analytical Chemistry Core (ACC):** This core fosters the evaluation of contaminant exposure to humans and wildlife and the determination of contaminant distribution in the environment. The core provides routine quantitative and qualitative analysis of organic and metal contaminants on a routine basis to investigators in support of Duke SRC research projects. The ACC also develops novel methods for emerging contaminants of concern in environmental and biological samples on an as-needed basis. Finally, the ACC serves as a consulting and training resource for cutting-edge analytical chemistry needs within the Duke SRC.

**Neurobehavioral Toxicity Core (NBTC):** This core supports the Center’s projects by providing information concerning neurobehavioral consequences of exposure to toxicants, including pesticides, flame retardants, and polycyclic aromatic hydrocarbons. Neurotoxicant impacts are evaluated using in vivo models with rats, zebrafish and killifish. Neurobehavioral functions investigated include sensorimotor function, learning, memory, attention, and emotional response. This core connects the findings of mechanistic studies to functional consequences in living organisms.

Positions are open to individuals currently enrolled as an undergraduate or Master’s student at Duke University or North Carolina Central University. Recent graduates are NOT eligible. All summer interns will be paid a competitive hourly wage and are expected to work full-time for a maximum of 35 hours/week (start/end dates are somewhat flexible between May–August). Summer internships typically last for 10 weeks, but this may vary depending on the student’s availability and the PI’s needs. In addition to working with their project or core, interns are expected to participate in weekly research discussions and lab meetings and to present their research.

**How to Apply:**
The application window opens on February 17, 2021. All applications received by March 3, 2021, will be reviewed and considered. Applications received after March 3, 2021, will only be considered if internship openings in the desired project/core are still available.

To apply, email your cover letter and resume to SuperfundIntern@duke.edu.

The cover letter should describe your educational background, explain your interest in research, and specify your project/core of interest.

Applicants who do not include both required components (cover letter and resume) may be overlooked during the review process.

**Requirements:**
Applicants must be located in North Carolina for the duration of the internship.
Applicants must be a current undergraduate or Master’s student at North Carolina Central University or Duke University.

Questions should be sent to SuperfundIntern@duke.edu. Do NOT directly contact the individual PIs.

Find out more about the Duke University Superfund Research Center at: [https://sites.nicholas.duke.edu/superfund](https://sites.nicholas.duke.edu/superfund)