# Cadmium & Neurodegenerative Disease



# Cadmium exposure linked to cognitive impairment

Exposing mice to cadmium to generate blood cadmium levels similar to those found in blood samples from the general human population resulted in cognitive impairment.

Principal Investigator, Dr. Zhengui Xia, and her trainee, Hao Wang, experimentally exposed mice to relatively low levels of cadmium in their drinking water to mimic blood levels found in the average human population. Humans are exposed to cadmium through smoking, food, cosmetics, batteries, and other industrial sources. Drs. Xia and Wang then tested the behavior of the treated mice and found that cadmium exposure interfered with learning and caused memory loss. This work suggests that exposure to cadmium may increase the risk of developing dementia and neurodegenerative diseases such as Alzheimer's Disease.



Megumi Matsushita (left) and Dr. Hao Wang are trainees of Dr. Zhengui Xia.

### A New and Important Insight

Cadmium's role in neurodegenerative disease is a brand new and important insight. Dr. Zhengui Xia has been actively presenting her work to traditional Alzheimer's researchers who, for the most part, have focused on the role of genes in Alzheimer's and not on the role of environmental exposures. Meanwhile, most work on cadmium has been focused on its role in causing cancer. The next step for the Xia lab, which now includes trainee Megumi Matsushita, is to try to understand how cadmium impairs learning and memory and to find a way to protect people from these effects.

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## Cadmium

Cadmium is a natural metal found in the Earth's crust. All rocks contain some cadmium. Most cadmium used in the United States is extracted during the production of other metals like zinc, lead and copper. Cadmium does not corrode easily and has many uses including in batteries; pigments such as those used in some paints and cosmetics; metal coatings such as auto paint; and plastics. The primary source of cadmium exposure is through smoking cigarettes. Smoking approximately doubles the levels of cadmium in the body compared to not smoking. Elevated cadmium levels can also be found in water sources like the Duwamish River that are near historical and current industries. Aquatic organisms will accumulate cadmium, potentially allowing it to enter the food supply. People who fish in in local waters should be cautious and follow any advisories. People who work in industries that involve heating cadmium should be sure to use personal protective equipment and good industrial hygiene practices. *Information provided by ATSDR* 



### The Xia Lab

The larger focus of the Xia lab is on understanding the signals that regulate the fate of brain cells. These signals determine whether these stem cells in the brain form new cells that turn into neurons or glial cells. In addition to its work on cadmium, the Xia lab also focuses on lead and its role in the gene and environment interactions that contribute to cognitive impairment and Alzheimer's. This work is important, not only because it improves understanding of the effects of contaminants on brain cells, but also because it can contribute to the development of treatments for aging-related diseases for which there currently are no cures.

Graduate student Megumi Matsushita at work in the Xia lab.

### THE UW SUPERFUND RESEARCH PROGRAM

The University of Washington Superfund Research Program is an interdisciplinary program that conducts and communicates research on the impacts of metal neurotoxicity on human and ecological health. Our research focuses on metals that commonly occur at Superfund hazardous waste sites for which there is incomplete understanding of their neurotoxic effects on human and ecological health. The physiological processes we study include adverse effects on cognition, olfaction, and neurobehavioral processes, and are associated with the risk of developing Alzheimer's and dementia, Parkinson's disease and other neurodegenerative diseases.

### **LEARN MORE**

UW Superfund Research Program: deohs.washington.edu/srp/home

Dr. Zhengui Xia: deohs.washington.edu/faculty/xia\_zhengui

### CONNECT

contactLisa Hayward Wattsphone206.685.8244E-mailIhayward@uw.edu

 address
 4225 Roosevelt Way NE, Seattle, WA 98195

 twitter
 twitter.com/UW\_SRP

 linkedin
 linkedin.com/in/uw-deohs