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## Agency for Toxic Substances and Disease Registry's Don't Mess With Mercury Initiative

Michelle Watters, MPH, MD, PhD and Jamie Rayman, MPH

Mercury has long been recognized by the public health community as an environmental and occupational health hazard. In October 2013, the U.S. signed and ratified the international Minamata Convention on Mercury. Once fully ratified, this global treaty will require countries to reduce emissions and releases of mercury from products, processes, and industries to protect human health and the environment (United Nations Environment Programme, 2014). While many public health policy efforts focus on methylmercury exposure from fish or airborne elemental mercury emissions from coal-powered plants, a recent Agency for Toxic Substances and Disease Registry (ATSDR) initiative, Don't Mess With Mercury (DMWM) (Figures 1 and 2), is aimed at preventing exposure from elemental mercury spills.

Elemental mercury is a dense, silvery metal that is liquid at room temperature. When spilled, its high surface tension causes tiny droplets to form. These unique physical characteristics appeal to children and adolescents who have been observed playing with mercury, sharing it with friends, decorating their hair with it, taking it on school buses and into school buildings, and smoking mercury-dipped cigarettes. Mercury can be found in a variety of household items including thermometers, fluorescent light bulbs, and electronic switches. People have kept jars and containers of mercury for refining metals, folk medicine, and some ritualistic practices (Agency for Toxic Substances and Disease Registry [ATSDR], 1999).

Elemental mercury volatilizes at room temperature; the vapors are colorless, odorless, and heavier than air and accumulate in lower areas of a room. Heating mercury or dispersing mercury droplets by vacuuming or sweeping will increase concentrations of airborne mercury. The droplets can settle deep into cracks and crevices making the spill difficult to remediate and providing an ongoing exposure. Inhalation of mercury vapor is the major route of exposure and toxicity; minimal dermal or gastrointestinal absorption occurs. Once inhaled, mercury enters the bloodstream and distributes to all tissues but accumulates primarily in the kidneys and brain. Elemental mercury crosses the blood-brain and placental barriers (ATSDR, 1999).

The human body has no known physiologic requirement for mercury. The nervous system and renal system are sensitive targets for both acute and chronic exposures to mercury vapors. Exposures may result in tremor, personality changes, irritability, memory loss,

insomnia, mood swings, weakness, and sensory-motor peripheral neuropathy. Kidney effects range from transient proteinuria to acute tubular necrosis. High concentrations of vapor received acutely can cause cough, dyspnea, and pneumonitis. Dermal manifestations of mercury vapor exposure may include an erythematous, pruritic rash or acrodynia (a rare, nonallergic hypersensitivity reaction seen in some children). In general, children are more sensitive to health effects from mercury than adults (ATSDR, 1999).

Unfortunately many people, especially children, are not aware of the dangers of mercury exposure, and mercury spills are common throughout the country. In 2008, Congress directed ATSDR to characterize elemental mercury exposures to children across the U.S. The report, “Children’s Exposure to Elemental Mercury,” summarized numerous mercury spill exposures and other sources of children’s exposure to mercury (ATSDR, 2009). While no comprehensive surveillance system exists for elemental mercury spills, numerous sources were used to document hundreds of spills ranging in size from broken thermometers reported to poison control centers (1,825 calls in 2012) to mercury spills of one pound or more (two tablespoons by volume) that must be reported to the U.S. Coast Guard’s National Response Center (at least 50 school-related spills documented in a six-year period) (ATSDR, 2009; Mowry, Spyker, Cantilena, Bailey, & Ford, 2013).

Consequences of mercury spills range from minor inconveniences to major, potentially harmful exposures that are expensive to remediate. Cleanup of even relatively small spills that had initially been improperly managed have cost thousands of dollars and resulted in days to months of unplanned school closures. In 2003, a large spill at a Washington, DC, area high school resulted in school closure for 35 days and a remediation cost of about \$1.5 million (U.S. Environmental Protection Agency, 2013). In this incident, a student took mercury from a science laboratory and distributed it to other students. In 2013, two children required chelation therapy when they developed symptoms consistent with mercury exposure and elevated blood mercury levels. They had obtained mercury from a neighbor’s shed and spilled it at home and on the school bus. Four other family members also had blood mercury levels exceeding the human health risk threshold of 50 µg/L (ATSDR, 1999; Centers for Disease Control and Prevention, 2014).

ATSDR started the DMWM initiative after a U.S. Environmental Protection Agency (U.S. EPA) Region 9 request in 2008 for health education outreach. The region’s emergency response workers had responded to multiple mercury spills caused by young teens and preteens handling mercury found in homes, garages, schools, or abandoned buildings. ATSDR created a 30-second DMWM public service announcement in English and Spanish to increase awareness of mercury and encourage behavioral change among middle school children. The public service announcement was posted on a joint U.S. EPA-ATSDR Web site. ATSDR recognized, however, that schools needed additional educational material, as well as outreach to administrators, teachers, and staff, to further reduce the number of spills and exposures and improve the management of spills that do occur.

ATSDR launched an expanded DMWM Web site ([www.atsdr.cdc.gov/dontmesswithmercury](http://www.atsdr.cdc.gov/dontmesswithmercury)) in late 2013. The site’s goals are to prevent mercury spills from happening and to minimize harm if spills do occur. For the primary prevention goal, the site

provides instructional material on eliminating mercury in schools, finding alternative products for use in school science classes and facilities, and creating a school mercury policy. Interactive educational materials for students include a web-based video game and an interactive graphic of the effects of mercury on the human body. The DMWM Web site also provides step-by-step instructions on proper spill cleanup and disposal, including how to create a spill kit for small spills. Supporting materials include speaking points for communicating with parents and the media about exposure concerns and fact sheets for health providers for counseling patients. While the materials are targeted to the education system, much of the information is applicable for other venues such as homes, clinics, and offices.

ATSDR is not alone in the effort to eliminate mercury spills. Many state health departments, U.S. EPA, and other nonprofit organizations have created educational materials on preventing mercury spills. These initiatives will empower schools with knowledge of spill response plans and educational and emergency contacts. Ultimately, the reduction in the number and the extent of mercury spill incidents in schools will reflect a successful public health outreach. With education, this health hazard can be relegated to a historical footnote.

If you see mercury, don't mess with it. Mercury is anything but cool.

## Biographies



Michelle Watters, MPH, MD, PhD



Jamie Rayman, MPH

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Editor's Note: As part of our continuing effort to highlight innovative approaches to improving the health and environment of communities, the *Journal* is pleased to publish a bimonthly column from the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). The ATSDR, based in Atlanta, Georgia, is a federal public health agency of the U.S. Department of Health and Human Services and shares a common office of the Director with the National Center for Environmental Health at the Centers for Disease Control and Prevention (CDC). ATSDR serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances.

The purpose of this column is to inform readers of ATSDR's activities and initiatives to better understand the relationship between exposure to hazardous substances in the environment and their impact on human health and how to protect public health. We believe that the column will provide a valuable resource to our readership by helping to make known the considerable resources and expertise that ATSDR has available to assist communities, states, and others to assure good environmental health practice for all is served.

The findings and conclusions in this article are those of the author(s) and do not necessarily represent the views of CDC/ATSDR.

Michelle Watters is a medical officer for ATSDR's Division of Community Health Investigations. Dr. Watters provides medical expertise in public health issues related to exposure to biological, chemical, and radiological agents for the regional offices, state and local public health and environmental agencies, and community members. Jamie Rayman is a health educator for ATSDR's Division of Community Health Investigations in the Region 9 office (San Francisco). Ms. Rayman develops health education and communication materials for community members affected by hazardous waste.

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**FIGURE 1.**  
Agency for Toxic Substances and Disease Registry's Don't Mess With Mercury Initiative

don't mess with  
**MERCURY**

Take action to protect your home and school from mercury spills.  
Visit the website where you will find:

- Mercury video game
- Don't Mess With Mercury video
- Material on mercury spill prevention
- More info about mercury

For more information, visit:  
[www.atsdr.cdc.gov/dontmesswithmercury/](http://www.atsdr.cdc.gov/dontmesswithmercury/)  
or contact ATSDR at 1-800-CDC-INFO.



**U.S. Department of Health and Human Services**  
Agency for Toxic Substances and Disease Registry



mercury beads under floor tile



professional cleaning up mercury beads

CS244745

**FIGURE 2.**  
Agency for Toxic Substances and Disease Registry's Don't Mess With Mercury Initiative