



# Mercury Exposure and You

## What is mercury (Hg)?

Mercury occurs naturally in the environment and is also released into the environment through human activity. Mercury occurs in elemental, inorganic, or organic forms. Elemental mercury is a silvery, odorless liquid that evaporates slowly at room temperature, becoming a vapor. Inorganic mercury is mercury combined with chemical elements such as chlorine, sulfur or oxygen. Organic mercury is mercury combined with carbon-containing compounds. A common form of organic mercury is methylmercury which is produced by microorganisms exposed to mercury in water and soil. This methylmercury accumulates in certain fish and other seafood.

## What is mercury used for?

Use of mercury in commercial products and manufacturing has decreased in the U.S. largely in response to legislation prohibiting or limiting its uses. However, mercury may still be present in a wide range of products, especially older items in use or storage, and in products imported from outside the U.S.

- Elemental mercury is used in electrical equipment and switches, measuring and control instruments (e.g., thermometers, blood pressure gauges, pressure gauges, barometers, thermostats), electric lighting (e.g., neon lights, fluorescent lamps, high intensity auto headlights, and computer screens), and in silver amalgam dental fillings. Elemental mercury is used in rituals by some cultures.
- Organic mercury compounds have been used as preservatives in some vaccines (e.g., thimerosal) and cosmetics. Since 2001 all children's vaccines and vaccines routinely administered to adults, except for some flu vaccines, in the United States have contained no thimerosal or only trace amounts of thimerosal (see <http://www.fda.gov/BiologicsBloodVaccines/Vaccines/QuestionsaboutVaccines/default.htm>). Additionally, New York State Public Health Law prohibits administration of vaccines with more than a trace amount of thimerosal to women who are pregnant and children less than three years of age, with certain exceptions (see [http://www.health.ny.gov/regulations/public\\_health\\_law/section/2112/information\\_for\\_physicians/](http://www.health.ny.gov/regulations/public_health_law/section/2112/information_for_physicians/)). Merbromin (mercurochrome) and merthiolate are topical antiseptics containing organic mercury that are now prohibited in the U.S., although they are readily available in other countries.
- Inorganic mercury compounds have been used in some creams and soaps advertised for skin-lightening or acne (see <http://www1.nyc.gov/site/doh/health/health-topics/mercury-in-soaps-and-creams.page> and <https://www.fda.gov/forconsumers/consumerupdates/ucm294849.htm>). Mercuric oxide has been used in the manufacture of some batteries, but its use is now limited to small amounts in some button batteries.

- Both inorganic and organic mercury compounds may be present as pigments or preservatives in some art materials and museum artifacts. Art materials labeled “conforms with ASTM D-4236” do not contain mercury (see <http://www.cpsc.gov/en/Business--Manufacturing/Business-Education/Business-Guidance/Art-Materials/>).

### **How can I be exposed to mercury?**

Mercury may be present in occupational and non-occupational settings. Occupational mercury exposures may occur among employees of industries where mercury is used or released, and also among families of employees who may unintentionally bring mercury home. Non-occupational mercury exposures may occur from contact with mercury, such as mercury released to the environment from industrial or commercial activities; from accidental spills; from contact with products containing mercury; or from the use of mercury in religious or cultural practices.

Exposure to elemental mercury most often occurs from breathing air containing elemental mercury vapor. This occurs in some occupations, when storage containers or devices containing elemental mercury, such as thermostats or thermometers, break, or when industrial mercury wastes are spilled or improperly disposed of and release mercury droplets and/or vapor into the air. Low level exposures to elemental mercury also comes from amalgam dental fillings. Widespread national efforts to reduce mercury exposures in recent years have reduced the most common potential sources of elemental mercury exposure to those summarized in the table “**Current Sources of Elemental Mercury**”.

## Current Sources of Elemental Mercury

Source	Comments
<b>Occupational Sources</b>	
Mercury cell chlor-alkali plants	Mercury used as an electrolyte to separate chlorine from caustic soda at some chlor-alkali plants in the U.S. can be released in and from chlor-alkali plants.
Mining	Mercury can be released during gold mining and processing; mercury has not been mined in the U.S. since 1992.
Dental offices, clinics, and laboratories	Preparation, use, and disposal of dental amalgam may result in mercury releases and possible exposures.
<b>Non-Occupational Sources</b>	
Air emissions	Mercury is released to air from coal-fired electrical plants, oil and gas combustion, waste combustion, and incineration. Mercury released to air can eventually enter waterways, be converted to methylmercury, and be taken up by fish.
Mercury-containing instruments and lamps	Fluorescent lamps, high Intensity discharge lamps, switches (e.g., automobile, chest freezer), thermostats, thermometers, scientific instruments (e.g., barometers, sphygmomanometers, hygrometers, manometers, etc.), gauges, pressure or flow regulators, gas meters, and some antiques (e.g., pendulum clocks, mirrors) may contain small amounts of elemental mercury. Mercury can be released and exposures can occur if these articles are broken accidentally or dismantled without adequate precautions.
Laboratories, schools	Accidents, poor laboratory practices and/or inadequate ventilation may be associated with handling and use of mercury and mercury containing chemicals. Mercury released to drains may collect in sink traps.
Mercury-containing products	Mercury is not permitted in pesticides, paint, or many other products (e.g., toys, games), but may be present in older items. In the U.S. small amounts of mercury may be present in button-cell batteries, and are permitted in some vaccines and cosmetics intended for application in the eye area. Some skin lightening or acne creams made outside the U.S. may contain mercury.
Dental amalgam fillings	Dental amalgam fillings may slowly release mercury vapor at very low concentrations.
Some cultural, religious activities	Some religions sometimes use elemental mercury in homes, candles, amulets, etc.

Exposure to methylmercury most often comes from eating fish that contains methylmercury. Greater amounts of methylmercury are generally found in certain marine fish such as swordfish, shark, tuna, and larger predatory freshwater fish like black bass, walleye and pike.

Exposures to elemental, inorganic, or organic mercury may come from contact with hazardous waste containing mercury, from skin contact with mercury or substances containing mercury (e.g., some skin lightening/acne creams), or from use of medications or vaccines containing mercury.

### **Where can I get more information about eating fish that may contain methylmercury?**

NYS DOH issues health advisories on eating fish taken from New York State waters by recreational anglers because some of these fish contain chemicals at levels that may be harmful to health. Many of these health advisories are for fish with elevated mercury levels. The health advisory is available at the NYS DOH website: <http://www.health.ny.gov/fish> or by calling the number at the end of this fact sheet. Additional information, particularly for fish that are purchased by consumers at grocery stores and fish markets, is available by calling the federal Food and Drug Administration's (FDA) consumer food safety hotline (1-800-FDA-4010) or by visiting the FDA website: <http://www.fda.gov/Food/FoodbornIllnessContaminants/Metals/ucm2006760.htm>.

Many types of fish do not contain high mercury levels. Fish are low in saturated fats, and are an important source of protein and omega-3 fatty acids. These naturally occurring fish oils lower plasma cholesterol and triglycerides, lower the risk of heart disease, and are important in neurological development of unborn babies and growing children. Eating a variety of different fish and shellfish is a good way to get the benefits of eating fish while balancing concerns for mercury exposure.

### **What health effects can mercury cause?**

Whether or not health effects occur from mercury exposure depends on the amount and form of mercury a person takes in, how and for how long the person is exposed, and individual characteristics such as age, pregnancy status and general health.

Breathing very high levels of elemental mercury vapor for a short time can cause lung and eye irritation, coughing, chest pain, nausea, vomiting, diarrhea, fever, high blood pressure, increased heart rate and skin rashes. Long-term exposure to lower levels of mercury vapor may cause memory loss, headache, sleeplessness, tremors and personality changes (irritability, nervousness, unusual shyness), gum inflammation (gingivitis), high blood pressure, and in some cases kidney damage. Long-term, exposure to low levels of mercury vapor from dental amalgams has not been associated with neurologic or respiratory effects in children or adults. Unborn babies, nursing infants, and children may be especially vulnerable to effects of mercury on their developing nervous systems as a result of mercury vapor inhaled by their mother or by themselves. Other potentially vulnerable individuals include those with medical conditions of the nervous system, kidneys, or heart and circulatory system, which might be worsened by exposure to elemental mercury.

Short-term exposure to high levels of inorganic mercury can cause toxicity to the kidney, nervous system and heart, and can also cause symptoms such as nausea, vomiting, metallic taste in the mouth, and severe abdominal cramping. Long-term exposure, even to lower levels, has also been associated with kidney damage.

Long-term use of skin products containing elemental and/or inorganic mercury can result in health effects noted above for elemental or inorganic mercury depending upon the level and duration of exposure. Severe skin rashes have also been reported.

In very rare cases, children acutely exposed to elemental or inorganic mercury develop an ailment called acrodynia (sometimes called "pink disease"). Acrodynia has a specific set of symptoms that

include severe leg cramps, irritability, numbness, prickling or tingling, painful pink fingers and peeling skin on hands, feet or nose. While mainly occurring in children, adult cases of acrodynia have been reported.

Long term, high level, methylmercury exposures are associated with disturbances in vision, hearing and speech, as well as tingling and numbness in fingers and toes, lack of coordination and muscle weakness. Exposure to methylmercury is of special concern for children and unborn babies because their nervous systems are still developing and may be especially vulnerable. Methylmercury consumed by a mother can enter her fetus, and can also be passed in breast milk to nursing infants. Some mothers who ate mercury contaminated fish from Minimata Bay, Japan, resulting in long-term, high level exposure to methylmercury before and during pregnancy and while nursing, had babies who were blind, deaf or had cerebral palsy. Studies of children whose mothers with diets high in seafood contaminated with lower levels of methylmercury (compared to seafood from Minimata Bay) found subtle nervous system effects (e.g., altered memory, attention and language development) in children exposed before and/or after birth. In some studies of adult men, long-term exposure to low levels of methylmercury has been associated with an increased risk of heart attacks.

### **What medical testing is used to assess mercury exposure?**

Testing urine or blood for total mercury is the most commonly accepted method of assessing mercury exposure for medical purposes. NYS Public Health Law (Part 58-1.7) requires that analyses of biological samples for mercury be performed only at the request of licensed physicians or other authorized persons by a laboratory holding a NYS laboratory permit for Trace Elements under the NYS Clinical Laboratory Evaluation Program (CLEP) (for details see <http://www.wadsworth.org/regulatory/clep>).

Analysis of hair samples has been used in some research studies of health effects of methylmercury in large groups of people. However, relationships between methylmercury levels in hair and health effects are not clearly established. Thus, testing hair for mercury levels can be useful for biomonitoring or to assess past exposures, but is not routinely recommended for assessing the likelihood of health effects (see [http://www.atsdr.cdc.gov/HAC/hair\\_analysis/03-0330HairSampleTesting-Scientific.pdf](http://www.atsdr.cdc.gov/HAC/hair_analysis/03-0330HairSampleTesting-Scientific.pdf)).

### **What levels of mercury in blood or urine have been associated with health effects?**

In the general population, levels of mercury in blood are typically less than 5 micrograms per liter (mcg/L) and depend primarily on the amount of seafood in the diet. Infrequently, clinically observable signs and symptoms (loss of coordination, burning or tingling sensation in skin) may occur when blood mercury levels rise to about 100 mcg/L following recent, high level, methylmercury exposure. Elevated blood mercury levels are of greatest concern in pregnant women because of the anticipated vulnerability of the developing fetal brain to mercury exposure. Scientists do not know precisely what level of mercury in maternal, umbilical or fetal blood may be associated with harmful effects on brain development of babies. Based on currently available scientific studies, umbilical cord blood mercury levels of 60 mcg/L or higher (equivalent to about 30 to 40 mcg/L in maternal blood) may pose some risk of harm to the fetus.

Levels of mercury in urine are typically less than 3 mcg/L or less than 3 mcg/gram creatinine (Creatinine is a metabolite normally found in urine that can be used to adjust for how dilute or concentrated a urine sample is. It is especially useful when a spot sample rather than a 24-hour urine sample is collected) and may depend on the number of amalgam fillings the person has. Studies of six-to-ten-year old children with these levels of mercury in their urine due to the presence of dental amalgams have not found health effects. Sustained urine mercury levels of 20 mcg/L, or more have been associated with effects on memory, attention, manual coordination, mood, increased fatigue and confusion, slight hand tremor, and indications of potential kidney disease.

## What can I do if the level of mercury in my blood or urine is elevated?

Levels of mercury in your blood or urine above typical levels suggest you may have had an elevated exposure to some form of mercury. You and your health-care provider may wish to consider sources of possible mercury exposure (see “**Current Sources of Elemental Mercury**”), and possible ways to reduce your mercury exposure.

Elevated mercury in your blood suggests you ate seafood containing mercury. Altering your diet to eat less of the types of fish known to have high mercury levels can decrease your blood mercury level. Information and consumption advice about types of marketplace fish with high mercury levels is available by calling the federal Food and Drug Administration (FDA) consumer food safety hotline (1-800-FDA-4010) or by visiting their website at <http://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/ucm2006760.htm>, accessed September 28, 2016. Information and consumption advice about types of sportfish with high mercury levels taken from New York State waters is available at the NYSDOH website at [www.health.ny.gov/fish](http://www.health.ny.gov/fish) or by calling the numbers below.

Elevated mercury in your urine suggests exposure to mercury vapor or inorganic mercury in the school, workplace or home. Mercury exposures in the workplace can be reduced by: (1) replacing mercury with a less toxic substance when possible; (2) adopting work practices that minimize the release of mercury in your work environment; (3) using local ventilation and other engineering controls to remove airborne mercury before exposure can occur; and (4) using a respirator (mask) certified by the National Institute for Occupational Safety and Health (NIOSH) for protection from specific airborne products, and wearing protective clothing such as gloves and coveralls.

Practical ways to minimize potential exposure to mercury in school or at home include: (1) removing unnecessary sources of elemental mercury (e.g., thermometers, thermostats, switches and pressure-control gauges), and replacing them with mercury-free products; (2) safely cleaning up mercury spills (in consultation, as needed, with local health department); (3) discarding products such as art materials not labeled “conforms with ASTM D-4236” and skin products that may contain mercury or are labeled as containing “mercury,” “mercuric,” “Hg,” or “calomel” (mercurous chloride). All potential sources of mercury should be discarded in accordance with local regulations for mercury-containing waste (<http://www.dec.ny.gov/chemical/285.html>).

[www.health.ny.gov/mercury](http://www.health.ny.gov/mercury)

*In serious cases of mercury poisoning, a health-care provider may prescribe chelation (pronounced key-lay-shun) therapy. This should only be conducted in consultation with an experienced medical practitioner. Chelation therapy is not always successful and it poses health risks of its own.*

*If you would like more information on the health effects of mercury, sources of mercury in the home, or New York State fish advisories, contact the NYS DOH, Bureau of Toxic Substance Assessment at 518-402-7800 or at 800-458-1158.*

*If you would like more information on the control of mercury in the workplace, contact the NYS DOH, Bureau of Occupational Health at 518-402-7900 or at 800-458-1158.*