



Mercury Exposure and Your Health

Q: What is mercury?

A: Mercury is a naturally occurring element. It is a persistent bioaccumulative toxin. There are three forms of mercury. Each has unique characteristics:

- **Elemental or metallic mercury.** This is a shiny, silver-white metal that is liquid at room temperature. If heated, it is a colorless, odorless gas. It is used in thermometers, fluorescent light bulbs and some electrical switches. When exposed to the air or if spilled, mercury metal vapor gets into the air where it can be breathed into the lungs. The warmer the temperature, the more quickly the mercury gets into the air. Elemental mercury also can be absorbed through the skin. If spilled mercury is not cleaned up completely, it easily gets spread around. Mercury can be easily spread from one place to another (example – from work to your car, and then to your home) because your shoes, clothes, hair and other objects can carry tiny drops of mercury metal on them.
- **Inorganic mercury compounds.** Mercury combines with other elements to form inorganic compounds or “salts” that usually are powders or crystals. Mercury compounds are found in old alkaline and some button batteries. They also are found in some over-the-counter drugs such as thimerosal tincture, merthiolate tincture, some types of mercurochrome, some ointments and nasal sprays, and some herbal medicines. Inorganic mercury compounds may be harmful if breathed or swallowed.
- **Organic mercury compounds.** When mercury combines with carbon, it forms organic mercury compounds. **Methylmercury** is an example of an organic mercury compound. This form can build up in the environment and accumulate in fish, shellfish and some animals (including people) that eat fish. **Phenylmercury** is used to control the growth of fungus in some interior latex paints manufactured before 1991, some exterior and oil base paints, some caulks, some eye-area cosmetics, toiletries and other products. When these products are used, mercury metal vapor gets into the air and can be breathed. Phenylmercury also can pass through the skin and is toxic this way or if swallowed.

Q: How does mercury get into the environment?

A: Mercury is released into the environment from many human activities. Workplaces that may release mercury into the air, soil or water include municipal incinerators, power plants, hazardous waste sites, dentists’ offices, hospitals and manufacturers of products containing mercury. Once in the environment, mercury can pollute the air and water.

Q: How can I be exposed to mercury?

- A:** There are three main routes of mercury exposure:
- breathing or inhaling mercury vapors
 - absorbing mercury through the skin, especially if cuts are present
 - accidentally eating or ingesting mercury

→ In particular, exposure to metallic mercury accounts for most exposure at work, at home and in the community.

→ Exposure to methylmercury occurs only from eating some types of fish.

Remember!

Exposure to any form of mercury can cause mercury toxicity.

If you are exposed to mercury from more than one source, these exposures will add up.

Additional information can be found at <http://www.atsdr.cdc.gov/facts46.html> and <http://www.atsdr.cdc.gov/toxprofiles/phs46.html>.

Q: If I am exposed to mercury, will I get sick?

A: The risk to a person's health (or how severe the health effects are from mercury exposure) is determined by the following factors:

- dose - how much mercury a person was exposed to
- duration - how long a person was exposed
- length of time since the exposure
- individual differences
 - nutritional status of person exposed
 - health of the person exposed
 - route of exposure (e.g., inhalation, ingestion or skin contact)
 - genetic differences
 - gender
 - age (A fetus is the most susceptible.)

Not everyone who is exposed to mercury will have all the signs and symptoms of mercury exposure

Q: How can mercury affect my health?

A: All forms of mercury are poisonous to humans and can produce a wide range of health effects depending largely on the amount and timing of exposure. The nervous system is very sensitive to all forms of mercury. Methyl mercury and metal mercury vapors are more harmful than other forms because more mercury in these forms reaches the brain. Exposure to high levels of all forms of mercury can permanently damage the brain, kidneys and a developing fetus.

Very high exposure to breathing metal mercury vapor in the air can poison quickly and cause tremors, inability to walk, convulsions and even death. Symptoms begin with cough, chest pain, trouble breathing and upset stomach. Chemical pneumonia, which can be fatal, can then develop. Other effects include nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

Repeated exposure to breathing metal mercury vapor affects the human brain, spinal cord, eyes and kidneys. It may cause mood changes; inability to concentrate; memory loss; a fine shaking, tingling or loss of feeling of the hand, tongue or eyelid; discoloration of the cornea and lens of the eye; disturbances of vision; and kidney disease.

Swallowing inorganic mercury compounds can cause nausea, vomiting and diarrhea that is often bloody. Severe kidney damage can occur. Some mercury compounds can cause irritation of the skin and eyes on contact. Survivors of acute poisoning or chronically exposed people might develop nerve, skin and kidney problems that might include neuropsychiatric disturbances (e.g., memory loss, irritability or depression), tremor, tingling, inflammation of the gums and mouth, flushing, discoloration shedding layers of skin on the hands and feet, and hypertension (high blood pressure).

Methylmercury exposure can result in a wide range of health effects in adults. The mature nervous system can be permanently affected by methylmercury, causing various symptoms that often do not show up until months after exposure. Effects noted at the earliest states of exposure include paresthesias (abnormal sensations such as tingling and numbness of toes, fingers, mouth and lips); ataxia (stumbling); generalized weakness; decreased vision and hearing; muscle spasms; and tremors.

If a *pregnant woman eats large amounts of fish contaminated with methylmercury*, her unborn child may develop damage to vision, hearing, taste, smell, memory and mental ability.

Infants and children also are at high risk from methylmercury-contaminated fish and possibly contaminated breast milk. For more information on mercury in fish and health effects of methylmercury, see our fact sheet "Mercury in Fish and Your Health."

Additional information can be found at <http://www.atsdr.cdc.gov/tfacts46.html> and <http://www.atsdr.cdc.gov/toxprofiles/phs46.html>.

Q: How does mercury affect children?

A: The developing fetus and young children are most sensitive to the effects of any form of mercury exposure, but particularly to methylmercury and vapor of metal mercury. The effects caused by mercury exposure may be permanent and could lead to poor school performance and health problems. Harmful effects of mercury that can be caused to the fetus as a result of mercury exposure (metal vapor and methylmercury) through the mother include brain damage, mental retardation, incoordination, blindness, seizures and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

Children can get "pink disease" (acrodynea) with a rash over the body: chills: swelling and irritation of hands, feet, cheeks and nose; light sensitivity; trouble sleeping; and heavy sweating. Acrodynea has been reported most frequently in children treated with teething powders or in children who inhaled mercury vapor, such as from broken thermometers. Children exposed to excessive amounts of mercury chloride tablets for constipation, worms or to mercury salt containing teething powders had swollen gums, excessive salivation, weight loss, diarrhea and/or abdominal pain, muscle twitching or cramping in the legs and/or arms, and increased heart rates and elevated blood pressure.

Women who are pregnant or who soon may become pregnant should be particularly careful about exposure to metallic mercury vapor and methylmercury. Fetuses can be exposed to mercury in the womb if their mothers eat foods contaminated with methylmercury or the mothers are exposed to metallic mercury vapor in the workplace (which may occur with those working in thermometer/barometer or fluorescent light manufacturing or the chlor-alkali industry). Exposures to mercury vapors are relatively rare outside of the workplace, unless metallic mercury is present in the home. All forms of mercury also can pass to a nursing infant through breast milk. Maternal exposure to methylmercury may lead to brain damage, mental retardation, poor coordination, speech difficulties and other effects.

Additional information can be found at <http://www.atsdr.cdc.gov/tfacts46.html> and <http://www.epa.gov/mercury/effects.htm>.

Q: How likely is mercury to cause cancer?

A: There are inadequate human cancer data available for all forms of mercury. The Environmental Protection Agency (EPA) has determined that mercuric chloride and methylmercury are *possible human carcinogens*, which means they may cause cancer.

Q: How do I know if I have been exposed to mercury?

A: Your health care provider can test your urine, hair or blood to determine if you have been exposed to mercury.

Testing Urine - This test is good for detecting exposure only to elemental or inorganic mercury, not to methylmercury.

Testing Hair - Hair is considered a reliable marker of exposure only to methylmercury or other organic mercury compounds.

Testing Blood - Blood is an excellent indicator of exposure only to methylmercury. Testing for mercury in blood is not a good measure of elemental mercury exposure, except in the one or two days immediately following high levels of exposure.

Additional information can be found at <http://www.atsdr.cdc.gov/toxprofiles/phs46.html>.

Q: What are action thresholds for mercury in blood and urine for the evaluation of exposures in the general population?

A: *The State of Colorado reportable level* as described in the state Board of Health “Regulations Pertaining to the Detection, Monitoring, and Investigation of Environmental and Chronic Diseases” (6 CCR 1009-7) issued by the department to establish the following action thresholds:

- mercury in blood > 5 micrograms/L
- mercury in urine >20 micrograms/L

Action thresholds represent levels of mercury in blood and urine below which significant health effects are not likely.

The state reportable level of mercury in blood is intended for the protection of the developing fetus based on the available toxicologic health information. The reporting requirement is not intended to imply that no adverse health effects will occur below the level. The U.S. Environmental Protection Agency (EPA) reference dose for methylmercury is 0.1 micrograms/kg body weight/day, below which exposures are likely to be without appreciable adverse health effects. This dose is approximately equal to a concentration of 5.8 parts per billion mercury in blood (or 5.8 micrograms/L in blood). The EPA has determined that children born to women with blood concentrations of mercury above 5.8 micrograms/L are at some increased risk of adverse health effects.

For adult men, blood or urine mercury levels of up to 10 micrograms/L are not likely to be of significant concern, based on the values recommended in the Centers for Disease Control and Prevention (CDC) Case Definitions for Chemical Poisoning. However, CDC’s case definition for mercury poisoning cannot be used as a medical diagnosis. Effects of mercury poisoning might vary as a result of individual differences (e.g., sensitive individuals). Therefore, it is best to reduce exposure to mercury for individuals with blood mercury levels of greater than 5 micrograms/L.

Q: What are action thresholds for mercury in blood and urine for the evaluation of occupational exposures in workers?

A: *The American Conference of Industrial Hygienists established the Biological Exposure Index* as the following action thresholds for the evaluation of occupational exposures of mercury in workers:

- mercury in blood \geq 15 micrograms/L
- mercury in urine >20 micrograms/L

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