Mercury

What is Mercury?

As one of the 92 basic atomic elements, mercury occurs naturally in the environment in both the metallic or elemental state. Metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas. Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually in the form of white powders or crystals. Mercury also combines with carbon to make organic mercury compounds.

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The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. Mercury introduced into the environment from industrial sources, can increase the amounts of methylmercury that these small organisms make.

What is it used for?

Metallic mercury is used to produce chlorine gas and caustic soda, and it is also used in thermometers, barometers, pressure sensors, manometers ("silent" electrical switching devices), mirrors, fluorescent light bulbs, battery lamps and batteries. Metallic mercury is also still commonly used for dental amalgam fillings. Salts formed from elemental mercury were formerly used in mildew-resistant paints, agricultural fungicides, skin-lightening creams, antiseptic creams and ointments. Common industrial sources of inorganic mercury compounds include oil refining, mining ore deposits, incineration, and waste disposal by open burning and coal-fired power plants.

How are Humans Exposed?

Humans can be exposed to mercury through several different routes: Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air as pollution from mining ore deposits, coal fires, open burning of waste, spills, incinerators, and industries using mercury-containing fuels. Mercury enters the water or soil from natural deposits, disposal of wastes, spills, and volcanic activity. Methylmercury may be formed in water and soil by small organisms called bacteria. Methylmercury builds up in the tissues of fish and shellfish. Larger and older fish, most notably - swordfish, tend to have the highest levels of mercury. High levels of mercury have also been found in oysters and clams.

Mercury can leach into the body from dental amalgam fillings. Workers can breathe mercury-contaminated air or come into direct skin contact with mercury during uses in the workplace (dental, health services, chemical, and other industries that use mercury). Children can be exposed to Thimerosal, a vaccine preservative containing mercury, if they receive multiple doses of vaccines with total amounts of mercury levels exceeding federal guidelines.

The Federal Government established strict guidelines for mercury exposure: The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb). The FDA set a maximum permissible level of 1 part per million (ppm) of methylmercury for seafood products sold though interstate commerce. The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m3) and 0.05 mg/m3 of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

Acute Health Effects:

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Short-term exposure to high levels of metallic mercury

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vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

Chronic Health Effects:

Long-term mercury exposure effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Health Effects During and After Pregnancy:

Mercury in the mother's body passes to the fetus and may accumulate there. While the benefits of breast-feeding may be greater than the possible adverse effects, mercury can pass to a nursing infant through breast milk. Very young children are more sensitive to mercury than adults. Mercury's harmful effects that may be passed from the mother to her baby include brain damage, mental retardation, blindness, seizures, muteness, and lack of coordination. Children poisoned by mercury exposure after birth may develop problems of their nervous and digestive systems, and suffer kidney damage.

Carcinogenic Effects:

There are insufficient human cancer data available to implicate all forms of mercury as a causal factor. In laboratory testing, however, mercuric chloride has been shown to cause increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. Based on these results, the EPA determined that mercuric chloride and methylmercury are potential human carcinogens.

Controlling Risk of Exposure:

There are many ways to reduce exposure to mercury: Carefully handle and dispose of products that contain mercury, such as thermometers, barometers, silent switches or fluorescent light bulbs. Do not vacuum up spilled mercury. Vacuuming can cause mercury to vaporize and increase the potential for exposure. If a large amount of mercury has been spilled, immediately contact your health department and local Hazardous Waste Disposal agency. Teach children not to play with shiny, silver liquids. Wear proper OSHA-approved breathing apparatus and protective clothing when working in industries where mercury and mercury waste exposures may occur. Properly dispose of older medicines that contain mercury and keep all mercury-containing medicines away from children. Pregnant women and children should keep away from rooms where liquid mercury has been used. Learn about wildlife and fish advisories in your area from your public health or natural resources department. Due to the use of Thimerosal, a vaccine preservative containing mercury, avoid subjecting young children to multiple vaccines over a short period of time. Ask your physician about the availability of vaccines without Thimerosal.

Controlling Fish and Shellfish intake during Pregnancy:

A recent report issued by the Public Interest Research Group (PIRG) and the Environmental Working Group (EWG) provided analysis of an extensive database studying mercury levels in various species of

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fish and shellfish. The study concludes that one in four pregnant women could endanger the long-term development of their children by following the current FDA guidelines of consuming up to 12 ounces of fish per week. In January 2002, the FDA identified four species of fish that exceed FDA allowable guidelines of 1 part per million of mercury contamination - shark, swordfish, king mackerel and tilefish. Women who are pregnant or who are of childbearing age should not eat these fish. The PIRG and EWG report concludes that largemouth bass, tuna, sea bass, halibut, marlin, pike, oysters and white croaker should also be added to the FDA list. The report also identified mahi-mahi (dolphin fish), cod and pollock as species that should not be eaten more than once a month by pregnant women. Another factor of concern is that forty states have issued warnings about excessive mercury contamination (depending on the levels of mercury pollution in the bodies of water where the fish are caught) of all species of freshwater fish.

Source of Information:

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for Mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Fact Sheet by:

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