MERCURY AND HUMAN HEALTH

The Issue

Although mercury is released naturally from rocks, soil and volcanoes, human activities have boosted levels in the atmosphere. Canadians can be exposed to mercury from many sources, including food and the use of dental amalgam fillings.

Background

Mercury is used in, and released from, a variety of industrial processes and commercial products. Since the 1970s, environmental concerns have resulted in a reduction in the use and processing of mercury around the world.

Mercury exists in three different forms:

- **Elemental mercury** — this silvery, shiny, volatile liquid gives off a colourless, odourless vapour at room temperature
- **Inorganic mercury** — compounds formed when elemental mercury combines with other elements such as sulphur, chlorine or oxygen to create compounds known as mercury salts
- **Organic mercury** — compounds formed when elemental mercury combines with carbon, also known as methyl mercury.

Mercury is a global contaminant because it is toxic, does not break down in the environment and can build up in living things. In its vapour form, mercury can be carried long distances on wind currents, staying in the atmosphere for long periods of time.

Mercury can change from one form to another in the environment. For example, some types of bacteria and fungi can change mercury into its most toxic form, methyl mercury. Methyl mercury tends to accumulate to some degree in all fish, but especially in predatory fish such as shark, swordfish and large tuna, as well as in marine mammals. Predatory freshwater fish such as pike, bass and walleye may also have elevated methyl mercury levels. Since fish is also an excellent source of high-quality protein and omega-3 fatty acids and is low in saturated fat, the benefits and risks of eating fish must be considered carefully.

Sources of Mercury

Mercury comes from a range of natural sources such as volcanoes, soils, undersea vents, mercury-rich geological zones and forest fires, as well as from fresh water lakes, rivers and the oceans. However, human activity has increased the amount of mercury in the environment in several ways, including through a variety of combustion and industrial processes like coal-fired power generation, metal mining and smelting and waste incineration.

Mercury is also leached from flooded soil at new hydroelectric dam sites, or from any flooded area. This process can add to mercury levels in freshwater aquatic food chains in those areas.

Products such as button batteries, fluorescent tube lights, fever thermometers, thermostats, switches and relays, barometers and dental fillings may contain mercury; however, mercury-free alternatives exist in most cases. It is also used as a preservative in some products like cosmetics. When used according to regulated restrictions, mercury in cosmetics is considered safe. Disposing of these products can cause mercury to leach from landfills or be emitted from burning waste, adding to the amount of mercury in the environment.

Because mercury is toxic and has an impact on human and environmental health, even small mercury spills should be considered

hazardous and cleaned up with caution. Liquid elemental mercury, commonly found in household thermometers, thermostats and barometers, quickly forms a poisonous, colourless and odourless vapour when spilled. If inhaled, this vapour is rapidly absorbed through the lungs. Children are especially at risk because mercury vapours, which are heavier than air, often linger near the floor where children crawl and play. Your local public health office can give you information on how to clean up small mercury spills.

Health Effects of Mercury Exposure

The health effects of mercury exposure depend on its chemical form (elemental, inorganic or organic), the route of exposure (inhalation, ingestion or skin contact), and the level of exposure. Vapour from liquid elemental mercury and methyl mercury are more easily absorbed than inorganic mercury salts and can, therefore, cause more harm. You should try to reduce your exposure to all forms of mercury whenever possible.

Elemental Mercury
The health effects of elemental mercury depend on the length and type of exposure. For example, if you were to accidentally swallow liquid elemental mercury from a broken fever thermometer, little mercury would be absorbed. However, if you were to inhale the vapour from that mercury spill, it would be more easily absorbed into your body, potentially causing health problems. At higher concentrations, mercury vapour can cause damage to the mouth, respiratory tract and lungs, and can lead to death from respiratory failure. Long-term exposure to low concentrations causes symptoms similar to those of methyl mercury.

Inorganic Mercury Compounds
Inorganic mercury can cause kidney failure and gastrointestinal damage. Mercury salts are irritating, and can cause blisters and ulcers on the lips and tongue. Rashes, excessive sweating, irritability, muscle twitching, ing, weakness and high blood pressure are other symptoms of elevated exposures.

Organic Mercury Compounds (Methyl mercury)
Mercury can change from one form to another in the environment. Methyl mercury tends to accumulate to some degree in all fish, but especially in the predatory fish noted above. Methyl mercury is absorbed through the intestines and distributed throughout the body. It readily enters the brain, where it may remain for a long period of time. In a pregnant woman, it can also cross the placenta into the fetus, building up in the fetal brain and other tissues. Methyl mercury can also be passed to the infant through breast milk.

A child's developing nervous system is particularly sensitive to methyl mercury. Depending on the level of exposure, the effects can include a decrease in I.Q., delays in walking and talking, lack of coordination, blindness and seizures. In adults, extreme exposure can lead to health effects such as personality changes, tremors, changes in vision, deafness, loss of muscle coordination and sensation, memory loss, intellectual impairment, and even death.

The Risks of Mercury Poisoning

In general, Canadians are not at risk from mercury poisoning. However, people exposed to elevated levels of mercury may experience health problems ranging from rashes to birth defects, even death in cases of extreme poisoning.

People who consume large amounts of fish, marine mammals and wild game as part of their daily diet increase their risk. The developing fetus and children of women who have consumed large amounts of fish and marine mammals during pregnancy are the most susceptible to health problems. Children, who tend to put things in their mouths, may increase their intake of mercury through soil and contaminated objects.

In regions such as the Arctic, the traditional diet may include large quantities of fish and/or marine mammals at certain times of the year. However, this traditional diet has many nutritional and socio-cultural benefits, which must be weighed against the potential risks.

If you are concerned about mercury exposure, samples of hair, blood and urine can be taken in a doctor's office or health clinic and tested.

Minimizing Your Risk

Elemental mercury from dental fillings doesn't generally pose a health risk. There is, however, a fairly small number of people who are hypersensitive to mercury. While Health Canada Canada does not recommend that you replace existing mercury dental fillings, it does suggest that when the fillings need to be repaired, you may want to consider using a product that does not contain mercury.

Pregnant women, people allergic to mercury and those with impaired kidney function should avoid mercury fillings. Do not have mercury fillings removed when you are pregnant because the removal may expose you to mercury vapour. When appropriate, the primary teeth of children should be filled with non-mercury materials.

Predatory fish such as shark, sword-fish, fresh and frozen tuna (not canned), have higher levels of mercury and should be consumed only

occasionally. The health benefits of eating fish outweigh the risk of exposure to mercury if Health Canada consumption guidelines are followed. If you are an adult, limit your intake of these fish to no more than one meal per week. Pregnant women, women of child-bearing age and young children should be especially careful and limit their intake of these fish to no more than one meal a month.

For information on sport fish caught in local waters, check with your provincial or territorial authority on any advisory that may have been issued for that area.

The Government of Canada's Role

The Government of Canada issues retail fish consumption advisories, while the provincial and territorial agencies issue advisories on sport fish. The Canadian Food Inspection Agency enforces a guideline for mercury in fish. It applies to all fish except shark, swordfish, and fresh and frozen tuna, for which meal limits are recommended.

The Government of Canada is working in a number of areas to reduce the use and release of mercury into the environment. In 2000, the Canadian Council of Ministers of the Environment developed several Canada-wide standards to reduce mercury release to the environment. Standards have been, or are being, developed for certain mercury-containing products and for mercury emissions from selected industries. The Government has also helped set up the Northern Contaminants Program and the National First Nations Environmental Contaminants Program. Canada also has Cosmetic Regulations. These regulations contain restrictions for mercury; it is only permitted as a preservative ingredient in cosmetics intended for use in the area of the eye.

Although Canada will continue to reduce mercury releases, efforts must also be made elsewhere. Much of the mercury deposited on our lakes and soil comes from other countries. Canada is taking an active role in regional and international efforts to reduce mercury in the environment globally. The Government is working with the USA and Mexico through the North American Commission for Environmental Co-operation to address mercury issues under the North American Regional Action Plan on Mercury.

Need More Info?

For more information on fish advisories, visit:
http://www.hc-sc.gc.ca/english/protection/warnings/2002/2002_41e.htm

http://www.ec.gc.ca/MERCURY/EN/fc.cfm

For information on healthy pregnancies, visit:
http://www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/national_guidelines_06d_e.html

For information on the safety of dental amalgam, see Health Canada's - 1996 The Safety of Dental Amalgam;
http://www.hc-sc.gc.ca/english/media/releases/1996/96_63e.htm

For more information on restriction of mercury in cosmetics go to the Cosmetics Hot List and look for Mercury at:
http://www.hc-sc.gc.ca/hecs-sesc/cosmetics/hotlist_april_2004_m-p.htm

The National First Nations Environmental Contaminants Program at:
http://www.hc-sc.gc.ca/fnihb/cp/annualreview/environmental_contaminants.htm

For additional information about mercury and the environment see Environment Canada's - Mercury and the Environment at:
http://www.ec.gc.ca/mercury/

United Nations Environment Program at:
http://www.unece.org/env/

For information on cleaning up small mercury spills go to:
http://www.ec.gc.ca/MERCURY/EN/cu.cfm?

Or visit your provincial public health office at:
http://chp-pcs.gc.ca/CHP/index_e.jsp?pageid=10042

Additional It's Your Health articles can be found at:
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