



## Lead and Health

### Issue

Lead is a heavy metal which occurs naturally in the environment and has many industrial uses. Research has shown that exposure to even small amounts of lead can be hazardous to human health, especially for young children, newborns and the fetus. Exposure to lead has been linked with neuro-cognitive, cardiovascular and other health effects.

### Background

Lead is a significant environmental contaminant because it is toxic, persists in the environment, and can be "taken up" by the body and stored in bone and other biological tissues (bioaccumulative) for many years.

### Sources

The amount of lead in the environment increased during the industrial revolution, and again significantly in the 1920s with the introduction of leaded gasoline. Since the 1970s, however, lead exposure in Canada has decreased substantially, mainly because leaded gasoline and lead-based paint were phased out and the use of lead solder in food cans was virtually eliminated.

Today, lead enters the environment from a variety of natural and human sources. Natural processes such as soil weathering, erosion and volcanic activity release lead, but these processes rarely result in elevated concentrations in the environment. In fact, human activities release more lead and frequently result in sites of local contamination. Lead released from industrial emissions into the atmosphere can be a major source of environmental contamination, especially near "point sources" such as smelters or refineries.

### Paint

Lead is no longer used in household paint. However, before World War II, paints typically contained substantial amounts of lead, ranging from 10 percent to as much as 50 percent. After the war, the use of lead in paint was reduced, but some paints still contained high amounts of lead. Lead-based paint may be a source of exposure if it is peeling or chipping, or when lead-contaminated dust is created during sanding or other renovation activities in older buildings. In 1976, the amount of lead that could be added to interior paint was limited by law, but exterior paint could still contain high amounts of lead provided it carried a warning label. Under the *Surface Coating Materials Regulations*, which came into force in 2005, the lead limit was reduced to its background level for both interior and exterior paints sold to consumers. Canadian paint manufacturers have been conforming to this background level in their interior and exterior consumer paints since 1991. Some specialty coatings (such as artist paints and metal touch-up coatings) can contain lead, but if they do, they must be labelled to warn against applying the paint to surfaces that are accessible to children and pregnant women.

### Dust and Soil

Lead in soil can come from the air, from erosion of lead-bearing rocks, and from deteriorating lead-based paint on the exterior of buildings and other structures, and may be carried indoors as dust. Lead dust can also be generated within the home, especially in older homes that contain lead-based paints. Babies and young children are at special risk from lead in soil and dust, because they tend to put things in their mouths and their breathing zone is closer to floor level where lead dust accumulates.

### Consumer Products

Lead has many possible uses in consumer products. Products which may contain lead include artists' supplies such as paints (other than paints for use by children), pigments, and frits (mixtures of sand and fluxes used in glassmaking), other artists' supplies, leaded crystal, protective/decorative coatings on a wide variety of products (other than children's products, pencils and artists' brushes), toy and game figurines, fastenings and trim on clothing, lead shot, fishing sinkers and jigs, lead came used in panel and stained glass windows and doors, batteries, and lead vent and roof flashings. In the past lead was frequently used for making metal toys, and it is still sometimes used in other countries for making jewellery, such as necklaces worn by children. Hobbies which may expose both adults and children to lead-containing products and to lead-contaminated dust include: pottery-making, where lead glazing or lead pigments may be used; manufacture of stained glass items, which may produce fumes from the soldering of lead and dust from sanding of leaded glass; and the manufacture of fishing sinkers, lead shot or diving weights, which may produce fumes from melting lead.

### Drinking Water

For the most part, the amount of lead in natural water supplies in Canada is very low; however, lead can enter the water supply from lead service lines, lead solder in plumbing, or lead-containing brass fittings or faucets in your home. In Canada, the *Guidelines for Canadian Drinking Water Quality* limit the lead content of drinking water to a maximum acceptable concentration (MAC) of 0.010 milligrams per litre of water (10 ppb). The World Health Organization has also established a guideline of 0.010 mg/L for lead in

drinking water, whereas the U.S. Environmental Protection Agency has established a drinking water standard of 0.015 mg/L. Most municipalities are able to provide information on how to test drinking water for lead.

## Air

Lead is released into air through industrial emissions from smelters and refineries, for example, as well as through vehicle emissions. With the introduction of unleaded gasoline in Canada in 1975, lead concentrations in the air have declined significantly. Leaded gasoline in cars was banned in Canada in 1990. Since then, levels of lead in the air of most Canadian cities have dropped below detectable levels.

## Drugs

Some “natural” medications sold in other countries contain lead as a major ingredient. It is critical to avoid any medications or natural health products sold without an ingredient label.

## Food

Trace levels of lead are found in almost all food. Airborne lead falls onto crops or soil and is absorbed by plants. Infants can absorb lead from their mothers' bodies through breast milk.

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## Health Risks

Everyone is exposed to trace amounts of lead through air, soil, household dust, food, drinking water and various consumer products. Regardless of the route of entry, once absorbed by the human body, lead circulates in the bloodstream and either accumulates in tissues, especially in bone, or is excreted from the body as waste. Some of it is absorbed into soft tissue such as the liver, kidneys, pancreas and lungs. The half-life (time for the body to excrete half the accumulated lead) is about 25 years; therefore, lead can stay in the body for many years after exposure.

Short-term exposure to high levels of lead can cause vomiting, diarrhea, convulsions, coma or even death. Severe cases of lead poisoning are rarely reported in Canada. Symptoms of long-term exposure to lower lead levels may be less noticeable but are still serious. Anemia is

common and damage to the nervous system may cause impaired mental function. Other symptoms are appetite loss, abdominal pain, constipation, fatigue, sleeplessness, irritability and headache. Continued excessive exposure, as in an industrial setting, can affect the kidneys.

Exposure to even small amounts of lead can be harmful, especially to infants, young children and pregnant women. No “safe” level of exposure to lead has been identified. Recent scientific studies indicate that health effects may be occurring in children at blood lead levels below 10 µg/dL, which was once considered a “safe” level. Lead exposure is most serious for young children because they absorb lead more easily than adults and are more susceptible to its harmful effects. Even low level exposure may harm the intellectual development, behaviour, size and hearing of infants. During pregnancy, lead can cross the placenta and affect the unborn child. Female workers exposed to high levels of lead have more miscarriages and stillbirths.

The International Agency for Research on Cancer (IARC) has recently classified inorganic lead compounds as *probably carcinogenic to humans (Group 2A)*. IARC has determined that organic lead compounds are *not classifiable as to their carcinogenicity to humans (Group 3)* based on inadequate evidence from studies in humans and in animals. Organic lead compounds, in contrast to other lead compounds, contain carbon (e.g., tetraethyl lead and tetramethyl lead which can be released when gas containing lead is burned).

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## Minimizing Your Risk

There are several precautions that can be taken to minimize exposure to lead. These include:

- taking appropriate safety precautions when renovating, particularly if pregnant women or children are present. Safety information is available from the Canadian Paint and Coatings Association, the Canada Mortgage and Housing Corporation and Health Canada.

- reducing exposure to dust in the home by ensuring children wash their hands regularly, and by keeping play areas as dust-free as possible. Vacuum carpets and upholstery at least once per week, and damp-mop (dusting with a damp cloth rather than a dry cloth, which disperses the dust but does not remove it) floors and other hard surfaces.
- following the directions on product labels.
- running cold water first thing in the morning or any other time the system hasn't been used for a number of hours, as lead levels in tap water typically increase as water stands in pipes. Use cold tap water for drinking, cooking and making baby formula, since hot water is more likely to contain lead.
- checking for and discarding old jewellery or toys which contain lead. Items that contain a high amount of lead are greyish in colour, heavy for their size and may leave a grey mark when rubbed against a piece of white paper if the lead is not coated.
- do not use any natural medications without a clear label of ingredients.

If you are concerned about lead exposure, your doctor can conduct a blood test to measure your blood lead level. If high lead levels are found in your blood, your doctor will work in consultation with you to identify the potential source of lead and offer recommendations for reducing exposure. For cases of severe lead poisoning, your doctor may also recommend chelation therapy.

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## Role of Governments

Lead is listed as a toxic substance under the *Canadian Environmental Protection Act, 1999* (CEPA 1999), the primary federal legislation that deals with toxic substances in the environment, which allows the federal government to control the importation, manufacture, distribution and use of lead and lead compounds in Canada. Please visit [http://www.ec.gc.ca/TOXICS/EN/detail.cfm?par\\_substance\\_ID=140&par\\_actn=s1](http://www.ec.gc.ca/TOXICS/EN/detail.cfm?par_substance_ID=140&par_actn=s1) for a list of risk management tools in place which address lead.

Health Canada conducts research on the effects of lead exposure, as well as on exposure levels, and works to prevent or minimize the exposure of Canadians to lead by developing regulations that restrict the use of lead in consumer products. To this end, Health Canada has developed the *Lead Risk Reduction Strategy for Consumer Products* under the *Hazardous Products Act*. The intent of the strategy is to reduce the risk of childhood lead exposure by regulating the lead content of consumer products to which children are most likely to be exposed. The 2005 *Children's Jewellery Regulations*, which restrict the lead content of jewellery items intended for children under 15 years of age and the 2005 *Surface Coating Materials Regulations* were developed under the strategy. Additional regulations are underway.

Health Canada also promotes public and industry awareness of lead-related health issues and works with partners in industry and at all levels of government to develop guidelines concerning lead safety. Regulations under CEPA 1999 restrict the use of lead in gasoline and control its release from secondary lead smelters. The Act also regulates the disposal at sea of material containing specified concentrations of lead.

Drinking water quality is a responsibility shared among various levels of government. Health Canada works closely with the provinces and territories, through the Federal-Provincial-Territorial Committee on Drinking Water, to produce *Guidelines for Canadian Drinking Water Quality*, which includes a maximum acceptable concentration of 0.010 mg/L for lead in drinking water. Provinces and territories are responsible for setting their own enforceable guidelines or regulations for drinking water, based on these guidelines.

## Need More Info?

More information can be found at  
[www.chemicalsubstances.gc.ca](http://www.chemicalsubstances.gc.ca)

Health Canada's "It's Your Health" information sheet on "Lead"  
[www.hc-sc.gc.ca/iyh-vsv/environ/lead-plomb\\_e.html](http://www.hc-sc.gc.ca/iyh-vsv/environ/lead-plomb_e.html)

Health Canada's "It's Your Health" information sheet on "Lead-based Paint"  
[www.hc-sc.gc.ca/iyh-vsv/prod/paint-peinture\\_e.html](http://www.hc-sc.gc.ca/iyh-vsv/prod/paint-peinture_e.html)

Health Canada's "It's Your Health" information sheet on "Lead Crystalware"  
[www.hc-sc.gc.ca/iyh-vsv/prod/crystal\\_e.html](http://www.hc-sc.gc.ca/iyh-vsv/prod/crystal_e.html)

Environment Canada's "Enviro Facts" information sheet on "Toxic Chemicals in Atlantic Canada – Lead"  
[www.atl.ec.gc.ca/epb/envfacts/lead.html](http://www.atl.ec.gc.ca/epb/envfacts/lead.html)

Health Canada's Lead Information Package: Some Commonly Asked Questions about Lead and Human Health  
[www.hc-sc.gc.ca/ewh-semt/contaminants/lead-plomb/asked\\_questions-questions\\_posees\\_e.html](http://www.hc-sc.gc.ca/ewh-semt/contaminants/lead-plomb/asked_questions-questions_posees_e.html)

Health Canada: Lead in drinking water  
[www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc\\_sup-appui/lead-plomb/index\\_e.html](http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/lead-plomb/index_e.html)

Health Canada: Lead  
[www.hc-sc.gc.ca/ewh-semt/contaminants/lead-plomb/index\\_e.html](http://www.hc-sc.gc.ca/ewh-semt/contaminants/lead-plomb/index_e.html)

Canada Mortgage and Housing Corporation. 2004. Lead in Your Home. Ottawa, Canada.  
[www.cmhc.ca](http://www.cmhc.ca)

Canadian Paint and Coatings Association  
[www.cdnpaint.org](http://www.cdnpaint.org)

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