

# Lead and your health

Lead is not required for any normal bodily function. This metal has been used extensively by many industries in the past but as our knowledge of its toxic health effects expanded, the use of lead has been regulated and reduced.

## What is lead?

Lead is a naturally occurring heavy, bluish-grey metal with a relatively low melting point (327°C) found in the earth's crust with an average concentration of 10 parts per million (ppm). The concentration of lead in soil is higher in mineralised areas. It rarely occurs naturally as a metal, and is most commonly associated with other elements to form lead compounds. The most economically important compound is the mineral galena (lead sulphide), with other minerals such as anglesite (lead sulphate), cerrussite (lead carbonate) and litharge (lead oxide) of minor importance. Metallic lead is corrosion-resistant, easily shaped and mixed with other metals to form alloys. Lead is commonly used in roof flashing, paint (**domestic paint pre-1970, although lead concentrations up to 0.5% could be found in paint up to 1991**), shot and ammunition, solder, fishing sinkers, ceramic glazes, dyes and shielding to protect from radiation (x-rays etc.). It has also previously been used in water pipes and food storage cans. The most widespread use of lead today is in vehicle batteries.

## What happens to lead in the environment?

Prior to being phased out in 2000, leaded petrol was the most prominent source of environmental lead. Today, the main sources of lead are from mining, smelting and refining. Lead particles can be removed from the air by rain and by physical fallout into the surrounding environment. Once lead falls onto soil or water, it sticks strongly to soil and sediment particles, where it can remain for many years. The movement of lead into groundwater is highly unlikely unless rainfall is acidic. The solubility of lead in water and its movement from the

soil depends upon the physical and chemical properties of the lead compound and the soil.

## How might I be exposed to lead?

Lead is often found in mining and smelting areas, older houses and soil near heavily trafficked roadways (due to leaded petrol).

People living near smelters and mines can be exposed to lead by breathing contaminated air or swallowing dust, soil or rainwater contaminated with lead.

People living in older houses may be exposed to lead by drinking water from old lead plumbing or swallowing lead paint chips directly or fragmented in dust.

In addition to workers in lead production industries, people may be exposed to lead when they work in jobs such as radiator repair or car battery manufacture and recycling. Hobbies where lead is used such as lead-lighting, making stained glass, firing and glazing pottery, soldering electronics, making fishing sinkers and renovating older homes, furniture, cars or boats coated with lead-based paint can also be an exposure risk.

Children may be exposed to lead through hand-to-mouth activity when their hands come into contact with contaminated soil or dust.

There is also a potential risk of lead exposure from some imported products such as; toys containing lead or coated with lead-based paint, cosmetics (hair dye, kohl or surma), jewellery, canned food, traditional medicines and ceramic cookware where lead can be released from poorly fired clay or glazing during cooking or storage of alcoholic, acidic or hot food.



### How does lead enter and leave the body?

Lead can enter your body by breathing air containing very small particles and swallowing lead-bearing dust, soil or paint chips. Only very small amounts of lead on your skin can pass into your bloodstream, but if it is not washed off, it can easily be accidentally swallowed.

Unless you are in close proximity to a source, such as working at a smelter, mine or lead-related industry, the most common way for lead to enter the body is by mouthing or sucking contaminated objects such as hands. Once particles are swallowed, the amount of lead that actually enters your body will depend on how old you are, when you last ate and how well the lead particles dissolve in the stomach juices. Generally, lead sulphide is less soluble in the stomach than lead sulphate, carbonate and oxide compounds. If adults and children swallow the same amount of lead, a larger proportion will end up in the blood of children (about 50% of ingested lead is absorbed from the stomach) compared to adults (about 10% is absorbed).

Shortly after lead is absorbed into your body it travels in your blood to soft tissues and organs, such as liver, kidneys, brain, muscles and heart where it is either stored or excreted in your urine and faeces. About 99% of the lead that enters an adult will be excreted within a couple of weeks, but only about 32% of the lead taken in by children will leave the body. After several weeks, most of the remaining lead moves to your bones and teeth. Some lead can be stored for up to 30 years but it can leave your bones and move back into your bloodstream when bone is remodelled especially during pregnancy and breast feeding, bone repair, and osteoporosis in later life. Lead absorbed by the mother can also pass through the placenta to reach the baby. If exposure is ongoing, greater amounts of lead will accumulate in the body, especially in bone. The amount of lead measured in your blood is the best indicator of recent exposure.

### How lead can affect health

The effects of lead are the same whether it enters by breathing or swallowing. The central nervous system is the main target for lead toxicity in both adults and children. In adults, long-term exposure to low levels of lead may be associated with weakness in fingers, wrists and ankles, headaches, fatigue, small increases in blood pressure, anaemia and damaged nerve and renal function. At very high levels, lead can severely damage brain and kidney function in adults and children and ultimately cause death. In pregnant women, high levels of exposure may cause decreased birth weight or miscarriage and in men it can damage the organs responsible for sperm production. There is no conclusive evidence at this time that lead is carcinogenic (cancer causing).

### Can lead affect my children?

Children are considered to be more susceptible than adults to health effects from lead because (1) their brains, which are the main targets, are still developing and vulnerable and (2) they swallow, absorb and retain more lead in their body. Lead exposure may start as early as in the womb if mothers have lead accumulated in their bodies. Babies and small children can breathe and swallow lead while they play on the ground or floor by; mouthing toys contaminated with lead from soil or dust, hand-to-mouth activity, eating soil (pica) or swallowing flaking old paint chips which can contain up to 50% lead.

Health effects will depend on how much lead a child swallows and absorbs. At high blood lead levels, effects may include anaemia, colic, muscle weakness, anorexia and brain damage with seizures. In some cases lead levels may need to be lowered by treating the child with drugs that can bind to lead to help eliminate it from the body. Long-term exposure to low levels of lead may be associated with reduced growth, learning difficulties, behavioural problems and reduced IQ in young children.

### Is there a safe level of lead exposure?

In 2009 the National Health and Medical Research Council (NH&MRC) stated that “all Australians should have a blood lead level below 10 µg/dL (micrograms per decilitre)” and lead exposure in children, pregnant and breast-feeding women should be minimised. The level of 10 µg/dL should not be interpreted as ‘safe’ because no threshold level has been found below which any exposure to lead can be considered safe.

Blood lead levels above 10 µg/dl are more likely to occur in places where smelting and large scale lead mining operations are found, such as Port Pirie, Mt Isa, Lake Macquarie and Broken Hill.

If you think that a member of your family has been exposed to high levels of lead or may have lead poisoning, you should discuss this with your doctor. The doctor may recommend a blood test to assess the level of exposure and determine if further steps are necessary to reduce the health effects and minimise further exposure.

### How can I reduce my risk of exposure to lead?

It is important for families to know about the sources of lead in their homes and avoid exposure to these sources. In the home, deteriorating lead-based paint and renovating old painted surfaces pose the greatest exposure risk. Test kits that detect if your paint contains lead are available from most paint retailers. Making sure that surfaces accessible to children, such as cot frames and window sills are not coated with lead-based paint and safely removing or covering old paint with new paint will reduce the risk.

Pregnant women and children should not be present during demolitions and renovations. Stripping lead painted surfaces must be done without generating dust or fumes (e.g. not by using a heat gun) and debris must be disposed of safely (e.g. not by burning).

Lead dust can be brought inside on your hands and clothes if lead is present in your workplace. If you work with lead, your family’s exposure can be reduced by showering, changing clothes and washing private vehicles before leaving work.

In lead contaminated environments (e.g. near smelters) regular cleaning to remove household dust, particularly in areas where children play and sleep and soil is tracked inside, will minimise exposure. Cleaning tips: vacuum carpets, furnishings and furniture using a vacuum fitted with a HEPA filter (high efficiency particulate air filter), regularly damp dust and wet mop surfaces, remove dust from door and window screens and sills and dispose of vacuum dust in rubbish bins, not on the garden.

### Advice for parents of children living in areas with lead contamination

In areas where exposure risk is high, children require regular hand and face washing and drying so that lead is not accidentally swallowed, especially before eating or sleeping and after playing outside or with pets. It is important that children eat a healthy balanced diet with adequate calcium, iron and vitamin C. Good nutrition with frequent meals and snacks lowers the amount of swallowed lead that is absorbed and may reduce some toxic health effects. Children should be encouraged to eat in high chairs or at tables and food dropped on the floor should be discarded.

Regular cleaning of toys, particularly those used outside, will reduce the potential for transferring lead inside and ingestion via mouthing activities. Babies and young children should never be present during sweeping, vacuuming or renovating. If rainwater could possibly contain lead dust it should not be used for cooking, food preparation or drinking (including making up baby formula or cordial). Windows and doors should be kept closed on windy days and outdoor eating and play areas cleaned before use. Ceiling cracks should be

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sealed to reduce the dust entering the home. Maintaining a clean house and using door mats or ideally removing dirty boots and shoes outside to prevent tracking in soil will also reduce the risk of a child's exposure to lead.

### Where can I get more information?

Lead poisoning and treatment:  
<http://www.wch.sa.gov.au/services/az/divisions/labs/geneticmed/lead.html>

Exposure of children:  
<http://enhealth.nphp.gov.au/council/pubs/pdf/childactivity.pdf>

Exposure reduction strategies:  
<http://www.health.sa.gov.au/PEHS/topics/topic-ptpirie-services.htm>

Lead-safe renovation:

<http://www.planning.nsw.gov.au/plansfraction/pdf/managinglead.pdf>

<http://www.epa.gov/lead/pubs/renovaterightbrochure.pdf>

[http://www.epa.gov/lead/pubs/contractor\\_brochure.pdf](http://www.epa.gov/lead/pubs/contractor_brochure.pdf)

Lead paint removal:

<http://www.environment.gov.au/atmosphere/airquality/publications/pubs/leadpaint.pdf>

Lead dust removal:

<http://maine.gov/dep/rwm/lead/pdf/dustremovalmaunal.pdf>

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