HEAVY METAL EXPOSURE

Metal Toxicity, Metal Poisoning

The toxic effect of certain metals in certain forms and doses on life.

⚠️ Risk factor ⚠️ Male & Female

ℹ️ About Heavy metal exposure

Heavy metals include metals such as lead, mercury, boron, aluminum, cadmium, arsenic, antimony, cobalt, and lithium. Only a few such heavy metals have been researched in connection to reproductive function. People are continually exposed to metals in the environment. Medical tests can detect metals often, but this is to be expected and alone is not evidence that a person is poisoned. Metal screening tests should not be used unless there is reason to believe that a person has had excessive exposure to metals. People should seek medical testing for poisoning only if they are concerned for a particular reason, and physicians should consider a patient’s history and physical examination before conducting tests to detect metals.

An option for treatment of metal poisoning may be chelation therapy, which is a technique which involves the administration of chelation agents to remove metals from the body. Chelating agents are molecules that have multiple electron-donating groups, which can form stable coordination complexes with metal ions. Complexation prevents the metal ions from reacting with molecules in the body, and enable them to be dissolved in blood and eliminated in urine. It should only be used in people who have a diagnosis of metal intoxication. Chelation therapy is administered under very careful medical supervision due to various inherent risks. When the therapy is administered properly, the chelation drugs have significant side effects. Chelation administered inappropriately can cause neurodevelopmental toxicity, increase risk of developing cancer, and cause death; chelation also removes essential metal elements and requires measures to prevent their loss.

**Symptoms**

- dark circles under the eyes
- depression
- digestive problems
- extreme fatigue
- alcohol intolerance
- anxious and irritable
- insomnia
- loss of memory and forgetfulness
- low body temperature
- chronic unexplained pain
- coated tongue
- cold hands and feet
- frequent colds
- headaches
- high levels of toxic metals in your blood, urine or tissues
- metallic taste in mouth

**Associated diseases**

- cancer
- neurological disorders
- male infertility
- reproductive disorder
- reduced spermatogenesis
- Alzheimer’s disease
- hypertension
- insomnia
- asthma
- arthritis

**Complications**

- death results from profound shock
- myocarditis
- multi-organ failure
- cancer
- permanent learning and behavior disorders

**Risk factors**

- lead-based paints
- foods grown in lead-rich soil
- eating fish or shellfish contaminated with methylmercury
- breathing contaminated workplace air or skin contact during use in the workplace
- release of mercury vapor from dental amalgam fillings
- tobacco smoke
- eating foods containing cadmium
- contact with cadmium from household products

**Prevention**

Prevention strategies can be divided into individual (measures taken by a family), preventive medicine (identifying and intervening with high-risk individuals), and public health (reducing risk on a population level). Screening is an important method in preventive medicine strategies.

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**How it can affect fertility**

Lead (Pb), which is commonly found in batteries, metal products, paints, ceramics, and pipes, is one of the most prominent heavy metals. Environmental and occupational exposure to lead have been associated with increasing number of diagnosed fertility impairments. Lead interrupts the hypothalamic-pituitary axis and has been reported to alter hormone levels, alter the onset of puberty, and decrease overall fertility. Lead may alter sperm quality in men, and cause irregular menstruation, induce preterm delivery, and cause miscarriage, stillbirth, and spontaneous abortion in women. Chronic exposure to lead can also induce functional disorder (decrease of testosterone synthesis) or morphological disorder.

Mercury (Hg) is commonly found in thermometers, batteries, and industrial emissions. Mercury concentrations increase in the food chain, resulting in bioaccumulation that can negatively impact reproduction in humans who consume food, usually tainted seafood. Ultimately, mercury can disrupt spermatogenesis and disrupt fetal development.

Boron (B) is another heavy metal that is used in the manufacturing of glass, cement, soap, carpet, and leather; its effects on the hypothalamic-pituitary axis are comparable to lead.

Chronic exposure to heavy metals such as As (arsenic) may also affect sperm quality. Trace amounts of As have been observed in semen which suggests that it may inhibit the function of enzymes present in the acrosome and the membrane which covers the head of the sperm.

While there is not much research on cadmium (Cd), it has been shown experimentally to cause testicular necrosis in mice, as well as marked changes in libido and infertility. Heavy metal toxicity has been associated with male infertility, reproductive disorder, reduced spermatogenesis, and so forth. Cd in combination with other heavy metals such as Cr (chromium), As (arsenic), and Pb (lead) may account for decreased male fertility rate in the developed countries observed by reduced sperm counts and testis function.

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**Prognosis**

Many of the chemicals used world-wide in today’s society, including pesticides and endocrine disruptors, among others, may have various damaging effects on the reproductive health of both men and women.
Eliminating every exposure is unrealistic; however, identifying, eliminating, or minimizing even one factor may have significant positive effects on fertility for both men and women.

Find more about related issues

**Diagnoses**

**Amenorrhoea**
The absence of a menstrual period in women of reproductive age.
Learn more at: [www.fertilitypedia.org/therapy/diag/amenorrhoea](http://www.fertilitypedia.org/therapy/diag/amenorrhoea)

**Anovulation**
Failure of the ovaries to release an oocyte over a period of time generally exceeding 3 months.
Learn more at: [www.fertilitypedia.org/therapy/diag/anovulation](http://www.fertilitypedia.org/therapy/diag/anovulation)

**Globozoospermia**
A rare abnormality of sperm morphology, with the majority of sperm cells being round-headed, which leads to male infertility.
Learn more at: [www.fertilitypedia.org/therapy/diag/globozoospermia](http://www.fertilitypedia.org/therapy/diag/globozoospermia)

**Oligoasthenoteratozoospermia**
Male fertility diagnosis defined as a combination of low sperm concentration, reduced motility and abnormal sperm morphology in the ejaculate.
Learn more at: [www.fertilitypedia.org/therapy/diag/oligoasthenoteratozoospermia](http://www.fertilitypedia.org/therapy/diag/oligoasthenoteratozoospermia)

**Repeated implantation failure**
The absence of implantation after three or more transfers of high quality embryos or after placement of 10 or more embryos in multiple transfers.
Learn more at: [www.fertilitypedia.org/therapy/diag/repeated-implantation-failure](http://www.fertilitypedia.org/therapy/diag/repeated-implantation-failure)

**Gallery**

**Lead poisoning - blood film**
Basophilic stippling (arrows) of red blood cells in a 53-year-old who had elevated blood lead levels due to drinking repeatedly from glasses decorated with lead paint.

![Lead poisoning - blood film](image)

**Recycling lead in a lead-acid battery recovery facility**
Battery recycling workers are at risk for lead exposure.

![Recycling lead in a lead-acid battery recovery facility](image)

**Sources**

"Lifestyle factors and reproductive health: taking control of your fertility" —by Sharma licensed under [CC BY 2.0](http://ncbi.nlm.nih.gov/pmc/articles/PMC3717046/)

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"Heavy Metal Levels in Adolescent and Maternal Blood: Association with Risk of Hypospadias" —by Sharma et al. licensed under [CC BY 3.0](http://hindawi.com/journals/ismr/2014/714234/)

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"Recycling lead in a lead-acid battery recovery facility." (https://en.wikipedia.org/wiki/Lead_poisoning#/media/File:Recycling_lead_in_a_lead-acid_battery_recovery_facility.jpg) — by NIOSH licensed under CC BY 2.0