



## Health Information about Arsenic



Arsenic has been discovered in Maryland in and around industrial sites and in groundwater at levels that are higher than recommended for long-term exposure. This fact sheet answers general health questions about exposures to arsenic.

### What is arsenic?

Arsenic is a naturally occurring metalloid (metal-like) element. In nature, it is usually found in combination with other elements. Most inorganic and organic arsenic compounds are white or colorless powders that do not evaporate. They have no smell, and most have no special taste. Thus, you usually cannot tell if arsenic is present in your food, water, or air. The mineral (inorganic) forms of arsenic are generally more toxic than its more complex organic compounds found naturally in plant and animal tissues.

### What is arsenic used for?

Arsenic has been used to control insects, weeds, mold and bacteria, and rodents. Arsenic-containing pesticides have been used in fruit orchards and other agriculture, as well as in wood preservatives, dyes and paints, human and animal medications, food supplement products, glass-making, electronics manufacturing, and leather tanning.

### How are people exposed to arsenic?

- Many foods contain small amounts of arsenic. Our greatest source of exposure is usually through food and water. Fish and shellfish can accumulate arsenic, most of which is in an organic form that has low potential to cause harm.
- Eating or breathing soil or dust particles contaminated with arsenic.
- Drinking groundwater from natural deposits containing arsenic.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Working in a job that involves arsenic production or use, such as copper or lead smelting, wood treating, or pesticide application.
- Touching arsenic-containing materials, however arsenic is not easily absorbed through the skin.

### What happens to arsenic in the environment?

Since arsenic is a basic element, it cannot be destroyed. It simply changes forms and moves around in the environment. It is generally diluted and moved by water and air. It may stay in soil and sediments for very long periods of time, and it may or may not travel with water through the soil. Some plants absorb arsenic.

### What happens to arsenic in the human body?

Whether arsenic enters the body by eating, drinking, inhalation through the lungs, or absorption through the skin, it is carried in the bloodstream to all parts of the body. The liver converts absorbed arsenic to less hazardous forms and the kidneys then remove it in the urine. Most of the arsenic is gone several days after exposure. If greater amounts of arsenic are absorbed than the body can detoxify and eliminate, the body can develop an increasing burden of arsenic.

## **What are the harmful effects of arsenic?**

The effects of exposure to any hazardous substance depend on the route of the exposure (skin, inhalation, ingestion), how long the exposure lasts, and how high the exposure is. In any person, the effects also depend on the person's health history, personal traits and habits, and whether other chemicals are present. High levels of arsenic can result in death, while slightly lower levels can cause immediate effects such as nausea, vomiting, and diarrhea.

Chronic (long-term) exposure to arsenic has been shown to increase the risk of cancer of the skin, lungs, urinary bladder, and possibly kidney, liver, and prostate. The U.S. Environmental Protection Agency (EPA) and other organizations have classified arsenic as a known carcinogen. Other health effects are also associated with long-term exposure. Arsenic can cause a characteristic pattern of skin changes that involve a darkening of the skin and the appearance of small wart-like outbreaks on the palm, soles, and torso. Arsenic can also affect the peripheral nervous system and the blood count. Although some studies suggest that arsenic may also contribute to poor circulation, high blood pressure, heart disease, liver toxicity, diabetes, and reproductive effects, its role in these illnesses has not been clearly defined.

## **How does arsenic affect children?**

Children are exposed to arsenic in many of the same ways that adults are. Since children often play in the dirt and put their hands in their mouths, eating contaminated soil can be a more important source of arsenic exposure.

Children exposed to arsenic may have many of the same effects as adults. There is also some evidence that long-term exposure to arsenic in children may result in lower IQ scores. There is also some information suggesting that children may be less efficient at converting inorganic arsenic to the less harmful organic forms. For this reason, children may be more susceptible to health effects from inorganic arsenic than adults.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals show that large doses of arsenic that cause illness in pregnant females can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal tissues. Arsenic is found at low levels in breast milk.

## **How can families reduce the risks of exposure to arsenic?**

- Keep children from playing in contaminated dirt.
- Frequently wash toys, pacifiers, and other items that go into children's mouths.
- Wash hands and face after working or playing in the soil or playing on equipment and decks made of arsenic-treated lumber, especially before eating.
- Avoid using arsenic-treated lumber around the home. Never burn arsenic-treated wood.
- Cover contaminated soils with grass or other material.
- Wash garden vegetables and fruits to remove soil particles.
- Remove work and play shoes before entering the house.
- If you have a job that exposes you to arsenic, shower and change clothes before you leave work and wash work clothes separately from other clothes.
- Prevent pets from tracking contaminated soils into your home.
- Damp-mop floors and wipe counters, tables, and window ledges regularly.
- Test your domestic well for arsenic if you live in an area known to have arsenic-containing minerals.

### **Is there a medical test to determine whether I've been exposed to arsenic?**

There are tests available to measure arsenic in your blood, urine, hair, and fingernails. Urine tests are more reliable for arsenic exposure within the last few days. Because some fish contain arsenic, eating fish before a urine test may increase urine arsenic levels, although this may not indicate a health risk. Tests of hair and fingernails can measure exposure to arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. However, they cannot predict how and whether the arsenic levels in your body will affect your health.

### **Has the government made recommendations to protect human health?**

The EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted the uses of arsenic in pesticides. EPA has set a limit of 0.01 milligram per kilogram for arsenic in drinking water. The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit of 10 micrograms of arsenic per cubic meter of workplace air for 8-hour shifts and 40-hour work weeks.

### **A note about arsenic-treated lumber**

Presently, about 90% of all arsenic produced is used as a preservative for wood to make it resistant to rotting and decay. The preservative is copper chromated arsenic (CCA) and the treated wood is referred to as "pressure-treated." In 2003, U.S. manufacturers of wood preservatives phased out the use of CCA in wood products for certain residential uses, such as play structures, picnic tables, decks, fencing, and boardwalks.

### **What is the usual concentration of arsenic in Maryland soils?**

Naturally occurring arsenic concentrations in soils in the eastern and central regions of the State typically range from non-detectable to a maximum of 10 mg/kg. Extensive data collection and evaluation has resulted in the Maryland Department of the Environment estimating the mean arsenic concentrations in the eastern and central regions of the State to be 2.3 and 3.3 mg/kg, respectively. Localized areas within the eastern and central regions may have lower and higher naturally occurring concentrations of arsenic. Within the Annapolis area geologic outcrops have resulted in concentrations in the 10 to 25 milligram per kilogram range.

### **Where can I get more information?**

Fact sheets are available from the Agency for Toxic Substances and Disease Registry:

*ToxFAQs* <http://www.atsdr.cdc.gov/tfacts2.html>

*Public Health Statement* (more detailed) <http://www.atsdr.cdc.gov/toxprofiles/phs2.html>

*Arsenic Treatment for Individual Wells in Maryland*, Maryland Department of the Environment  
<http://www.mde.state.md.us/assets/document/FactSheets/arsenic%20fact%20sheet%20final.pdf>

Information is also available from the Maryland Department of the Environment (410-537-3000) and the Maryland Department of Health and Mental Hygiene (410-767-6234).

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