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“Arsenic is in our environment, and children may be less able to process it out of their bodies than adults. Exposure to arsenic can result in changes in the brain, resulting in lower IQs, impaired memory, learning problems and behavioral problems.

The most common sources of exposure are arsenic in the soil and water and on outdoor surfaces. Arsenic is used to treat wood, minimizing fungal decay and insect infestation, and can be found in decks, playground equipment and picnic tables.

This article explains ways to avoid contact with arsenic-treated wood as well as ways to minimize the impact such exposure might have on your child. Learn how to reduce your child’s risk. Learn also how to support regulatory action to reduce the amount of arsenic in wood products, animal feed and especially drinking water sources.”

- Larry B. Silver, MD

What is arsenic?

Arsenic is a semi-metal element that occurs naturally in the environment and in living organisms. It has no odor or taste. Arsenic combines with other elements to form many different compounds, some of which are more harmful than others.¹ Natural sources of arsenic in the atmosphere are volcanic eruptions and forest fires.²

Much more arsenic is released into the environment from human activity than from natural sources.³ Arsenic and arsenic compounds find their way into our surroundings from a variety of industrial and agricultural processes. For example:

- Ninety percent of industrial arsenic use is in chromated copper arsenate (CCA), a pesticide used to protect wood from fungal decay and insect infestation. It is often found in outdoor wooden structures such as decks, picnic tables and playgrounds.
- Arsenic is used in the manufacture of many consumer

products, including semi-conductors, paints, metals and medicine. Making or disposing of these products may release arsenic into the environment.²

- Arsenic escapes into the atmosphere during mining, ore smelting and the burning of coal.³
- Arsenic is added to chicken and pig feed to help control disease. Most of the arsenic in the feed passes through the animals during digestion, and the arsenic-laced manure is later used to fertilize crops.⁴

The US Environmental Protection Agency and World Health Organization have established a limit of arsenic of 10 parts per billion in drinking water, equivalent to one droplet of water in 26,000 gallons. The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter (10 mg/m³) of workplace air.¹ Levels beyond these limits are known to cause a wide variety of health problems.

How does arsenic affect children’s health and nervous systems?

Nearly all of the research on the health effects of arsenic has focused on adults. Children may not be as good at processing arsenic as adults, making them

more susceptible to its highly toxic effects.¹

A recent study conducted by Columbia University established a link between arsenic-contaminated

drinking water and impaired intellectual function in children.⁵ Other studies have established links between exposure to arsenic and lower IQs, impaired memory,⁶ learning delays in animals⁷ and mental health problems.⁸ The ill health effects of arsenic appear to be stronger with elevated levels of manganese, another toxicant.⁶

High levels of arsenic are extremely deadly, but low-level, chronic exposure to the chemical can

also cause severe health problems. Arsenic has been linked to cancer of the bladder, skin, kidneys, nasal passages, lungs, liver and prostate.² Other health effects can include skin damage, blood circulation problems, liver damage, stomach pain, nausea, vomiting, diarrhea and neuropathy (nerve disorders). Arsenic can interfere with the body's hormones: animal studies have linked arsenic exposure during pregnancy to miscarriage, premature birth and birth defects.⁹

How are children exposed to arsenic?

Contaminated soil, water and outdoor surfaces, particularly CCA-treated lumber, are some of the most common ways children are exposed to arsenic. Playground equipment, decks and picnic tables made with treated wood release arsenic into soil and contaminate hands and clothing. Because young children put their hands in their mouths often, structures made from treated wood are particularly dangerous for this age group.³

While the arsenic in animal feed has not been shown to concentrate in dangerous levels in the

muscle tissues of chicken and pigs, it does accumulate at high levels in animal waste. When animal waste is then used as a fertilizer for food crops, the arsenic is absorbed into plant crops via the soil.³ While arsenic-containing pesticides were banned in the US for use on food crops in 1989, the contamination of ground water persists and is another potential source of exposure.¹⁰

Arsenic can be passed from mother to child across the placenta and has been detected in low levels in human breast milk.¹

What can you do to reduce your child's risk?

There are several important steps you can take to decrease your child's risk:

- Avoid contact with CCA-treated wood. If this is impossible, wear gloves and masks to lower the contamination levels. Use untreated lumber for construction around your house and remove any treated lumber that is in use. Sealing or painting CCA-treated lumber will only provide protection from arsenic for about six months.¹¹ To be safe, refinish these surfaces twice a year.
- Have children wash their hands after contact with treated wood on playgrounds, decks and picnic tables. Make sure that CCA-treated picnic tables are covered with a coated tablecloth.
- Prevent your children from eating dirt or putting objects in their mouths that may be contaminated with arsenic.
- If you live in an area with high levels of arsenic in the water, use a cleaner source, such as bottled water, or use an arsenic filter.

- Support regulatory action to reduce the amount of arsenic in wood products, animal feed and especially drinking water sources.

If you suspect contamination, have yourself and your child tested by a doctor. When requesting a test for arsenic, consider testing for the presence of other metals as well, given the interaction between arsenic and other metals.⁴ Symptoms of arsenic contamination include the following:

- Stomach irritation (including stomachache, nausea and vomiting)
- Decreased production of blood cells (including fatigue, abnormal heart rhythm and a "pins and needles" sensation in hands and feet)
- Skin color changes (darkening of the skin and the appearance of corns or warts on the palms, soles and torso.
- Throat irritation (sore throat)

Footnoted resources

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This and other Practice Prevention columns are written and published by LDDI staff at the Collaborative on Health and the Environment, with an introduction provided by **LDDI Medical Advisor Dr. Larry B. Silver**. Dr. Silver is a child and adolescent psychiatrist and clinical professor of psychiatry at Georgetown University Medical Center. He has published several popular books for parents, educators and clinicians about learning disabilities, attention deficit hyperactivity disorder, health and mental health. Past president of the Learning Disabilities Association of America, he received their Learning Disabilities Association Award. He also received the Berman Lifetime Achievement Award from the American Academy of Child and Adolescent Psychiatry for his contributions to the study and treatment of learning disabilities. More information about Dr. Silver is available on the LDDI website: www.healthandenvironment.org/initiatives/learning/r/prevention.

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