

PROMOTING HEALTHY ENVIRONMENTS FOR CHILDREN

Arsenic



KEY POINTS

- Arsenic is a widespread metallic element naturally occurring in soil and groundwater. It is also released into the environment by industrial sources.
- Children can be exposed through ingestion, inhalation, and prenatally.
- Arsenic is a carcinogen. Chronic exposure raises the risk of bladder, lung, and skin cancers. Early-life exposures, including prenatal exposures, are especially dangerous.
- Public health policies include standards that focus primarily on exposure through drinking water. Exposures may also occur, however, through other items consumed by children, including rice cereals, fruit juices, apple products, and brown rice syrup.

CLINICAL GUIDANCE

Children are at increased risk of exposure to arsenic because they eat more food, breathe more air, and drink more water per pound of body weight than adults. Children are also more likely to put their hands in their mouths.

Children can be exposed through:

- Ingestion of arsenic-contaminated well water.
- Consumption of rice-based cereals, brown rice syrup, juices, and other foods contaminated with arsenic.
- Ingestion of contaminated soil or dust.

Prevention is key!

- For babies, varied diets are recommended. Iron-fortified rice cereal need not be the first grain introduced to infants. Other options include oat, barley, and multigrain cereals. For older kids, varied grains are also recommended in addition to rice.
- When preparing rice, rinse it before cooking. Cook the rice in plenty of water (as you would pasta).
- When possible, avoid buying food products made with “rice syrup.”
- Limit consumption of fruit juices.
- Ask whether wood in family’s decking or playgrounds has been treated with Chromated Copper Arsenate (CCA). If yes, refer to a hardware or paint store for safe alternatives or wood coatings.
- Families with well water should have their water tested for arsenic (as well as for microbials and other metal and contaminants according to screening [tests recommended by the EPA](#)).
- In areas with elevated levels of arsenic in drinking water, consider drinking bottled water. Boiling does not remove arsenic and most filtration systems do not remove arsenic.

Clinical effects are different for acute versus chronic exposures.

- Arsenic is an anti-metabolite and can impact every organ system. The primary targets are the gastrointestinal tract and skin due to the high metabolic rates in those organs.
- Chronic exposure to arsenic can increase risk of bladder, lung, and skin cancers.
- Early childhood exposure is linked to increased risk of infection, bronchiectasis, altered hepatic function, neurodevelopment and cognitive effects, skin changes (eczematoid eruptions, hyperkeratosis, and hyperpigmentation), and increased risk of skin cancer.
- Prenatal exposure can lead to spontaneous abortion, stillbirth, preterm birth, and, later on, a risk of neurodevelopmental disorders and cancer.
- Acute, high-dose exposure can cause severe symptoms including nausea, vomiting, hematemesis, diarrhea, anorexia, weight loss, bone marrow suppression, cardiac dysfunction, and sensorimotor peripheral neuropathy (stocking-glove distribution that may mimic Guillain-Barre).
- Arsenic toxicity may be worse in children who are chronically malnourished, especially those with deficiencies in methionine, zinc, folate, vitamin A, and/or selenium.

Diagnose and treat arsenic exposure.

- Timed urine collection for 8 to 24 hours is the best diagnostic test. “Speciation” of the arsenic is mandatory to determine if the patient has been exposed to the toxic “inorganic” form of arsenic or the relatively non-toxic “organic” form of arsenic.
- The patient should avoid consuming seafood for at least 5 days prior to collecting the urine sample to rule out the contribution of the organic arsenic commonly found in many types of seafood.
- Hair and fingernail analysis have not been validated and are not recommended.
- Children suspected to have had significant arsenic exposure should be referred immediately to a medical toxicologist, Poison Control Center, or Pediatric Environmental Health Specialty Unit for possible chelation therapy.

FOR MORE INFORMATION

The following resources offer additional information regarding arsenic:

- [Pediatric Environmental Health, 4th Edition](#) – AAP Policy Manual
- [Tips to Reduce Arsenic in Your Baby's Diet](#) – HealthyChildren.org
- [Parents Plus: Limit infants' exposure to arsenic by feeding a variety of grains](#) – AAP News
- [PEHSU Fact Sheet: Arsenic in Food](#) – PEHSU Resource
- [What You Can Do to Limit Exposure to Arsenic: Tips to Limit Exposure to Arsenic](#) – FDA Resource
- [Heavy metals in baby food and juice: Advice from Environmental Pediatricians](#)