

**This fact sheet answers the most frequently asked health questions (FAQs) about americium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**HIGHLIGHTS: Very low levels of americium occur in air, water, soil, and food, as well as in smoke detectors. Exposure to radioactive americium may result in increased cancer risk. Americium has been found in at least 8 of the 1,636 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA).**

## What is americium?

Americium is a man-made radioactive chemical. Americium has no naturally occurring or stable isotopes. Two important isotopes of americium are americium 241 (<sup>241</sup>Am) (read as americium two-forty-one) and <sup>243</sup>Am. Both isotopes have the same chemical behavior in the environment and the same chemical effects on your body.

<sup>241</sup>Americium is used in ionization smoke detectors. There is no broad commercial use for <sup>243</sup>Am.

Nuclear reactors, nuclear explosions, or the radioactive transformation of plutonium can produce both <sup>241</sup>Am and <sup>243</sup>Am. These isotopes transform by giving off alpha radiation and turning into radionuclides of other elements. The half-life of a radioactive material is the time it takes for half of the material to give off its radiation. The half-life of <sup>241</sup>Am is 432 years and that of <sup>243</sup>Am is 7,370 years.

## What happens to americium when it enters the environment?

- Americium released to the air (from nuclear weapon tests) will be associated with particles and will settle to the soil and water in rain or snow. Small particles in air can travel far from the point of release.
- Americium released into water will stick to particles in the water or the sediment at the bottom.

- Americium strongly sticks to soil particles and does not travel very far into the ground.
- Plants may take up small amounts of americium from the soil.
- Fish may take up americium, but little builds up in the fleshy tissue. In shellfish, americium is attached to the shell and not to the parts you normally eat.

## How might I be exposed to americium?

- The general population may be exposed to very small amounts of americium in air, water, soil, and food. They may also be exposed to very low levels of americium radiation from smoke detectors and fallout from nuclear weapons testing.
- People working at sites where transuranic waste from nuclear weapons efforts or spent nuclear fuel from nuclear power plants are stored may be exposed to higher levels of americium.
- People producing or handling americium in smoke detectors or other devices may be exposed to higher levels of radiation.

## How can americium affect my health?

The radiation from exposure to americium is the primary cause of adverse health effects from americium. Inside your body, americium is concentrated in your bones, where it remains for a long time. The radiation given off by

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americium can change the genetic material of the bone cells and this could result in the formation of bone cancers. The chance of getting cancer is low at low doses, and increases as the dose increases.

Laboratory animals exposed to very high levels of americium had damage to the lungs, liver, and thyroid. However, americium is accumulated in these organs for only a relatively short time. It is unlikely that you would be exposed to amounts of americium large enough to cause harmful effects in these organs.

### How likely is americium to cause cancer?

Americium has not been found to cause cancer in humans. However, studies in animals have demonstrated that internal exposure to <sup>241</sup>Am can cause cancer in bone and liver, where americium is stored.

### How can americium affect children?

Children can be affected by americium in the same ways as adults. However, exposure as children could result in a longer period in which americium in the bones could affect nearby cells and increase the chance of causing cancer later in life. However, there are no actual data showing that children are more sensitive than adults to americium.

### How can families reduce the risk of exposure to americium?

Higher-than-normal levels of americium may be in soil near a nuclear waste site, nuclear reactor, or plant that manufactures ionization smoke detectors. Consequently, prevent your children from eating dirt and make sure they wash their hands frequently.

In the unlikely case that you are exposed to high levels of radioactive americium because of accidental release at a manufacturing facility, at a nuclear plant, or because a nuclear weapon has been damaged or detonated, follow the advice of public health officials who will publish appropriate guidelines for reducing exposure.

### Is there a medical test to show whether I've been exposed to americium?

Two types of tests are available for americium. One is to see if you have been exposed to a large dose of radiation, and the other is to see if americium is in your body. The first looks for changes in blood cell counts or in your chromosomes that occur at 3 to 5 times the annual occupational dose limit. It cannot tell if the radiation came from americium. The second type of test involves examining your blood, feces, saliva, urine, and even your entire body. It is to see if americium is being excreted from or remains inside your body. Either the doctor's office collects and sends the samples to a special lab for testing, or you must go to the lab for testing.

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

The Nuclear Regulatory Commission (NRC) has set limits for americium in workplace air of  $3 \times 10^{-12}$  microcurie per milliliter ( $\mu\text{Ci}/\text{mL}$ ) for <sup>241</sup>Am and <sup>243</sup>Am. EPA set an average annual drinking water limit of 15 picocurie of alpha-emitting radionuclides (such as americium) per liter (pCi/L) so the public radiation dose will not exceed 4 millirem.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological Profile for Americium. Atlanta, GA: U.S. Department of Health and Human Services.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

