

This fact sheet answers the most frequently asked health questions (FAQs) about cesium. 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:** Exposure to stable or radioactive cesium occurs from ingesting contaminated food or drinking water or breathing contaminated air. High levels of radioactive cesium in or near your body can cause nausea, vomiting, diarrhea, bleeding, coma, and even death. This may occur after nuclear accidents or detonation of atomic bombs. Stable (non-radioactive) cesium has been found in at least 8 of the 1,636 National Priority List (NPL) sites identified by the Environmental Protection Agency (EPA). Radioactive cesium has been found in at least 23 of the 1,636 NPL sites identified by the EPA.

### What is cesium?

Cesium is a naturally occurring element found combined with other elements in rocks, soil, and dust in low amounts. Naturally occurring cesium is not radioactive and is referred to as stable cesium. There is only one stable form of cesium naturally present in the environment, <sup>133</sup>Cs (read as cesium one-thirty-three).

Nuclear explosions or the breakdown of uranium in fuel elements can produce two radioactive forms of cesium, <sup>134</sup>Cs and <sup>137</sup>Cs. Both isotopes decay into non-radioactive elements. <sup>134</sup>Cs and <sup>137</sup>Cs generate beta particles as they decay. It takes about 2 years for half of <sup>134</sup>Cs to give off its radiation and about 30 years for <sup>137</sup>Cs; this is called the half-life.

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

- Cesium in air can travel long distances before settling to the ground or water.
- Most cesium compounds dissolve in water.
- In moist soils, most cesium compounds are very soluble.
- Cesium binds strongly to moist soils and does not travel far below the surface of the soil.
- Radioactive decay is a way of decreasing the amount of <sup>134</sup>Cs and <sup>137</sup>Cs in the environment.

### How might I be exposed to cesium?

- You can be exposed to low levels of stable or radioactive cesium by breathing air, drinking water, or eating food containing cesium.
- Food and drinking water are the largest sources of exposure to cesium.
- You can be exposed to radioactive cesium if you eat food that was grown in contaminated soil, or if you come near a source of radioactive cesium.
- Working in industries that process or use natural cesium or cesium compounds.
- Living near uncontrolled radioactive waste sites containing cesium.

### How can cesium affect my health?

It is highly unlikely that you would be exposed to high enough amounts of stable cesium to cause harmful health effects. Laboratory animals given very large amounts of cesium compounds showed changes in behavior, such as increased or decreased activity.

Exposure to large amounts of radioactive cesium can damage cells in your body from the radiation. You might also experience acute radiation syndrome, which includes nausea, vomiting, diarrhea, bleeding, coma, and even death in cases of very high exposures.

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

### How likely is cesium to cause cancer?

There are no studies regarding non radioactive cesium and cancer. There are no human studies that specifically associate exposure to radioactive cesium with increased cancer risk.

Because radioactive cesium emits ionizing radiation, carcinogenic effects similar to those observed in Japanese survivors of the atomic bombing incidents might be expected among individuals acutely exposed to very high levels of radiation from a radioactive cesium source.

Rats exposed to high doses of radiation from <sup>137</sup>Cs had increased risk of mammary tumors. Older rats seemed more resistant than younger ones.

### How can cesium affect children?

Children can be affected by cesium in the same ways as adults. Infants born to atomic bomb survivors exposed to high doses of ionizing radiation while pregnant, showed later signs of decreased mental abilities.

Exposure to the radiation from radioactive cesium has caused birth defects in animals.

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

Since cesium is naturally found in the environment, we cannot avoid being exposed to it. However, these relatively low amounts do not warrant immediate steps to reduce exposure. In the unlikely case that you are exposed to high levels of radioactive cesium because of accidental release at a nuclear plant or a nuclear weapon has been 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 cesium?

Two types of tests are available for radioactive cesium. One is to see if you have been exposed to a large dose of radiation, and the other is to see if cesium 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 cesium. The second type of test involves examining your blood, feces, saliva, urine, and even your entire body. It is to see if cesium is being excreted from or remains inside your body at levels that are higher than normal. 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 National Institute for Occupational Safety and Health (NIOSH) recommends a limit of 2 milligrams of cesium hydroxide per cubic meter of air (2 mg/m<sup>3</sup>) as an average for a 10-hour workday, 40-hour workweek.

The EPA has established a maximum contaminant level of 4 millirem per year for beta particles and photon radioactivity for man-made radionuclides (including radioactive cesium).

The Nuclear Regulatory Commission (NRC) has set limits for radioactive cesium in workplace air of 4x10<sup>-8</sup> microcurie per milliliter (μCi/mL) for <sup>134</sup>Cs and 6x10<sup>-8</sup> μCi/mL for <sup>137</sup>Cs. EPA has set an average annual drinking water limit of 80 picocurie per liter (pCi/L) for <sup>134</sup>Cs or 200 pCi/L for <sup>137</sup>Cs so the public radiation dose will not exceed 4 millirem.

### Reference

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

**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.

