

This fact sheet answers the most frequently asked health questions (FAQs) about strontium. 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 strontium occurs from ingesting contaminated food or drinking water or breathing contaminated air. In children, high levels of stable strontium can impair bone growth. High levels of radioactive strontium can cause anemia or cancer. Strontium has been found in at least 102 of the 1,636 National Priority List sites identified by the Environmental Protection Agency.

What is strontium?

Strontium is a naturally occurring element found in rocks, soil, dust, coal, and oil. Naturally occurring strontium is not radioactive and is either referred to as stable strontium or strontium. Strontium in the environment exists in four stable isotopes, ⁸⁴Sr (read as strontium eighty-four), ⁸⁶Sr, ⁸⁷Sr, ⁸⁸Sr.

Strontium compounds are used in making ceramics and glass products, pyrotechnics, paint pigments, fluorescent lights, and medicines.

Strontium can also exist as several radioactive isotopes; the most common is ⁹⁰Sr. ⁹⁰Sr is formed in nuclear reactors or during the explosion of nuclear weapons. Radioactive strontium generates beta particles as it decays. One of the radioactive properties of strontium is half-life, or the time it takes for half of the isotope to give off its radiation and change into another substance. The half-life of ⁹⁰Sr is 29 years.

What happens to strontium when it enters the environment?

- In air, strontium is present as dust, which eventually settles over land and water.
- Some strontium compounds dissolve in water.
- Some strontium compounds in soil can dissolve in water and move deeper in the soil to underground water.

- Radioactive decay and decontamination are the only ways of decreasing the amount of ⁹⁰Sr in the environment.

How might I be exposed to strontium?

- You can be exposed to low levels of stable strontium and radioactive strontium by breathing air, eating food, or drinking water.
- Food and drinking water are the largest sources of exposure to strontium.
- You can be exposed to radioactive strontium if you eat food that was grown in contaminated soil, or if you come near a source of radioactive strontium.

How can strontium affect my health?

Exposure to low levels of stable strontium has not been shown to affect adult health, but may harm children (see following section).

Breathing or ingesting low levels of radioactive strontium have not been shown to affect health. High levels of radioactive strontium can damage bone marrow and cause anemia and prevent the blood from clotting properly.

How likely is strontium to cause cancer?

The only stable strontium compound that may cause cancer is strontium chromate, but this is due to chromium not strontium.

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

Exposure to high levels of radioactive strontium may cause cancer. Leukemia has been seen in humans exposed to relatively large amounts of radioactive strontium. Leukemia and cancers of the bone, nose, lung, and skin have also been seen in laboratory animals.

The International Agency for Research on Cancer (IARC) has determined that radioactive strontium is a human carcinogen.

How can strontium affect children?

We do not know if exposure to strontium will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to radioactive strontium.

Exposure to high levels of stable strontium can result in impaired bone growth in children.

Children may be more susceptible than adults to the harmful effects of radioactive strontium.

How can families reduce the risk of exposure to strontium?

Having a balanced diet with sufficient amounts of vitamin D, calcium, and protein will reduce the amount of strontium that is absorbed.

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

All people have small amounts of stable strontium in their bodies. There are tests to measure the level of strontium in blood, hair, feces, and urine. These tests are most useful for people exposed to high levels. These tests cannot determine the exact levels of strontium you may have been exposed to or predict how the levels in your tissues will affect your health.

Two types of tests are available for radioactive strontium. One is to see if you have been exposed to a large dose of radiation, and the other is to see if strontium 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 strontium. The second type of test involves examining your blood, feces, saliva, urine, teeth, and even your entire body. It is to see if strontium is being excreted from your body, is in your teeth, or remains inside your body at levels that are higher than normal. The doctor's office collects and sends 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?

EPA has set a limit of 4000 micrograms strontium per liter of drinking water (4000 µg/L).

EPA has set a limit of 8 picocurie ⁹⁰Sr per liter of drinking water.

The Nuclear Regulatory Commission has set limits for radioactive strontium in workplace air for a 40-hour work week of 6×10^{-8} microcurie per milliliter (µCi/mL) for ⁸⁹Sr and 8×10^{-9} µCi/mL for ⁹⁰Sr. EPA has set an average annual drinking water limit of 20 picocuries per liter (pCi/L) for ⁸⁹Sr and 8 pCi/L for ⁹⁰Sr so the public radiation dose will not exceed 4 millirem.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological Profile for Strontium. 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.

