

This fact sheet answers the most frequently asked health questions (FAQs) about radium. 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's 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: Radium is a radioactive substance formed from the breakdown of uranium and thorium. Exposure to high levels results in an increased risk of bone, liver, and breast cancer. This chemical has been found in at least 18 of the 1,177 National Priorities List sites identified by the Environmental Protection Agency (EPA).**

## What is radium?

(Pronounced rā'dē-əm)

Radium is a naturally occurring silvery-white radioactive metal that can exist in several forms called isotopes. Radium is formed when uranium and thorium break down in the environment. Uranium and thorium are found in small amounts in most rocks and soil. Two of the main radium isotopes found in the environment are radium-226 and radium-228.

Radium undergoes radioactive decay. It divides into two parts—one part is called radiation and the other part is called a daughter. The daughter, like radium, is not stable, and it also divides into radiation and another daughter. The dividing of daughters continues until a stable, nonradioactive daughter is formed. During the decay process, alpha, beta, and gamma radiation are released. Alpha particles can travel only a short distance and cannot travel through your skin. Beta particles can penetrate through your skin, but they cannot go all the way through your body. Gamma radiation can go all the way through your body.

Radium has been used as a radiation source for treating cancer, in radiography of metals, and combined with other

metals as a neutron source for research and radiation instrument calibration. Until the 1960s, radium was a component of the luminous paints used for watch and clock dials, instrument panels in airplanes, military instruments, and compasses.

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

- Radium is constantly being produced by the radioactive decay of uranium and thorium.
- Radium is present at very low levels in rocks and soil and may strongly attach to those materials.
- Radium may also be found in air.
- High concentrations are found in water in some areas of the country.
- Uranium mining results in higher levels of radium in water near uranium mines.
- Radium in the soil may be absorbed by plants.
- It may concentrate in fish and other aquatic organisms.

## How might I be exposed to radium?

- Everyone is exposed to low levels of radium in the air, water, and food.

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

- Higher levels may be found in the air near industries that burn coal or other fuels.
- It may be found at higher levels in drinking water from wells.
- Miners, particularly miners of uranium and hard rock, are exposed to higher levels of radium.
- It may also be found at radioactive waste disposal sites.

### How can radium affect my health?

Radium has been shown to cause effects on the blood (anemia) and eyes (cataracts). It also has been shown to affect the teeth, causing an increase in broken teeth and cavities. Patients who were injected with radium in Germany, from 1946 to 1950, for the treatment of certain diseases including tuberculosis were significantly shorter as adults than people who were not treated.

### How likely is radium to cause cancer?

Exposure to high levels of radium results in an increased incidence of bone, liver, and breast cancer. The EPA and the National Academy of Sciences, Committee on Biological Effects of Ionizing Radiation, has stated that radium is a known human carcinogen.

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

Urine tests can determine if you have been exposed to radium. Another test measures the amount of radon (a breakdown product of radium) in exhaled air. Both types of tests require special equipment and cannot be done in a doctor's office. These tests cannot tell how much radium you were exposed to, nor can they be used to predict whether you will develop harmful health effects.

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

The EPA has set a drinking water limit of 5 picocuries per liter (5 pCi/L) for radium-226 and radium-228 (combined).

The EPA has set a soil concentration limit for radium-226 in uranium and thorium mill tailings of 5 picocuries per gram (5 pCi/g) in the first 15 centimeters of soil and 15 pCi/g in deeper soil.

The federal recommendations have been updated as of July 1999.

### Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogen: A substance that can cause cancer.

CAS: Chemical Abstracts Service.

National Priorities List: A list of the nation's worst hazardous waste sites.

Picocurie (pCi): A unit used to measure the quantity of radioactive material.

rem: A unit used to measure radiation dose.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1990. Toxicological profile for radium. 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.

