

This fact sheet answers the most frequently asked health questions (FAQs) about radon. For more information, call the CDC Information Center at 1-800-232-4636. 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: Radon is an odorless, colorless, tasteless, naturally-occurring radioactive gas formed from the breakdown of uranium and thorium. Exposure to high levels results in an increased risk of lung cancer.

What is radon?

Radon is a naturally occurring, radioactive, noble gas that is odorless, colorless, and tasteless. It is formed as part of three radioactive decay chains that begin with uranium or thorium. These elements are found in small amounts in most rock, soil, and water. Each atom of uranium or thorium decays or transforms about a dozen times, each time expelling radiation and forming a different element with different radioactive properties. Radium and then radon are formed midway through these decay chains.

Since radon is a noble gas, it releases from any chemical bonds that attach it, and it may travel far enough to reach groundwater or the air.

Radon progeny is the term given to those radioactive atoms with short half-lives into which radon quickly decays. Air, soil, and water contain many atoms that are at various points in these decay chains. A sample of any one is expected to contain a mixture of these radioactive elements or radionuclides, including radon and radon progeny.

What happens to radon when it enters the environment?

- Radon gas released from rocks and soil can move to air, groundwater, and surface water.
- Radon-222 has a radioactive half-life of about 4 days; this means that one-half of a given amount of radon will decay to radon progeny every 4 days.
- Radon progeny are solid particles that can be trapped inside the earth or, if in the air when radon decays, can attach to dust and other particles and move with the air. Radon progeny that are attached to dust can be removed by air filters.

How might I be exposed to radon and radon progeny?

- Radon is normally found at very low levels in outdoor air.
- Radon progeny are often attached to dust; you are exposed to them primarily by breathing them in.
- Radon and radon progeny are normally found at higher levels in indoor air in homes, schools, and office buildings.
- Concrete construction materials or cracks in the basement or foundation of a home may allow higher levels of radon and radon progeny inside the home.
- Elevated levels of radon and radon progeny can be found in areas with elevated levels of uranium or thorium. This can include most any mining or milling operation involving metals or phosphates.
- Radon and radon progeny are normally found in surface and groundwater and are expected to be in drinking water from these sources. They are also found in drinking water from wells that contain radon. Radon in water can become airborne especially when the water is used for cooking or showering.

How can radon and radon progeny affect my health?

When radon or radon progeny undergo radioactive decay, some of the decays expel high-energy alpha particles, which are the main source of health concerns. The main isotope of health concern is radon-222 (²²²Rn).

Many scientists believe that the alpha radiation dose from long-term exposure to elevated levels of radon progeny

Radon

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in air increases your chance of getting lung cancer. Cigarette smoking greatly increases your chance of developing lung cancer if you are exposed to radon and radon progeny at the same levels as people who do not smoke.

How likely are radon and radon progeny to cause cancer?

The Department of Health and Human Services (DHHS), International Agency for Research on Cancer (IARC), and the Environmental Protection Agency (EPA) consider radon to be a human carcinogen. The greater your exposure to radon, especially if you smoke cigarettes, the greater your chance of developing lung cancer.

How can radon and radon progeny affect children?

Smaller lungs and faster breathing rates may result in higher radiation doses to the lungs of children relative to adults. However, limited information from children employed as miners in China do not provide evidence of increased susceptibility to the effects of exposure to radon.

How can families reduce the risk of exposure to radon and radon progeny?

Indoor radon and radon progeny levels can be reduced by methods that include sealing the pathways through which radon can enter a building and installing a ventilation system that routes air from underneath the building (either under the slab or in the crawl space) to outdoor air. For more information, contact your state radon office, a professional radon testing and mitigation firm, the National Environmental Health Association's National Radon Proficiency Program, or the National Radon Safety Board.

Is there a medical test to determine whether I've been exposed to radon and radon progeny?

Radon in human tissues is not detectable by routine medical testing. Some radon progeny can be detected in urine and in lung and bone tissue. These tests cannot tell how much radon you were exposed to, nor can they be used to predict whether you will develop harmful health effects. Radon exposure is estimated by measuring radon levels in the air.

Has the federal government made recommendations to protect human health?

The EPA recommends fixing your home if measured indoor levels of radon are 4 or more picocuries per liter of air (4 pCi/L). The EPA also notes that radon levels less than 4 pCi/L still pose a health risk and can be reduced in many cases. If indoor radon levels need to be reduced, the EPA recommends using a certified radon mitigation specialist to ensure that appropriate methods are used to reduce radon levels.

The Mine Safety and Health Administration (MSHA) has adopted an exposure limit of 4 Working Level Months (WLM) per year for people who work in mines (WLMs basically combine the concentration of radon progeny in mine air with length of exposure inside the mine).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2012. Toxicological Profile for Radon. Atlanta, GA: U.S. Department of Public 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 and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636 FAX: 770-488-4178.

ToxFAQs™ Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaqs/index.asp>.

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.