

Radon & Health Fact sheet



IOWA

College of Public Health

Introduction

Radon is a naturally occurring gas that originates from the breakdown of uranium and is present in air, water, and soil (1). It is odorless, colorless, tasteless, and imperceptible to the senses. Radon is radioactive, forming other radioactive products called decay products over time. Higher radon concentration in the ground in Iowa results from historical glacial activity that carried rock containing uranium to Iowa (2). The uranium in this rock naturally decays to form radon. Because the glaciers deposited this rock unevenly, uranium and, as a result, radon levels in the ground vary from site to site.

Exposure Sources

Unstable radon decays into radioactive products and emits alpha particle radiation (1). These radioactive products can be inhaled and damage lungs the DNA in our lung cells. This damage can lead to genetic mutations, which may eventually cause lung cancer. Many people are exposed to radon by breathing in indoor air. The amount of radon in the air is measured in pCi/L (picocuries per liter of air). Radon gas can infiltrate homes from soil through small cracks in the foundation or openings around pipes, sump pumps, crawl spaces, drains, and other structures (2). Building materials, water supply, and natural gas are also sources of radon in the home.

Radon levels will increase in homes with poor ventilation and lower floors near the foundation, such as a basement or ground floor. Indoor radon levels are often higher than outdoors levels (1). Because of its unique glacial rock deposits, Iowa has the highest average indoor radon levels in the nation (2,3). Radon levels can vary from home to home because of the uneven distribution of radon in the ground (2). Radon testing is the only way to determine indoor radon concentrations (1,2,3).

Health Risks Associated with Radon

Cancer Health Risks

Radon causes cancer in humans (4,5) and, after smoking, is the second leading cause of lung cancer in the nation (1). For example, the Iowa Radon Lung Cancer Study concluded that “cumulative radon exposure in the residential environment is significantly associated with lung cancer risk” (5). The chances of getting lung cancer from radon increase with the indoor level of radon and the time spent in the home. People who smoke that are exposed to radon are at a 10 to 20 times higher risk of developing lung cancer than non-smokers (1). Moreover, with their different lung shapes and sizes and higher breathing rates, children are exposed to higher radon doses than adults. No consistent relationship has been found between elevated radon exposure and cancer at other sites.

Non-Cancer Health Risks

Lung cancer is the only established adverse health effect associated with exposure to elevated radon levels (1). Some studies are being conducted in examination of a potential association between radon exposure and risk of stroke and clonal hematopoiesis of indeterminate potential (CHIP) (6).

How is Radon regulated?

- There are no enforceable federal regulations for acceptable radon levels in indoor environments, such as individual residences or schools (1).
- The EPA recommends taking action to reduce radon levels if they are at or above 4 pCi/L to limit the risk of developing lung cancer (1).
- Radon levels below 4 pCi/L still carry risk and, in many cases, should be further reduced, especially for inhabited or heavily used areas (1).

What can you do?

- Because the entire state of Iowa is at high risk of radon in homes and other buildings, the Iowa Department of Health and Human Services recommends testing every two years or after renovating your home (3). Radon testing is inexpensive and reliable.
- If the results from radon testing are greater than or equal to 2 pCi/L, installing a radon mitigation system can range from \$800 to \$2,500 (3).

References



1. Centers for Disease Control and Prevention (2023). Radon Toxicity: Standards and Regulations. Agency for Toxic Substances and Disease Registry. <https://www.atsdr.cdc.gov/csem/radon/standards.html>
2. Iowa Department of Health and Human Services (2020). Iowa Radon Home Buyers and Sellers Fact Sheet. <https://hhs.iowa.gov/media/7917/download?inline=#:~:text=Long%20ago%2C%20glacial%20activity%20left,harmful%20to%20humans%20when%20inhaled.>
3. Iowa Department of Health and Human Services (n.d.) Radon and You: What You Need to Know to Protect You and Your Family. [https://hhs.iowa.gov/media/7880/download?inline=.](https://hhs.iowa.gov/media/7880/download?inline=)
4. International Agency for Research on Cancer. (1988). Man-made mineral fibres and radon (IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 43). <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Man-Made-Mineral-Fibres-And-Radon-1988.>
5. Field, R. W., Steck, D. J., Smith, B. J., Brus, C. P., Fisher, E. L., Neuberger, J. S., Platz, C. E., Robinson, R. A., Woolson, R. F., Lynch, C. F. (2000). Residential Radon Gas Exposure and Lung Cancer: The Iowa Radon Lung Cancer Study. *American Journal of Epidemiology*, 151 (11), pp. 1091-1102. [https://cheec.uiowa.edu/sites/cheec.uiowa.edu/files/Residential%20Radon%20Gas%20Exposure%20and%20Lung%20Cancer_Iowa%20Study.pdf.](https://cheec.uiowa.edu/sites/cheec.uiowa.edu/files/Residential%20Radon%20Gas%20Exposure%20and%20Lung%20Cancer_Iowa%20Study.pdf)
6. UNC Gillings School of Global Public Health (2024) Is Radon Linked to a Health Condition Other Than Lung Cancer? From September 6, 2024. <https://sph.unc.edu/sph-news/is-radon-linked-to-a-health-condition-other-than-lung-cancer/>