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Grade
Science Article
Date

Radiation: What You Need to Know

Radiation can affect our health—for better or worse.

You might not know exactly how to describe it, but chances are good that you know the word radiation can have two very different connotations. On the one hand, radiation exposure was one of the most feared consequences after an earthquake and a tsunami damaged a nuclear reactor in Japan back in 2011. On the other hand, radiation may have helped someone you know fight a disease such as cancer.

All Around Us

Radioactive materials give off invisible atomic particles or energy called radiation. “Radiation is always around us,” notes Dr. Ritsuko Komaki, a professor of radiation oncology at the MD Anderson Cancer Center in Houston.



Some radiation comes from the sun, along with the sun's heat, visible light, ultraviolet rays, and more. Tiny bits of nuclear radiation are in soil too. "Usually it's a very low dose, and it's not harmful," says Komaki. In fact, most radiation around us isn't something to worry about. But very high exposures to radiation can cause sickness and, in the worst cases, death.

Activities such as mountain climbing or taking a long airplane ride expose you to slightly more radiation—because you're closer to the sun. Experts generally don't worry about those exposures either.

Nuclear reactors, such as those at the Fukushima Daiichi plant in Japan that was damaged by the 2011 earthquake and tsunami, split uranium atoms. That action releases energy. The energy is used to turn water into steam, which moves turbines that make electricity. When everything works, the process doesn't pollute the air. Nuclear plants' fuel and certain wastes, however, are radioactive.

When emergency measures failed at Fukushima, explosions and fires released radioactivity into the environment. Cleanup has taken years. And the accident has heightened fears about radiation.

Radiation's Risks

After a nuclear power plant accident, radiation levels in the area of the nuclear plant can be thousands of times higher than they were before. Very high exposures cause acute radiation syndrome. Symptoms can range "from not feeling right to seizures and even loss of consciousness and death," says Dr. David Weinstock at Boston's Dana-Farber Cancer Institute.



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In addition to making people sick right away, too much radiation can damage cells and raise a person's risk of developing cancer later in life. In 1986, a nuclear power plant exploded in Chernobyl, Ukraine. Years later, thyroid cancer rates rose among young adults nearby. (The thyroid gland helps control the body's energy levels and other functions.) The young people had grown up drinking milk from cows that ate contaminated grass.

Authorities have been checking radiation levels in various foods and water to prevent similar problems in Japan. The U.S. Food and Drug Administration (FDA) also has monitored foods coming from Japan to the United States. While scientists found slightly higher radiation on the West Coast after the Fukushima accident, amounts were way below danger levels. "The Fukushima event really poses no risk to people in the United States," says Weinstock.

Could a Nuclear Power Plant Accident Happen in the United States?

The United States hasn't had a major nuclear emergency since an accident closed Pennsylvania's Three Mile Island power plant in 1979. Will an accident happen in the U.S. again? "Nobody can answer that question," says physicist Kelly Classic, a spokesperson for the Health Physics Society. But, she says, companies and communities are prepared. Power companies have regular safety drills for plants and nearby communities. People living nearby have access to emergency medicines such as potassium iodide in case of an accident. (That medicine temporarily blocks radioactive iodine from entering, and possibly harming, the thyroid gland.) Hospitals and emergency responders conduct regular drills on handling emergencies too.

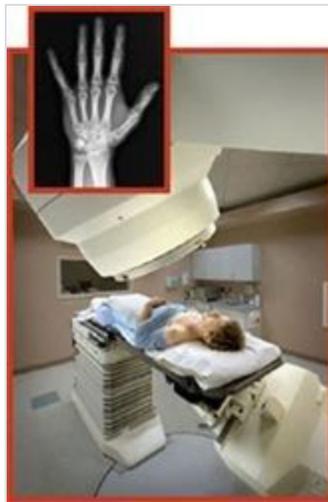
Radon and Indoor Air

A radioactive gas called radon exists in soil all over Earth. It forms when naturally occurring radioactive materials such as uranium or radium break down. Radon can seep into basements and floors, and the buildup of the gas inside a home or building can make people sick. For example, long-term radon exposure can cause lung cancer in people. See whether the Environmental Protection Agency recommends testing for homes in your area.

On the Plus Side

Radiation can help our health too. A special type of radiation is used to treat some meats, fruits, and vegetables to kill bacteria that can make people sick, for instance.

Although radiation's energy can kill some of the body's healthy cells, it can also be used to kill cancerous tumors. "We are just targeting the cancer cells and protecting normal tissue surrounding the cancer," explains Komaki, who primarily researches lung cancer. According to the National Cancer Institute, a little more than half of all cancer patients receive some form of radiation therapy as part of their treatment.



Kyodo/Newscom; Ap Photo/Air Photo Service

Some forms of radiation can help doctors track down health problems in the first place. X-rays and computed tomography (CT) scans use radiation to see inside the body. Many people believe that the benefits from being able to find health problems generally outweigh any tiny risks from exposure to radiation, but some accidents have happened. As a result, the FDA wants medical scanning equipment to have even more safeguards than it does now. Either way, experts say it's a good idea to limit your exposure to radiation even when it's part of a medical test.

Always ask why any scan is necessary, especially if you think you have had that same test recently. “If there’s no justifiable reason for the extra radiation exposure, then don’t let yourself be exposed” if you can help it, says Kelly Classic, a health physicist at Minnesota’s Mayo Clinic and spokesperson for the Health Physics Society.

Scientists and health experts around the globe continue to study radiation. They hope to harness its powerful benefits to continue to help people. When it’s used intentionally to help people, radiation can be a boon to human health. “There are hundreds of thousands to millions of people who are alive today because we’ve harnessed the power of radiation,” says Weinstock.

No, Your Food Won’t Glow

Treating some types of meat and produce with radiation can prevent disease. The process, called food irradiation, uses “enough to destroy the bacteria, but not enough to destroy the quality or the nutritional content of the food,” explains food scientist Christine Bruhn at the University of California, Davis. It doesn’t make food radioactive—just as an X-ray won’t make you radioactive.

Nonetheless, critics worry about possible accidents at processing plants. Detractors also say irradiation benefits farmers more than consumers. In their view, farms should avoid overcrowding in the first place—cramped conditions crowding on factory farms, they assert, stress animals and promote the types of disease that irradiation is then used to destroy.

In any case, bacteria can still contaminate food after irradiation. What is the best way to prevent foodborne illness, whether the food has been treated with irradiation or not? Practice safe food handling at home.

Comprehension Questions

1 According to the text, what is radiation?

- A. energy given off by radioactive materials
- B. energy given off by invisible atomic particles
- C. energy given off by the things around us
- D. Energy given off by nuclear power plants

2. How does the author describe radiation in the text?

- A. as something people should avoid at all costs
- B. as something that's less harmful than its reputation suggests
- C. as something that can be both good and bad for people
- D. as something that is mostly helpful for human health and food safety

3. People who live near a nuclear power plant are at risk of harm to their health if an accident were to happen.

What evidence from the text supports this conclusion?

- A. "Nuclear reactors, such as those at the Fukushima Daiichi plant in Japan that was damaged by the 2011 earthquake and tsunami, split uranium atoms. That action releases energy."
- B. "After a nuclear power plant accident, radiation levels in the area of the nuclear plant can be thousands of times higher than they were before. Very high exposures cause acute radiation syndrome."
- C. "The U.S. Food and Drug Administration (FDA) also has monitored foods coming from Japan to the United States. While scientists found slightly higher radiation

on the West Coast after the Fukushima accident, amounts were way below danger levels."

- D. "Power companies have regular safety drills for plants and nearby communities. People living nearby have access to emergency medicines such as potassium iodide in case of an accident."

4. Which of the following conclusions about radiation is supported by the text?

- A. Radiation is more harmful than helpful.
- B. Radiation is neither harmful nor helpful.
- C. Radiation is more helpful than harmful.
- D. Radiation is both helpful and harmful.

5. What is this text mostly about?

- A. the ways that radiation can kill bacteria that may be present in foods
- B. the effects, both positive and negative, that radiation can have
- C. the fact that too much radiation can be harmful for our health, even causing cancer or death
- D. why we should be careful about and try to minimize our exposure to radiation

6 Read these sentences from the text.

You might not know exactly how to describe it, but chances are good that you know the word radiation can have two very different **connotations**. On the one hand, radiation exposure was one of the most feared consequences after an earthquake and a tsunami

damaged a nuclear reactor in Japan back in 2011. On the other hand, radiation may have helped someone you know fight a disease such as cancer.

As used in these sentences, what does the word "**connotations**" most nearly mean?

- A. possibilities
- B. meanings
- C. connections
- D. consequences

7. Choose the answer that best completes the sentence.

_____ high exposures to radiation can cause sickness or death, radiation can be used to help our health.

- A. Although
- B. However
- C. Before
- D. Because

8. Based on the text, what kinds of sicknesses can very high radiation exposure and long-term radiation exposure cause?

9. Based on the text, how have people harnessed the power of radiation? Use evidence from the text to support your answer.

My Summary

(Have an introduction and a conclusion)(Font 14 and Arial or Times NewRoman)